

## Chapter 5: Financial Planning and Analysis

This chapter can be a tough one because it touches on a number of topics that you may not encounter frequently or at all, depending on your organization or your responsibilities. There are different types of calculations included here, ranging from fairly simple calculations, such as computing a simple future value or weighted average cost of capital (WACC), to more complicated ones, such as the internal rate of return (IRR) or net present value (NPV) calculations that are virtually impossible to do without a financial calculator or spreadsheet program.

Also included in this chapter are the concept and methodology associated with cost-benefit analyses. This, too, is a likely problem source. You may not be asked to actually compute the more involved types of calculations; you may be asked to interpret answers. I'd study the IRR, NPV, and possibly the payback period this way. This chapter has the usual definitional content as well. Key points to remember include:

### Time value of money

The time value of money deals with the value of cash flows at the current point in time (present value) or the value at some later date (future value). Both values are calculated by using a constant rate to discount future flows to the present or compound flows forward to the future date.

The formula for calculating both present and future values is:

$$PV = (FV)/(1+i)^n$$

where FV is future value

i is the appropriate discount rate, and

n is the number of periods.

Many firms define i as their weighted average cost of capital or an opportunity cost of funds.

Typical problems ask you to compute the value for funds received in the future after (typically) an outlay in the present. That is, how does the accumulated value of future flows, discounted at the given rate, look? Another alternative is to ask you to calculate how much you will accumulate in the future if you invest an amount, which could be either fixed or variable), each time period until a future date.

A sample might be something like this:

How much should you invest if a project will return \$5,000 five years from now and your cost of capital is 10%?

$$PV = (\$5,000)/(1+.1)^5 = \$5,000/1.61051 = \$3,104.61.$$

Another problem might ask you:

How much will \$3,000 compound to in five years at an annual rate of 10%?

First, solve the formula for FV:

$$\begin{aligned} FV &= (PV) \times (1+i)^n = \$3,000 \times (1+.1)^5 = \\ & \$3,000 \times 1.61051 = \$4,831.53 \end{aligned}$$

Note that the factor is the same in both problems because the time period was the same.

Test yourself

Here is another question that is relatively simple. You are given the value for  $i$ , the number of periods ( $n$  in the formulas), and the future value.

- Q1. What is the present value of an investment with an interest rate of 6% that pays \$300 in three years?
- (A) \$283.02
  - (B) \$267.00
  - (C) \$251.89
  - (D) \$237.63

A1. (C)  $(\$300)/(1 + 0.06)^3 = \$251.89$ . On a four-function calculator, just divide \$300 by 1.06 three times.

Note: This problem could have asked for the future value of \$251.89. To solve for future value, multiply \$251.80 three times by 1.06. (Try just hitting the "=" sign three times.) Present value has to be less than future value unless the interest rate used is equal to zero. This is useful to remember in checking your calculations.

- Q2. What is the future value of a \$1,000 investment with an interest rate of 5.5% that pays off in three years?
- (A) \$851.61
  - (B) \$1,055.00
  - (C) \$1,174.24
  - (D) \$1,851.61

A2. (C)  $[\$1,000] \times [(1 + 0.055)^3] = \$1,174.24$

It is unlikely you'll get more than a simple problem on the test, since you are restricted to simple calculators. However, be sure to practice multiplying out to get the factors. In the heat of the test, you could lose count if you have to do several chain multiplications.

Remember one last rule: present value (PV) will always be less than future value (FV) unless the discount rate is 0. In other words, you should not get such an answer. If you do, you've made a mistake. It's also a good idea to do time value problems twice, just to be sure you did not make a silly error.

## Cost of capital

The cost of capital includes the cost of debt and the cost of equity. In this chapter and in Chapter 13, you are asked to compute the after-tax cost of debt and the weighted average cost of capital (WACC). Chapter 13 discusses the cost of equity; Chapter 5 only covers debt (which Chapter 13 repeats). The formulas to solve for cost of debt or for the WACC are fairly simple. To compute the after-tax cost of debt, you must be given the pre-tax cost of debt and the company's tax rate. The after-tax cost of debt then is: (pre-tax rate)  $\times$  (1 - tax rate). The latter expression is a general one used to calculate the after-tax cost of anything. Here, you use it for debt.

Companies compute costs of capital to use in evaluating capital expenditures. The premise for a weighted average cost of capital is that this fairly represents the proportional amount of debt and equity in the company's capital structure. Computing a weighted average cost of capital is a possible problem you might face in the exam. It is calculated by multiplying the costs of debt and equity by their respective fractional amounts. In such problems, you'll usually be given the percentages of debt and equity or their amounts, in which case you calculate the percentages for each.

The only tricky thing to remember is that you need a tax rate to reduce the cost of debt (only). You do this by multiplying the pretax debt rate by one minus the company's marginal tax rate. The cost of debt will probably be pretax, but read any problem carefully. You could be given the after-tax rate as well as a firm's effective tax rate. In such a case, the tax rate for the firm is unnecessary. The trap is using it to reduce the after-tax rate, which, of course, already has been reduced.

The following is an example of the WACC calculation:

A firm has as its target capital structure equal amounts of debt and equity. If its cost of debt is 10% and its cost of equity is 15%, what is its WACC ?  
Assume a 34% tax rate.

If it has equal amounts of debt and equity, the percentage for each is 50%.

$$\text{WACC} = (\text{after-tax debt portion}) + (\text{equity portion})$$

$$\text{WACC} = [(1-.34) \times .10 \times .50] + (.15 \times .50)$$

$$\text{WACC} = (.66 \times .10 \times .50) + (.15 \times .50)$$

$$\text{WACC} = .033 + .075 = .108 \text{ or } 10.8\%.$$

You should be able, as shown in this example, to convert fractional amounts to percentages.

Test yourself

The WACC can be tricky if the weights for debt and equity are not in numeric or percentage terms. For instance, you may be told that the company maintains twice as much equity as debt. In this case, you would use 2 for equity and 1 for debt.

Q3. What is a company's after-tax cost of debt if its pre-tax rate is 8.50% and its tax rate is 35%?

- (A) 2.975%
- (B) 5.500%
- (C) 5.695%
- (D) 8.167%

A3. (C)  $0.0850 \times (1.000 - 0.350) = 0.05695$  or 5.695%.

Remember the cost of after-tax debt is always lower than the pre-tax rate unless the company does not pay any taxes (tax rate = 0%).

Q4. A corporation has issued long-term debt at an average rate of 8.28% and its cost of equity has averaged 14.25%. Its tax rate is 36%, and it maintains three times as much equity as debt. What is its WACC?

- (A) 11.43%
- (B) 12.01%
- (C) 11.30%
- (D) 12.76%

A4. (B)  $[\.25 \times (.0828 \times .64)] + [.75 \times .1425] = 12.01\%$

Q5. What is a firm's weighted average cost of capital if its marginal tax rate is 35%, its average cost of equity is 16%, its average cost of debt is 12%, and it carries one-half the amount of debt as equity?

- (A) 14.00%
- (B) 14.67%
- (C) 13.27%
- (D) 11.90%

A5. (C)  $\{[1 \times (1 - .35) \times .12] + [2 \times (.16)]/3\} = (.078 + .32)/3 = 13.27\%$

Note that weight of debt is one-half that of equity. This is another way of saying a 1:2 ratio.

## Cost behavior

Dealing with costs is one of the skills a treasury manager should have or be expected to develop. Being able to differentiate among the three types of costs is important:

- ◆ **Fixed costs:** These are flat fees or charges that must be paid regardless of any activity. They also do not change with levels of activity (as the other two types do), unless some level of operating capacity is surpassed. This is more applicable to general operations, where plant or warehouse capacities are generally regarded as fixed charges until full capacity is insufficient. With financial charges, such as those that appear on monthly bank account analysis statements, charges like account maintenance and other flat fees are not likely to change unless treasury managers negotiate volume discounts for situations where many accounts or uses of the same service are expected.
- ◆ **Variable costs:** As the name suggests, these charges accumulate as volume occurs (and grows). For heavy volume situations, variable costs can be significant. With financial costs, there is almost always some level of variable costs associated with bank service charges, etc.
- ◆ **Semi-variable charges:** This term is used to describe the typical mixture of fixed and variable costs associated with financial costs, such as bank service charges. You'll need to be able to split out the fixed and variable types from semi-variable costs to solve a break-even type problem (see below in cost-benefit analysis).

The amount of fixed costs in the overall cost structure determine the operating leverage; i.e., the higher the fixed cost, the higher the operating leverage. This means that you have to generate more revenue to cover the fixed costs than you do when costs are mostly variable. For this reason,