Dividend Payout Ratio

The dividend payout ratio is the percentage of a company's earnings paid out as dividends. This ratio expresses how well earnings support the dividend payout. A high dividend payout ratio, relative to other companies, may indicate a relatively mature company with a low growth rate. Low payout ratios may suggest high growth, or simply low earnings. The ratio is calculated as:

$$\text{dividend payout ratio} = \frac{\text{yearly dividend per share}}{\text{earnings per share}}$$

Alternatively, you can derive the ratio by dividing total dividends paid by net income.

Compound Annual Growth Rate

The compound annual growth rate (CAGR) of an investment is the year-over-year growth rate of the investment if it is assumed that it grew at a steady rate over a particular period. Although the actual rate of return over whatever period of time you are examining may have been quite different from year to year, CAGR smooths it out to provide an average compound growth rate per year. CAGR can be used to measure (or compare) the return provided by a security, by an entire company, or by a division or business line.

The CAGR calculation is more complex than most of the metrics we've been examining. It is derived as follows:

$$\text{CAGR} = \left(\frac{\text{value at end of period}}{\text{value at beginning of period}} \right)^{\left(\frac{1}{\text{number of years}} \right)} - 1$$

> **Example:** Jane N. Vestor buys a share of stock for $300. Exactly four years later, its market value is $520. To calculate the compound annual growth rate, we divide the ending value (520) by the starting value (300) and get 1.733. We then take 1.733 to the $\frac{1}{4}$ power ($1.733^{.25}$) and get 1.147. We subtract 1, and arrive at 0.147. The CAGR for Jane's stock is 14.7%. Not bad!

On the exam, you will not have a calculator with an exponent function on it. While it is important to know the formula for CAGR and understand how it works, you will not be able to use this formula to calculate CAGR because you will not have a calculator that is capable of performing the calculation.

Cost of Capital/Weighted Average Cost of Capital

Cost of Capital

A company's **cost of capital** is the opportunity cost of all funds—debt and equity—invested

in the business. In other words, the cost of capital is the expected rate of return the business could have earned if it invested its funds in a different investment with similar risk. The cost of capital concept recognizes that resources are scarce and that by using money for one purpose you give up the opportunity to use it for a different purpose.

Businesses use cost of capital for many purposes, such as to determine whether or not to make a specific investment, pursue a particular project, or acquire a company. For example, if the expected return from a proposed acquisition is less than the cost of capital to make the acquisition, it is probably not a good deal for shareholders. The calculation of cost of capital requires making a number of assumptions, but typically involves (1) calculating the cost of debt, taking into account interest rates, tax rates, and the deductibility of interest, and (2) calculating the cost of equity, which is somewhat more speculative and complicated and usually involves the calculation of an appropriate capital asset pricing model (CAPM).

Weighted Average Cost of Capital

To account for a company's specific capital structure, the cost of capital is converted into the **weighted average cost of capital** (WACC). The WACC is weighted based on the percentage of debt versus equity in the capital structure:

$$\text{WACC} = (\text{cost of debt} \times (1 - \text{marginal tax rate}) \times \% \text{ of debt}) + (\text{cost of equity} \times \% \text{ of equity})$$

This weighting approach more accurately reflects the composite cost of capital for the company.

Cost of Equity for WACC Calculation: Capital Asset Pricing Model (CAPM)

You might wonder how to determine a company's cost of equity for purposes of calculating WACC. Typically, an investment banker will look to a formula called the **capital asset pricing model**, or CAPM. The calculation for cost of equity using CAPM is:

$$\text{cost of equity} = \text{risk-free rate of return} + (\text{beta} \times \text{market risk premium})$$

The **risk-free rate of return** is the expected rate of return of investing in U.S. Treasuries or other so-called risk-free investments. **Beta**, as we will discuss shortly, is a measure of a stock's volatility relative to the overall market. The **market risk premium** is the difference between the risk-free rate of return and the expected market return. An example of CAPM is in order.

⊞ **Example:** Assume the risk-free rate of return is 1% and that the company's equity has a beta of 1.1 (i.e., somewhat more volatile than the market as a whole). The expected market rate of return is 8%. In this example, the market risk premium is 7% (the difference between the market return and the risk-free rate of return). The market risk premium is multiplied by the beta (7 x 1.1), giving a result of 7.7. We then add this to the risk-free rate of return (1%), for a total cost of equity of 8.7%.

Let's use these two acronyms—WACC and CAPM—together in an example.

Example Question: The capital structure of Very Hypothetical Inc. is 70% debt, 30% equity. VHI's pre-tax cost of debt is 10%. VHI's marginal tax rate is 40%. Very Hypothetical's stock has a beta of 1.2. The expected market rate of return is 9%, and the risk-free rate of return is 1.3%. What is Very Hypothetical's weighted average cost of capital?

Answer: Approximately 7.4%

Explanation: The weighted average cost of capital (WACC) = (cost of debt x (1 – tax rate) x % of debt) + (cost of equity x percentage of equity). The question provides the cost of debt, but not the cost of equity. To calculate the cost of equity, we will use the capital asset pricing model (CAPM).

Under CAPM, cost of equity = risk-free rate of return + (beta x market risk premium). The market risk premium is 7.7%, the difference between the expected market rate of return (9%) and the risk-free rate of return (1.3%). We multiply this number by the beta (1.2) and get 9.24%. We add the risk-free rate of return (1.3%), and get a cost of equity of 10.54%.

Now we can plug the cost of equity figure, and the figures originally provided, into the WACC equation: (0.10 x 0.60 x 70) + (0.1054 x 30). The result is 4.2 + 3.162, or a total WACC of roughly 7.4%.

Economic Profit

A company's cost of capital is also critical to the concept of **economic profit.** From an accounting perspective, profit is simply income minus expenses. Economic profit, however, takes into account the opportunity cost of capital—the opportunities that are foregone by pursuing a particular course over another course—in calculating profit. A company's economic profit is its net profit *minus* its opportunity cost of capital, as represented by what it could have earned in an alternative investment.

> **Example:** Consider a company that has acquired a new line of business (Business A). It had also considered buying Business B, which had a similar risk profile, but decided against it. At the end of the year, Business A's accounting profit is $17 million. That same year, Business B's accounting profit was $12 million. Business A's economic profit is $5 million. This figure takes into account the opportunity cost of not investing in Business B. If Business B had actually generated a larger accounting profit than Business A, Business A would have suffered an economic loss, even though it was "profitable" in a traditional accounting sense.

NET PRESENT VALUE, INTERNAL RATE OF RETURN, AND DISCOUNTED CASH FLOW

Net Present Value

Present value is the value today of a future sum of money or stream of payments. Present value is calculated by taking the future amount and applying a given discount rate, which

usually represents an expected or required rate of return. This process is referred to as "discounting to present value." To calculate present value, use the following equation:

$$\text{present value for year } z = \frac{\text{future value}}{(1 + \text{discount rate})^z}$$

For example, to find the present value of $100 to be paid in five years at a 5% discount rate, we would calculate $(100 / (1.05)^5 = \$78.35$.

Net present value (NPV) is a method of evaluating proposed investments, projects, or capital expenditures. NPV represents the net sum of the present values of all future cash flows, minus the purchase price or investment amount, over some time horizon.

$$\text{NPV} = \sum_{t-1}^{T} \frac{C_t}{(1+r)^t} - C_0$$

Where:
C_t = net cash inflow during the period t
C_0 = total initial investment costs
r = discount rate
t = number of time periods
$\sum$ = the sum of

For example, the projected cash flows for a three-year forecasted period are, respectively, $10 million, $12 million, and $14 million. The discount rate for the period is 5%, and the original investment amount is $27 million. The NPV would be calculated as follows:

$$\frac{\$10 \text{ million}}{(1 + 0.05)^1} + \frac{\$12 \text{ million}}{(1 + 0.05)^2} + \frac{\$14 \text{ million}}{(1 + 0.05)^3} - \$27 \text{ million} = \$5.5 \text{ million}$$

For an investment that is a perpetuity, meaning a situation in which annual net cash flow and the discount rate hold constant for an infinite amount of time, a different formula is used to calculate net present value:

$$\text{NPV for a perpetuity} = \frac{\text{annual net cash flow}}{\text{discount rate}} - \text{investment amount}$$

⊞ **Example:** C Group is considering a project that will require an initial investment of $45 million. That project is expected to have an annual post-tax cash flow of $4.05 million in perpetuity with a discount rate of 9%. To calculate the net present value of the project, the cash flows from the project are valued in perpetuity and the initial investment is subtracted from this value. To compute the perpetuity, divide the annual net cash flow by the annual discount rate (4.05 million / 0.09). This equals 45 million. Then subtract the initial investment from this amount (45 million – 45 million), resulting in a net present value of 0.