WUTC DOCKET: UE-190334
EXHIBIT: DJG-12
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BEFORE THE WASHINGTON

UTILITIES & TRANSPORTATION COMMISSION

WASHINGTON UTILIITES AND TRANSPORTATION COMMISSION,

Complainant,

v.

AVISTA CORPORATION d/b/a AVISTA UTILITIES,

Respondent.

DOCKET NOS. UE-190334 and UG-190335, UE-190222 (*Consolidated*)

DAVID J. GARRETT

ON BEHALF OF PUBLIC COUNSEL

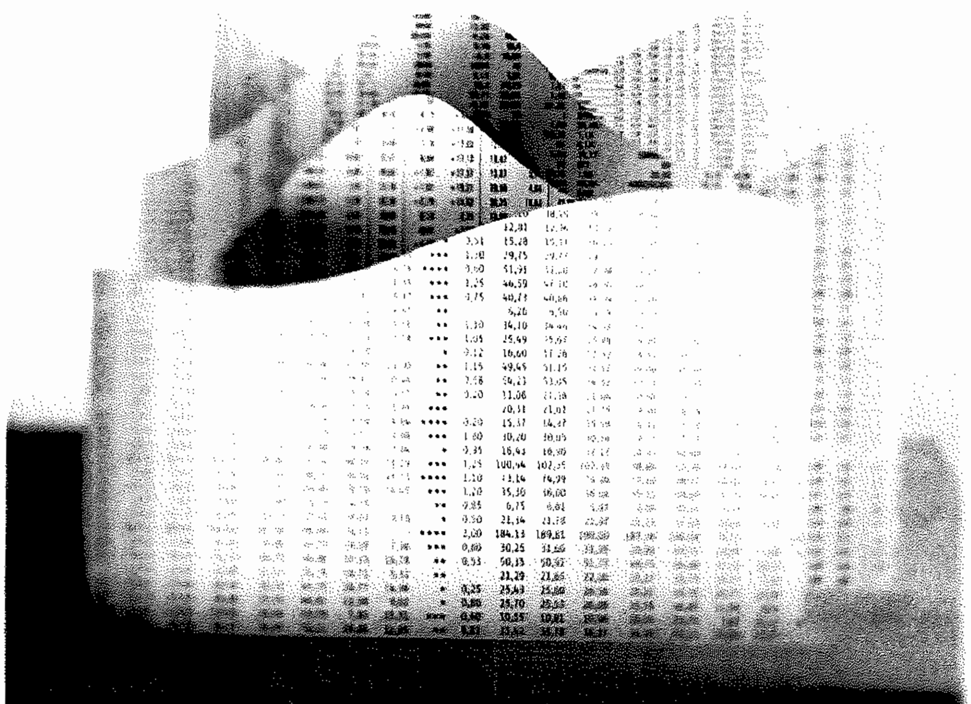
EXHIBIT DJG-12

Zvi Bodie et al.: *Essentials of Investments* (Excerpt)

October 3, 2019

BODIE | KANE | MARCUS

Essentials of Investments



Ninth Edition

6.1 DIVERSIFICATION AND PORTFOLIO RISK

Suppose you have in your risky portfolio only one stock, say, Dell Computers. What are the sources of risk affecting this "portfolio"?

We can identify two broad sources of uncertainty. The first is the risk from general economic conditions, such as business cycles, inflation, interest rates, exchange rates, and so forth. None of these macroeconomic factors can be predicted with certainty, and all affect Dell stock. Then you must add firm-specific influences, such as Dell's success in R&D, its management style and philosophy, and so on. Firm-specific factors are those that affect Dell without noticeably affecting other firms.

Now consider adding another security to the risky portfolio. If you invest half of your risky portfolio in ExxonMobil, leaving the other half in Dell, what happens to portfolio risk? Because the firm-specific influences on the two stocks differ (statistically speaking, the influences are independent), this strategy should reduce portfolio risk. For example, when oil prices fall, hurting ExxonMobil, computer prices might rise, helping Dell. The two effects are offsetting, which stabilizes portfolio return.

But why stop at only two stocks? Diversifying into many more securities continues to reduce exposure to firm-specific factors, so portfolio volatility should continue to fall. Ultimately, however, there is no way to avoid all risk. To the extent that virtually all securities are affected by common (risky) macroeconomic factors, we cannot eliminate exposure to general economic risk, no matter how many stocks we hold.

Figure 6.1 illustrates these concepts. When all risk is firm-specific, as in Figure 6.1A, diversification can reduce risk to low levels. With all risk sources independent, and with investment spread across many securities, exposure to any particular source of risk is negligible. This is an application of the law of large numbers. The reduction of risk to very low levels because of independent risk sources is called the *insurance principle.*

When a common source of risk affects all firms, however, even extensive diversification cannot eliminate all risk. In Figure 6.1B, portfolio standard deviation falls as the number of securities increases, but it is not reduced to zero. The risk that remains even after diversification is called **market risk,** risk that is attributable to marketwide risk sources. Other terms are **systematic risk** or **nondiversifiable risk.** The risk that *can* be eliminated by diversification is called **unique risk, firm-specific risk, nonsystematic risk,** or **diversifiable risk.**

market risk, systematic risk, nondiversifiable risk

Risk factors common to the whole economy.

unique risk, firm-specific risk, nonsystematic risk, diversifiable risk

Risk that can be eliminated by diversification.

This analysis is borne out by empirical studies. Figure 6.2 shows the effect of portfolio diversification, using data on NYSE stocks. The figure shows the average standard deviations of equally weighted portfolios constructed by selecting stocks at random as a function of the number of stocks in the portfolio. On average, portfolio risk does fall with diversification, but

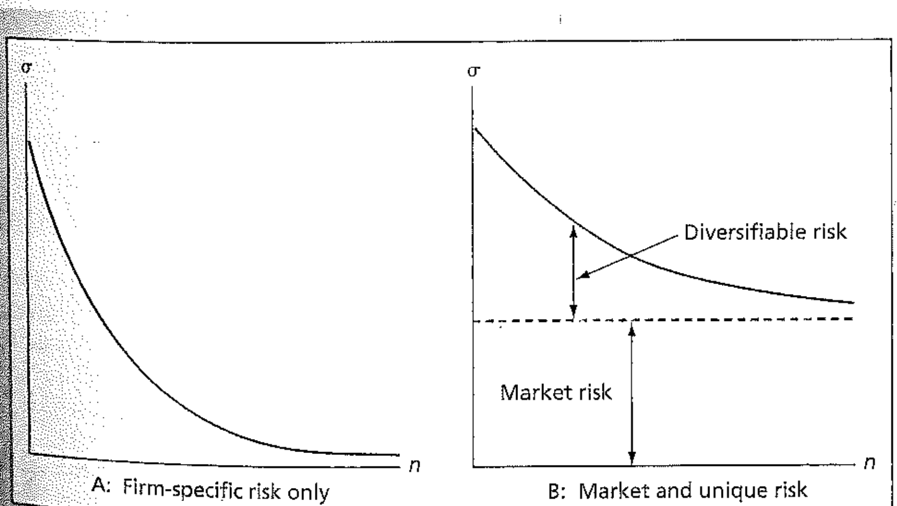


FIGURE 6.1

Portfolio risk as a function of the number of stocks in the portfolio 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

business cycles
Recurring cycles of recession and recovery.

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

trough
The transition point between recession and recovery.

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

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

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.

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.

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.

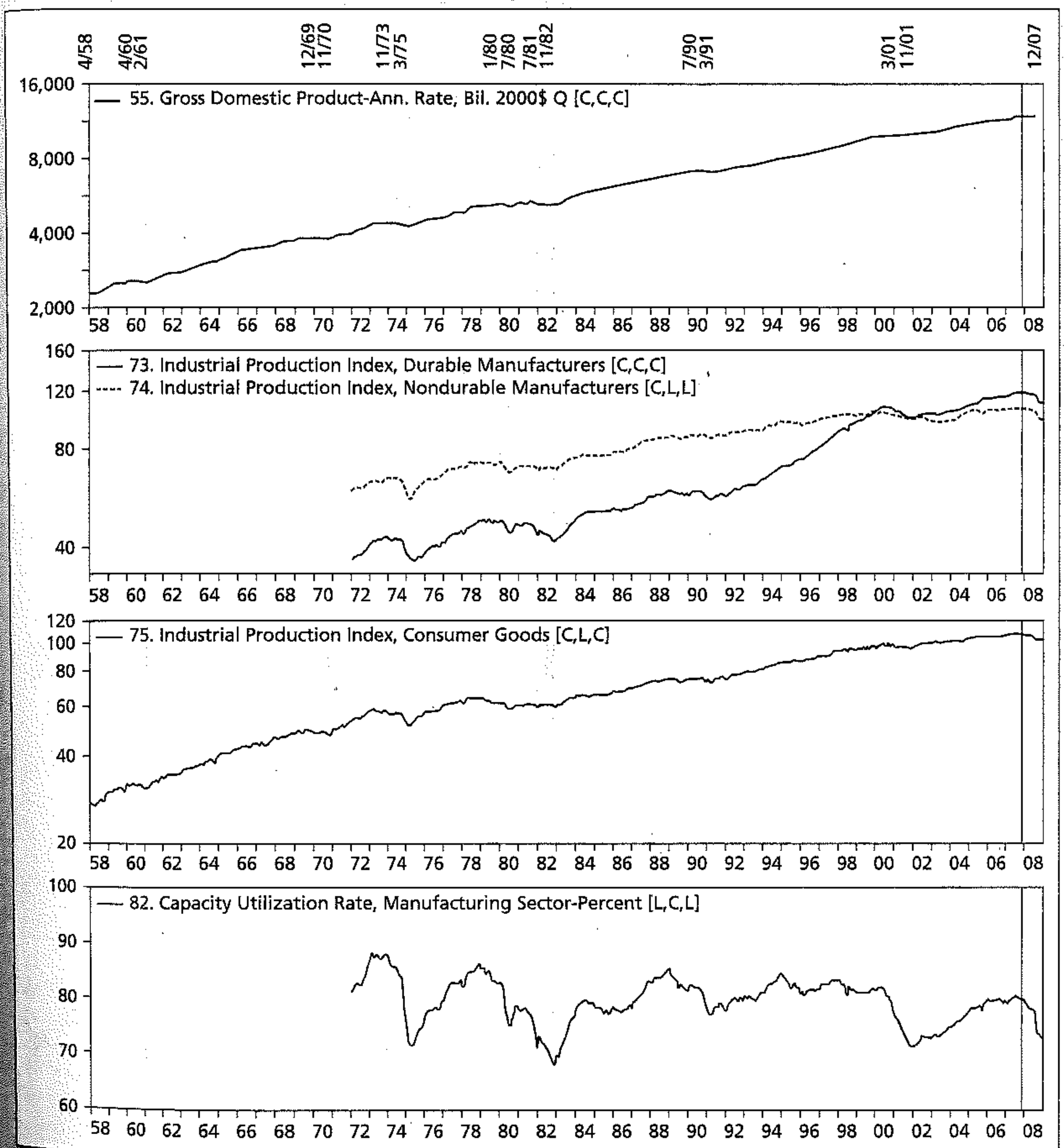
In contrast to cyclical firms, **defensive industries** have little sensitivity to the business cycle. These are industries that produce goods for which sales and profits are least sensitive to the state of the economy. Defensive industries include food producers and processors, pharmaceutical firms,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

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,

FIGURE 12.4

Cyclical indicators

Source: The Conference Board, *Business Cycle Indicators,* December 2008. Used with permission of The Conference Board, Inc.



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

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 15-fold 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 mean 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

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

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

$$V_0 = \frac{D_1}{1+k} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + \cdots \quad (13.3)$$

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. For example, if $g = .05$ and the most recently paid dividend was $D_0 = 3.81$, expected future dividends are

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

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

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

This equation can be simplified to

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

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

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 capital, dividend payout ratio, and projected 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 utilities. (We compare return on capital 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 capital measures operating income per dollar of total long-term

TABLE 13.2 Financial ratios in two industries

	Return on Capital	Payout Ratio	Growth Rate 2012–2015
Computer Software			
Adobe Systems	13.0%	0.0%	15.4%
Cognizant	19.0	0.0	21.0
Compuware	16.5	0.0	18.6
Intuit	21.0	21.0	13.3
Microsoft	31.5	30.0	10.2
Oracle	20.0	14.0	10.3
Red Hat	14.0	0.0	17.9
Parametric Tech	15.5	0.0	9.6
SAP	18.5	28.0	6.7
Median	18.5%	0.0%	13.3%
Electric Utilities			
Central Hudson G&E	6.0%	67.0%	2.6%
Central Vermont	6.0	54.0	1.9
Consolidated Edison	6.0	63.0	2.7
Duke Energy	5.5	65.0	4.4
Northeast Utilities	6.5	47.0	6.3
NStar	9.0	60.0	8.4
Pennsylvania Power (PPL Corp.)	7.0	55.0	3.6
Public Services Enter.	6.5	45.0	8.4
United Illuminating	5.0	73.0	2.2
Median	6.0%	60.0%	3.6%

Source: From *Value Line Investment Survey*, November and December 2011. Reprinted with permission of Value Line Investment Survey © 2012 Value Line, Inc. All Rights Reserved Worldwide. "Value Line" is a registered trademark of Value Line Inc.

financing, 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 capital of these firms is forecast to be 18.5%, and the firms have responded with quite high plowback ratios. Most of these firms pay no dividends at all. The high returns on capital and high plowback ratios result in rapid growth. The median growth rate of earnings per share in this group is projected at 13.3%.

In contrast, the electric utilities are more representative of mature firms. Their median return on capital is lower, 6%; dividend payout is higher, 60%; and average growth rate is lower, 3.6%. We conclude that the higher payouts of the electric utilities reflect their more limited opportunities to reinvest earnings at attractive rates of return.

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 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 of the end of 2011 is highlighted.

two-stage DDM

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

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 2012 are estimates for that year. Similarly, the entries in the far right column (labeled 14–16) are forecasts for some time between 2014 and 2016, which we will take to be 2015.

Value Line provides explicit dividend forecasts over the relative short term, with dividends rising from \$.72 in 2012 to \$1 in 2015. We can obtain dividend inputs for this initial period by using the explicit forecasts for 2012–2015 and linear interpolation for the years between:

2012	\$ .72
2013	\$ .81
2014	\$ .90
2015	\$1.00

Now let us assume the dividend growth rate will be steady beyond 2015. What is a reasonable guess for that steady-state growth rate? Value Line forecasts a dividend payout ratio of .25 and an ROE of 10%, implying long-term growth will be

$$g = \text{ROE} \times b = 10\% \times (1 - .25) = 7.5\%$$

Our estimate of Honda's intrinsic value using an investment horizon of 2015 is therefore obtained from Equation 13.2, which we restate here:

$$V_{2011} = \frac{D_{2012}}{(1+k)} + \frac{D_{2013}}{(1+k)^2} + \frac{D_{2014}}{(1+k)^3} + \frac{D_{2015} + P_{2015}}{(1+k)^4}$$

$$= \frac{.72}{(1+k)} + \frac{.81}{(1+k)^2} + \frac{.90}{(1+k)^3} + \frac{1.00 + P_{2015}}{(1+k)^4}$$

Here, P_{2015} represents the forecast price at which we can sell our shares of Honda at the end of 2015, when dividends enter their constant-growth phase. That price, according to the constant-growth DDM, should be

[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.