UNIT 3: VALUATION

AIMS AND OBJECTIVES

The main purpose of studying this unit is to achieve the following objectives:

- to appreciate one of the main applications of the concept of the time value of money,
- to differentiate among a bond, a preferred stock, and a common stock,
- to identify the basic inputs in valuation of an asset,
- to understand the techniques of computing the value of a bond, a preferred stock, and a common stock,
- to be able to interpret the values of financial assets,
- to understand how to determine the expected rate of return from investments in bonds, preferred and common stocks.

6.1 INTRODUCTION

As you have seen in the previous accounting courses, the value of an asset is determined based on its cost (historical cost). That means all the necessary expenditures incurred from the time the asset is acquired until it is placed in operation will be the cost of the asset. However, in financial management, the value of an asset is quite different.

Since finance is interested more on decision making rather than recording, the value of an asset is determined before it is purchased. The purpose is to decide whether to acquire or not to acquire the asset. Therefore, here the historical cost cannot be used as the value of the asset. Rather, the value of the asset is determined by valuation.

Valuation is the process of determining the worth of any asset whose value is obtained from future cash flows. Look, the value here is not historical cost. The value of any asset in finance is the present value of all future cash flows it is expected to provide over the relevant time period. This value is called intrinsic value. In the remainder of this unit, we shall emphasize the intrinsic value of an asset.

The intrinsic value of an asset is determined based on three basic inputs: cash flows (returns), time pattern of the returns, and the discount rate. The value of an asset is, therefore, determined

by discounting the expected cash flows to their present value. To determine the present value, we use a discount rate appropriate based on the asset's risk.

Value can be determined for any kind of asset like buildings, machineries, factories, bonds, stocks etc. But in this unit, we will discuss the value of three financial assets: bonds, preferred, and common stocks.

6.2 BOND VALUATION

Bond is a long-term debt instrument or security issued by businesses and governmental units to raise large sums of money. Investment in a bond provides two types of cash flows. One is the periodic interest payment by the issuing party. Another is the price paid to the investor upon maturity. The first, i.e., the interest payment is based on the par value of the bond and the coupon interest rate. The par value is the face value of the bond which will be paid to the investor upon maturity. Par value is also called maturity value. For instance if the par value of a bond is Br. 1,000, the issuer should pay the investor Br. 1,000 when the maturity date of the bond arrives. The coupon interest rate is the rate which the issuer pays to the investor on the par value of the bond. If A Company invests in a Br. 1,000 par value, 10-year, 8% coupon bonds of B Company, A shall receive Br. 80 (Br. 1,000 x 8%) per year for 10 years.

6.2.1 Basic Bond Valuation Model

The value of a bond is the present value of the periodic interest payments plus the present value of the par value. The value of a bond can be computed using the following equitation:

$$B_o = I(PVIFA\ k_d,n) + M(PVIF\ k_d,n)$$

where:

B_o = the value of the bond

I = interest paid each period = Par Value x Coupon interest rate

K_d = the appropriate interest rate on the bond

n = The number of periods before the bond matures

M = the par value of the bond

(PVIF k_d,n) = The present value interest factor for an annuity at interest rate of kd per period for n periods = $\dfrac{1-\dfrac{1}{(1+k_d)^n}}{k_d}$

($PVIF_{kd}$,n) = The present value interest factor at interest rate of kd per period for n periods = $\dfrac{1}{(1+k_d)^n}$

Notice that we have used k_d instead of i. This is because, generally, in financial management **k** designates rate of return and the subscript **d** denotes debt security. So k_d designates the rate of return on a debt security.

Illustration: Tebaber Berta Corporation has a Br. 1,000 par value bond with an 8% coupon interest rate outstanding. Interest is paid semiannually and the bond has 12 years remaining to its maturity date.

Required: What is the value of the bond if the required return on the bond is 8%?

Solution:

Given: M = Br. 1,000; k_d = 8% per year or 4% (8%÷2) per semiannual period; I = Br. 40 (Br. 1,000 x 4%); n = 24 semiannual periods (12 x 2); Bo =?

Bo = I(PVIFA k_d,n) + M(PVIF k_d,n)

= Br. 40($PVIFA_{4}$%, 24) + Br. 1,000($PVIF_{4}$%, 24)

= Br. 40 (15.2470) + Br. 1,000 (0.3901)

= Br. 1,000

If the appropriate discount rate (k_d) remains constant at 8% (4% per semiannual period), the value of the bond will not be changed. It will remain Br. 1,000. Suppose the appropriate discount rate is 8% 2 years from now, what would be the value of the bond?

Solution: now n is reduced to 20[24-(2 x 2)]

Bo = Br.40 (PVIFA4%, 20) + Br. 1,000 (PVIF4%, 20)

= Br. 40 (13.5903) + Br. 1,000 (0.4564)

= Br. 1,000

Suppose the interest rate in the economy when Tebaber Berta's bonds were issued was 6% rather than 8%, what would be the value of the bond? Since Tebaber Berta's bond now will be paying more interest than do other bonds in the market, the company's bond will be selling at a larger price. Such bonds which are selling more than their par value are called premium bonds. Here, k_d is 6% (3% per semiannual payment), but other things are not changed. So

Bo = Br. 40 (PVIFA3%, 24) + Br. 1,000 (PVIF 3%, 24)

= Br. 40 (16.9355) + Br. 1,000 (0.4919)

= Br. 1,169.32

So when the market interest rate (k_d) is less than the coupon interest rate, the value of a bond is always larger than the par value. An investor by deciding to invest his money on Tebaber Berta's bond, he will receive a 1% (4% - 3%) more interest payment than he would receive if he invested somewhere else. This allows the investor to receive Br. 10 [Br. 1,000 x (4% - 3%)] more every semiannual period. As a result, the investor would be willing to give more price to the bond. The additional price is the present value of each Br. 10 he is going to receive for the next 24 semiannual periods. Therefore, the value of a premium bond can also be computed as:

Bo = Br. 1,000 + Br. 10 (PVIFA3%, 24)

= Br. 1,000 + Br. (16.9355)

= Br. 1,169.36*

* The previous value was Br. 1,169.32. The difference is due to rounding problem.

Assuming the interest rate remains constant at 6% for the next 11 years (12 periods), what would happen to Tebaber Berta's bond?

Bo = Br. 40 (PVIFA3%, 22) + Br. 1,000 (PVIF3%, 22)

= Br. 1,159.38

Thus, the value of the bond would fall form Br. 1,169.32 to Br. 1,159.38. If you calculate the value of the bond at other future dates, the price would continue to fall as the maturity date approaches.

Had the interest rate (k_d) was 10% when Tebaber Berta's bond was selling, the value of the bond would be:

Bo = Br. 40 (PVIFA5%, 24) + Br. 1,000 (PVIF5%, 24)

= Br. 40 (13.7986) + Br. 1,000 (0.3101)

= Br. 862.04. Since Tebaber Berta's bond now will be paying less interest than do other bonds in the market, they are selling at a smaller price (discount bond).

If the interest rate remain constant at 10% for the next 11 years (22 periods), the value of Tebaber Berta's bond would be Br. 868.32. Thus, the value of the bond will have risen from Br. 862.04 to Br. 868.32. If you further calculate the value of the bond at other future dates, the price would continue to rise as the maturity date approaches.

Check Your Progress –1

1. When is a bond selling at premium, at par value, and at discount?

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2. Amha Corporation issued a new series of bonds on January 1, 1985. The bonds were sold at their par of Br. 1,000, have 12% coupon, and mature in 20 years. Coupon payments are made quarterly. What was the price of the bond on December 31, 1989, assuming that the level of interest rate had fallen to 8%?

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6.2.2 Interest Rate on a Bond

So far we have been seeing how to determine the value of a bond if we are given the par value, the coupon interest rate, the number of periods, and the interest rate on the bond. Next, we shall discuss on how to find the interest rate on a bond, i.e., k_d if we are given the value of the bond. We will consider yield to maturity and yield to call.

Yield to Maturity (YTM) is the rate of return investors earn if they buy a bond at a specific price Bo and hold it until maturity. The approximate YTM can be found using the following approximation formula:

$$\text{Approximate YTM} = \frac{I + \frac{M - Bo}{n}}{\frac{M + Bo}{2}}$$

Example: Zebra Company has a Br. 1,000 par value, 10% coupon interest rate, and 15 years to maturity. The bond is currently selling at Br. 1,090. Compute the YTM.

Solution:

Given: M = Br. 1,000; I = Br. 100 (Br. 1,000 x 10%); n = 15; Bo = Br. 1,090; YTM = ?

$$\text{Approximate YTM} = \frac{Br.100 + \frac{Br.1,000090}{15}}{\frac{Br.1,000 + Br.1,090}{2}} = 9\%$$

If an investor buys Zebra's bond at Br. 1,090 and holds it for 15 years, the approximate yield or rate of return per year is 9%.

Yield to call (YTC) is the rate of return earned by an investor if he buys a bond at a specified price, Bo, and the bond is called before its maturity date. YTC, therefore, is computed only for callable bonds. A callable bond is a bond which is called and retired prior to its maturity date at the option of the issuer. A bond is called by an issuer when the market interest rate falls below the coupon interest rate. The YTC can be found by solving the following equation.

$$\text{Approximate YTC} = \frac{I + \frac{Call\ Price - Bo}{n}}{\frac{Call\ Price + Bo}{2}}$$

Example: X Company is intending to purchase Y Company's outstanding bond which was issued on January 1, 1997. Y bond is a Br. 1,000 par value, has a 10% annual coupon, and a 30 year original maturity. There is a 5-year call protection, after which time the bond can be called at 108. X company is to acquire the bond on January 1, 1999 when it is selling at Br. 1,175.

Required: Determine the yield to call in 1999 for Y company bond.

Solution:

Given: I = Br. 100 (Br. 1,000 x 10%); Bo = Br. 1,175; call price = Br. 1,080 (Br. 1,000 x 108%);

n = 3 (call protection – 2 years elapsed since the bond was issued); YTC =?

$$\text{Approximate YTC} = \frac{Br.100 + \frac{Br.1,080 - Br.1,175}{3}}{\frac{Br.1,080 + Br.1,175}{2}} = 6.06\%$$

If X Company buys Y Company bond and holds the bond until the bonds are called by Y Company, the approximate annual rate of return would be 6.06%.

Check Your Progress –2

1. The Salem Company bond currently sells for Br. 955, has a 12% coupon interest rate and Br. 1,000 par value, pays interest annually, and has 15 years to maturity. Calculate the yield to maturity on this bond.

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2. Allied Company has just issued 10,000 bonds of Br. 1,000 par value each. The bonds have original maturity of 50 years and an annual coupon rate of 15%. There is a 10 year call provision on the bonds. 3 years after the bonds had been issued, they were selling at Br. 1,300 each. The call price for each bond is 109 ¾. Calculate the yield to call on Allied bonds.

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6.3 PREFERRED STOCK VALUATION

Preferred stock is a type of equity security that provides its owners with limited or fixed claims on a corporation's income and assets. Investment in a preferred stock provides a single cash flow, i.e., constant periodic dividend payments. Preferred stock has similarities to both a bond and a commn stock. As to similarities to a bond, preferred dividends are fixed in amount and are like interest payments. As to a common stock, the preferred dividends are paid for an indefinite time period.

6.3.1 Preferred Stock Valuation Model

The value of a preferred stock is the present value of all future preferred dividends it is expected to provide over an infinite time horizon. Most preferred stocks entitle their owners to regular and fixed dividend payments. If the payments last forever, the issue is a perpetuity. Therefore, the value of a preferred stock is found by the following formula:

$$VPS = \frac{Dps}{Kps}$$

Where:

Vps = Value of the preferred stock

Dps = Preferred stock dividends

Kps = The required rate of return on the preferred stock

Example: Abebe wishes to estimate the value of its outstanding preferred stock. The preferred issue has a Br. 80 par value and pays an annual dividend of Br. 6.40 per share. Similar-risk preferred stocks are currently earning a 9.3% annual rate of return. What is the value of the outstanding preferred stock?

Solution:

Given: Dps = Br. 6.40; Kps = 9.3%; Vps =?

$$Vps = \frac{Br.6.40}{9.3\%} = Br.\ 68.82$$

So the Br. 6.40 annual dividend an investor receives for an infinite years is equal to today's Br. 68.82 if the required rate of return is 9.3%.

6.3.2 Rate of Return on a Preferred Stock

To evaluate the worthiness of investment in a preferred stock in comparison to other investment opportunities, we should be able to compute the rate of return on a preferred stock. If we know the current price of a preferred stock and its dividend, we can compute the expected rate of return on the preferred stock. This can be done using the following formula:

$$Kps = \frac{Dps}{Vps}$$

Where

Kps = The expected rate of return on the preferred stock

Dps = Preferred stock dividends

Vps = Value or current price of the preferred stock

Example: A preferred stock pays an annual dividend of Br. 9 and the current market price is Br. 81. Compute the required rate of return from the preferred stock.

Solution:

Given: Dps = Br. 9; Vps = Br. 81; Kps =?

$$\text{Kps} = \frac{Br.9}{Br.81} = 11.11\%$$

For an investor to invest Br. 81 in this preferred stock and to receive an annual dividend of Br. 9, his minimum required rate of return is 11.11%.

6.4 COMMON STOCK VALUATION

The value of a share of common stock is the present value of the common stock's dividend expected over an infinite time horizon. The value of a share of common stock is also equal to the sum of the present value of the expected dividends and the present value of the expected selling price of the stock. The selling price in turn will depend on the dividends to be received by the purchasing party.

To understand the value of a common stock we should keep in mind two points. First, the dividends are expected for an infinite time period. Second, the dividends are not constant. Therefore, the value of a common stock is found by summing the present values of annual dividends.

$$\text{Po} = \frac{D_1}{(1+ks)^1} + \frac{D_2}{(1+ks)^2} + \cdots + \frac{D_\infty}{(1+ks)^\infty}$$

Where:

Po = Value of the common stock at time zero (as of today)

$D_1, D_2, \ldots, D_\infty$ = Pre share dividend expected at the end of each year

Ks = the required rate of return on the common stock.

The common stock valuation equation can be simplified by redefining each year's dividend. The dividends are defined in terms of anticipated dividends growth. Generally, there are three cases accordingly. These are:

1. Zero growth common stock,
2. Constant growth common stock, and
3. Variable growth common stock.

Hence, common stock valuation approaches are developed under each of the above dividend growth models. Next sections will discus each model one by one.

6.4.1 Zero Growth Stock

A zero growth stock is a common stock whose future dividends are not expected to grow at all. The expected growth rate (g) is zero. This is the simplest model to common stock valuation. It assumes a constant, non-growing annual dividend. So here the annual dividends are all equal. That is $D_1 = D_2 = \ldots = D_\infty = D$.

A common stock with zero growth rate is a security that is expected to provide a fixed dividend each year. Hence, a zero growth common stock is a perpetuity. Therefore, the value of a zero growth stock is given as:

$$Po = \frac{D}{Ks}$$

Example: The most recent common stock dividend of Shalom Manufacturing Corporation was Br. 3.60 per share. Due to the firm's maturity as well as stable sales and earnings, the dividends are expected to remain at the current level of the foreseeable future.

Required: Determine the value of Shalom's common stock for an investor whose required return is 12%.

Solution:

Given: D = Br. 3.60; Ks = 12%; Po =?

$$Po = \frac{Br.3.60}{12\%} = \text{Br. } 30$$

The maximum price the investor would be willing to pay for a share of Shalom's common stock is Br. 30 for he to receive a Br. 3.60 annual dividend for an indefinite years.

6.4.2 Constant Growth Stock

Constant growth stock is a common stock whose future dividends are expected to grow at a constant dividend growth rate (g). It is sometimes called normal growth stock. The constant (normal) growth common stock valuation model is the most widely cited approach to common stock valuation.

The value of a constant growth stock is the present value of the expected future dividends growing at a constant rate of g. Here the value can be found by using the following formula:

$$Po = \frac{D_1}{Ks - g} \quad ; Ks > g$$

Where:

D_1 = The expected dividend at the end of year 1.

g = The expected growth rate in dividends.

$D_1 = Do(1+g)$, where Do is the most recent dividend. Similarly D2 = D1 (1+g) and so on. To find the value of a common stock (constant growth) at one year, first, find the expected dividend at the end of next year.

Example: Zeila Motor Corporation's common stock currently pays an annual dividend of Br. 5.40 per share. The dividends are expected to grow at a constant annual rate of 5% to infinity. Estimate the value of Zeila's common stock if the required return is 12%.

Solution:

Given: Do = Br. 5.40; g = 5%; Ks = 12%; Po =?

$$Po = \frac{D_1}{Ks - g} \quad ; D_1 = Do\,(1+g_0) = Br.\ 5.40\ (1.05) = Br.\ 5.67$$

$$= \frac{Br.5.67}{12\% - 5\%} = Br.\ 81$$

For an investor to receive an annual dividend of Br. 5.40 growing at 5% constantly to infinity, the maximum price he would pay today is Br. 81.

If we are given the value of a constant growth stock, the most recent dividend, the expected dividend growth rate, we can compute the expected rate of return as follows.

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

Where:

Ks = The expected rate of return on a constant growth stock

D_1/P_0 = Expected dividend yield.

g = Expected dividend growth rate = capital gains yield.

Example: Assume the above example except that you are given the value of common stock of Br. 81 instead of the required return. Compute the expected rate of return?

$$Ks = \frac{Br.5.40(1.05)}{Br.81} + 0.05$$

$$= 12\%$$

6.4.3 Variable Growth Stock

Variable growth stock is a stock whose dividends are expected to grow at variable or non-constant rates. The model of common stock valuation that allows for a change in the dividend growth rate is called Variable (non constant) Growth Model. It sometimes is also called supernormal growth model.

The value of a share of variable growth stock is determined by following 4 procedures.

1. Find the value of the dividends at the end of each year during the initial growth period.
2. Find the present values of the dividends found in step 1.
3. Find the value of the stock at the end of the initial growth period
4. Add the present value of the dividends found in step 2 and the present value of the value of the stock found in step 3 to determine the value of the stock at time zero, i.e. po.

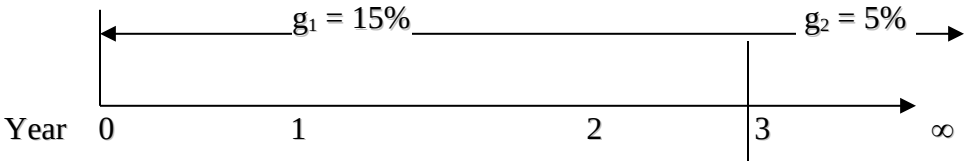
Example: Addis Company's most recent annual dividend, which was paid yesterday, was Br. 1.75 per share. The dividends are expected to experience a 15% annual growth rate for the next 3 years. By the end of 3 years growth rate will slow to 5% per year to infinity.

Stockholders require a return of 12% on Addis' stock

Required: Calculate the value of the stock today.

Solution:

Given: Do = Br. 1.75; g_1 = 15% for 3 years; g_2 = 5% from year 3 to infinity; k_5 = 12%; p_0 = ?



D_0 = Br. 1.75 D_1 = Br. 2.01 D_2 = Br. 2.31 D_3 = Br. 2.66

PV of D_1 = Br. 1.79 PVIF 12%, 1

PV of D_2 = 1.84 PVIF 12%, 2

PV of D_3 = 1.89 PVIF 12%, 3

PV of P_3 = 28.40 PVIF 12%, 3 P_3 = Br. 39.90

P_0 = Br. 33.92

$D_1 = D_0 (1 + g_1)$ = Br. 1.75 (1.15) = Br. 2.01

$D_2 = D_1 (1 + g_1)$ = Br. 2.01 (1.15) = Br. 2.31

$D_3 = D_2 (1 + g_1)$ = Br. 2.31 (1.15) = Br. 2.66

$$P_3 = \frac{D4}{k_5 - g_2} = \frac{D3\,(1+ g_2)}{k_5 - g_2} = \frac{Br.2.66\,(1.05)}{0.12 - 0.05} = Br.39.90$$

Therefore, the value of Addis Company's common stock today is Br. 33.92

UNIT 4: THE COST OF CAPITAL

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8.0 AIMS AND OBJECTIVES

After completing this unit, students should be able to understand:

- the meaning of cost of capita
- the implications of the cost of capital on the value of a firm,
- four major sources of capital to a firm and their cost,
- that the weighted average cost of capital is used in investment decisions,
- that the marginal cost of capital increases with raising of more and more capital during a given period,
- the point where the costs of debt, preferred stock, common stock, or retained earnings increases.

4.1 INTRODUCTION

As you well understand, two parties are involved in a financial asset under normal circumstances. One is the party issuing the financial asset. Another is the one that buys or invests on the financial asset. In unit 6, when we were discussing about valuation, we emphasized on the investor. That is, how much is the maximum price the investor would pay for the financial asset? To decide on this, the investor would discount the expected future cash flows. The discounting is done based on the investor's required rate of return.

The rate of return required by the investor should definitely be provide by some other party. The party which should provide the investor its required rate of return is the issuing party. For example, if the required rate of return by an investor on a given bond is 10%, the issuing company should provide this 10% to the investor. This required rate of return that should be met by the issuing company becomes its cost. This is a cost on the capital the issuing company wants to raise.

Therefore, the required rate of return on investments in financial assets by the investor is the cost of capital for the company issued the financial assets. But, generally, the cost of capital for the issuing company is higher than the required rate of return by the investor. This is because when the issuing company issues a financial asset, it must incur some costs. These costs incurred by the issuer in relation to issuance of financial assets are called flotation costs. Examples include advertising costs, commissions paid to those selling the financial assets, cost of printing documents, costs of registration with government agencies, discounts to encourage the sale of securities, and so on.

8.2 MEANING OF THE COST OF CAPITAL

The cost of capital is the minimum rate of return that a firm must earn in order to satisfy the overall rate of return required by its investors. It is also the minimum rate of return a firm must earn on its invested capital to maintain the value of the firm unchanged. The second definition considers the cost of capital as a break even rate.

If a firm's actual rate of return exceeds its cost of capital, the value of the firm would increase. If on the other hand, the cost of capital is not earned, the firm's market value will decrease. So the cost of capital is the rate of return that is just sufficient to leave the price of the firm's common stock unchanged.

The cost of capital serves as a discount rate when a firm evaluates an investment proposal. Suppose a firm is considering investment on a plant. The finance required for this investment is to be raised by selling a common stock issue. Now, after raising capital, the firm is expected to provide required rate of return to those who invest on the common stock. This in effect is the firm's cost of capital. So to decide to invest on the plant, the minimum rate of return from the investment at least should be equal to the required rate of return by the common stockholders. If the required rate of return by the firm's common stockholders is 13%, then the firm should earn a minimum of 13% on its investment on the plant. The 13% minimum rate of return that should be earned by the firm is, therefore, its cost of capital.

8.3 MEASURING THE SPECIFIC COST OF CAPITAL

The cost of capital for any particular capital source or security issue is called the specific cost of capital. It is also called individual cost of capital or component cost of capital.
Each type of capital contained the capital structure of a firm include:

1. Debt
2. Preferred stock
3. Common stock
4. Retained earnings

Two important points you should bear in mind about the specific cost of capital. One is that it is computed on an after-tax basis. Meaning, if there would be any tax implication on the individual source of capital, it should be considered. In almost all circumstances, the tax implication is only on debt sources of finance. The second point is that the specific cost of capital is expressed as an annual percentage or rate like 6%, 9%, or 10%. The cost of capital is not stated in terms of birrs.

8.3.1 The cost of debt

This is the minimum rate of return required by suppliers of debt. The relevant specific cost of debt is the after-tax cost of new debt. Generally, debt is the cheapest source of finance to a firm and, hence, the cost of debt is the lowest specific cost of capital. There are two basic explanations for this. First, debt suppliers, generally, assume the lowest risk among all suppliers of capital. They receive interest payments before preferred and common dividends are paid. Since they assume the smallest risk, their return is the lowest. Their lowest return would be the lowest cost of capital to the firm. Second, raising capital through debt sources entails interest expense. The inters expense in turn reduces the firm's income which ultimately would cause tax payment to be reduced. So raising money in the form of debt results in the smallest tax burden, and finally, the firm's cost of debt would be the lowest.

Debt sources of finance may take several forms like bonds, promissory notes, bank loans. Here, for our convenience we consider bond issue to illustrate the cost of debt.

Computing the cost of new bond issue involves three steps:

i) Determine the net proceeds from the sale of each bond

$$NPd = Pd - f$$

Where:

NPd = The net proceeds from the sale of each bond

Pd = The market price of the bond

f = Flotation costs

ii) Compute the effective before tax cost of the bond using the following approximation formula:

$$Kd = \frac{I + \frac{Pn - NPd}{n}}{\frac{Pn + NPd}{2}}$$

Where:

Kd = The effective before tax cost of debt

I = Annual interest payment

Pn = The par value of the bond

n = Length of the holding period of the bond in years.

iii) Compute the after-tax cost of debt

$$Kdt = Kd (1 - t)$$

Where:

Kdt = The after-tax cost of debt

t = The marginal tax rate

Example: Currently, Abyssinia Industrial Group is planning to sell 15-year, Br. 1,000 par-value bonds that carry a 12% annual coupon interest rate. As a result of lower current interest rates, Abyssinia bonds can be sold for Br. 1,010 each. Flotation costs of Br. 30 per bond will be incurred in the process of issuing the bonds. The firm's marginal tax rate is 40%.

Required: Calculate the after tax cost of Abyssinia's new bond issue:

Solution:

Given: Pn = Br. 1,000; I = Br. 120 (Br. 1,000 x 12%); n = 15; Pd = Br. 1,010; f = Br. 30; t = 40%; Kdt = ?

Then apply the three steps:

i) NPd = Br. 1,010 – Br. 30 = Br. 980

ii) Kd = $\dfrac{Br.120 + \dfrac{Br.1{,}000 - Br.980}{15}}{\dfrac{Br.1{,}000 + Br.980}{2}} = 12.26\%$

iii) Kdt = 12.26% (1 – 40%) = 7.36%

Therefore, the after – tax cost of Abyssinia's new bond issue is 7.36%. That is, Abyssinia should be able to earn a minimum of 7.36% to satisfy bondholders. Otherwise, the firm's value will decline.

Check your progress – 1

Ayenew Company's financing plans for next year include the sale of long-term bonds with a 10% coupon. The company believes it can sell the bonds at a price that will provide a yield to maturity of 12% to investors. If its marginal tax rate is 35%, what is Ayenew's after-tax cost of debt?

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8.3.2 The cost of preferred stock

The cost of preferred stock is the minimum rate of return a firm must earn in order to satisfy the required rate of return of the firm's preferred stock investors. It is also the minimum rate of return a firm's preferred stock investors require if they are to purchase the firm's preferred stock.

When a firm raises capital by issuing new preferred stock, it is expected to pay fixed amount of dividends to the preferred stockholders. So it is the dividend payment that is the cost of the preferred stock to the firm stated as an annual rate.

The cost of a new preferred stock issue can be computed by following two steps:

i) Determine the net proceeds from the sale of each preferred stock.

$$NPpf = Ppf - f$$

Where:

NPpf = Net proceeds from the sale of each preferred stock

Ppf = Market price of the preferred stock

f = Flotation costs

ii) Compute the cost of preferred stock issue

$$Kps = \frac{Dps}{NPpf}$$

Where:

Kps = The cost of preferred stock

DPs = The pre share annual dividend on the preferred stock

Example: Sefa Computer Systems Company has just issued preferred stock. The stock has 12% annual dividend and Br. 100 par value and was sold at 102% of the par value. In addition, flotation costs of Br. 2.50 per share must be paid. Calculate the cost of the preferred stock.

Solution:

Given: Pps = Br. 102 (Br. 100 x 102%); Dps = Br. 12 (Br 100 x 12%); f = Br. 2.50;

Kps =?

Then apply the two steps:

i) NPpf = Br. 102 – Br. 2.50 = Br. 99.50

ii) $Kps = \frac{Br.\ 12}{Br.\ 99.50} = 12.06\%$

Therefore, Sefa Company should be able to earn a minimum of 12.06% on any investment financed by the new preferred stock issue. Otherwise, the firm's value will decrease.

Check your progress II

Sattelite Share Company plans to sale preferred stock with par value of Br. 50 per share. The issue is expected to pay quarterly dividends of Br. 1.25 per share and to have flotation costs of 6% of the par value. The preferred stock sells at 95% of its par.

Required: Calculate the cost of preferred stock to Satellite Share Company.

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8.3.3 The cost of common stock

The cost of common stock is the minimum rate of return that a firm must earn for its common stockholders in order to maintain the value of the firm. A firm does not make explicit commitment to pay dividends to common stockholders. However, when common stockholders invest their money in a corporation, they expect returns in the form of dividends. Therefore, common stocks implicitly involve a return in terms of the dividends expected by investors and hence, they carry cost.

Generally, common stock dividends are paid after interest and preferred dividends are paid. As a result, common stock investors assume the maximum risk in corporate investment. They compensate the maximum risk by requiring the highest return. This highest return expected by common stockholders make common stock the most expensive source of capital.

The cost of common stock can be computed using the constant growth valuation model.

$$Ks = \frac{D_1}{NPo} + g$$

Where:

Ks = The cost of new common stock issue

D_1 = The expected dividend payment at the end of next year

NPo = Net proceeds from the sale of each common stock

g = The expected annual dividends growth rate

The net proceeds from the sale of each common stock (NPo) is computed as follows:

$$NPo = Po - f$$

Where:

Po = The current market price of the common stock

f = flotation costs

Example: An issue of common stock is sold to investors for Br. 20 per share. The issuing corporation incurs a selling expense of Br. 1 per share. The current dividend is Br. 1.50 per share and it is expected to grow at 6% annual rate. Compute the specific cost of this common stock issue.

Solution

Given: Po = Br. 20; Do = Br. 1.50; g = 6%; f = Br. 1; Ks = ?

Then apply the two steps:

i) NPo = Br. 20 – Br. 1 = Br. 19

ii) $Ks = \frac{D^1}{Npo} + g = \frac{Br.\ 1.50\ (1.06)}{Br.\ 19} = 14.37\%$

Therefore, the firm should be able to earn a minimum return of 14.37% on investments that are financed by the new common stock issue.

Check your progress III

Repentance Corporation's share of common stock is currently selling at Br. 75. The firm's projected dividend per share during the next year is Br. 3.38 and the expected dividend growth rate is 8%. Because of competitive nature of the market a Br. 3 per share under pricing is necessary. In addition, the sale of new common stock involves underwriting fee of Br. 0.60 per share and other flotation costs of Br. 0.90 per share.

Required: Calculate the cost of common stock for Repentance Corporation.

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8.3.4 The cost of Retained Earnings

Retained earnings represent profits available for common stockholders that the corporation chooses to reinvest in itself rather than payout as dividends. Retained earnings are not securities like stocks and bonds and hence do not have market price that can be used to compute costs of capital.

The cost of retained earnings is the rate of return a corporation's common stockholders expect the corporation to earn on their reinvested earnings, at least equal to the rate earned on the outstanding common stock. Therefore, the specific cost of capital of retained earnings is equated with the specific cost of common stock. However, flotation costs are not involved in the case of retained earnings.

Computing the cost of retained earnings involves just a single procedure of applying the following formula:

$$Kr = \frac{D^1}{Po} + g$$

Where:

Kr = The cost of retained earnings

D_1 = The expected dividends payment at the end of next year

Po = The current market price of the firm's common stock

g = The expected annual dividend growth rate.

Example: Zeila Auto Spare Parts Manufacturing company expects to pay a common stock dividend of Br. 2.50 per share during the next 12 months. The firm's current common stock price is Br. 50 per share and the expected dividend growth rate is 7%. A flotation cost of Br. 3 is involved to sale a share of common stock.

Required: Compute the cost of retained earnings

Solution

Given: Po = Br. 50; D_1 = Br. 2.50; g = 7%; Kr = ?

Then apply the formula:

$$Kr = \frac{D^1}{Po} + g = \frac{Br.\ 2.50}{Br.\ 50} + 7\% = 12\%$$

Check your progress IV

Zequala Textiles Share Company wishes to measure its cost of retained earnings. The firm's stock is currently selling for Br. 57.50. The firm expects to pay Br. 3.40 dividend at the end of the year. The expected dividend growth rate is 8%.

Required: Determine th cost of retained earnings.

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8.4 WEIGHTED AVERAGE COST OF CAPITAL (WACC)

In the previous section we have seen how to compute the cost of capital for each individual source of capital. The specific cost of capital is used in evaluating an investment proposal to be financed by a particular capital source. Practically, however, investment are financed by two or more sources of capital. In such a situation, we cannot make use of the individual cost of capital. Rather we should use the average cost of capital employed by the firm.

The firm's capital structure is composed of debt, preferred stock, common stock, and retained earnings. Each capital source accounts to some portion of the total finance. But the percentage contribution of one source is usually different from another. So we must compute the weighted average cost of capital rather than the simple average.

The weighted average cost of capital (WACC) is the weighted average of the individual costs of debt, preferred stock and common equity (common stock and retained earnings). It is also called the composite cost of capital.

If the weights of the component capital sources are all given, the weighted average cost of capital can be computed as:

$$WACC = WdKdt + WpsKps + WceKs$$

Where:

WACC = The weighted average cost of capital

Wd = The weight of debt

Wps = The weight of preferred stock

Wce = The weight of common equity

Kdt = The after – tax cost of debt

Kps = The cost of preferred stock

Ks = The cost of common equity

The WACC is found by weighting the cost of each specific type of capital by its proportion in the firm's capital structure. Weights of the individual capital sources can be calculated based on their book value or market value.

To illustrate the computation of the WACC, look at the following example.

Muna Tools Manufacturing Company's financial manager wants to compute the firm's weighted average cost of capital. The book and market values of the amounts as well as specific after-tax costs are shown in the following table for each source of capital.

Source of capital	Book value	Market value	Specific cost
Debt	Br. 1,050,000	Br. 1,000,000	5.3%
Preferred stock	84,000	125,000	12.0
Common equity	966,000	1,375,000	16.0
Total	Br. 2,100,000	Br. 2,500,000	

Required: Calculate the firm's weighted average cost of capital using:

1) book value weights
2) market value weights

Solution:

1) Total book value = Br. 2,100,000

Wd = Br. 1,050,000 = 0.5; Wps = Br. 84,000 = 0.04; Wce = Br. 966,000 = 0.46

Br. 2,100,000 Br. 2,100,000 Br. 2,100,000

WACC = WdKdt + WpsKps + WceKs

= 0.5 (5.3%) + 0.04 (12.0%) + 0.46 (16.0%)

= 2.65% + 0.48% + 7.36%

= 10.49%

The minimum rate of return on all projects should be 10.49%. Meaning, Muna should accept all projects so long as they earn a return greater than or equal to 10.49%

2) Total Market value = Br. 2,500,000

Wd = Br. 1,000,000 = 0.4; Wps = Br. 125,000 = 0.05; Wce = Br. 1,375,000 = 0.55
Br. 2,500,000 Br. 2,500,000 Br. 2,500,000

WACC = 0.4 (5.3%) + 0.05 (12.0%) + 0.55 (16.0%)
= 2.12% + 0.60% + 8.80%
= 11.52%

If the market value weights are used, Muna should accept all projects with a minimum rate of return of 11.52%

Check your progress V

On January 1, 2002, the total assets of Zway share company were Br. 54 million. There was no short-term debt. The firm's optimal capital structure is given below.

Long-term debt	Br. 27,000,000
Common equity	27,000,000
Total liabilities and equity	Br. 54,000,000

New bonds will have a 10% coupon rate and will be sold at Par. Common stock currently has a market price of Br. 60 and can be sold with a flotation cost of Br. 6 per share. Dividend yield is estimated to be 4% and the expected dividend growth rate is 8%

Required: Calculate:

1) the cost of debt assuming s 40% marginal corporate tax rate
2) the cost of common equity (50% common stock and 50% retained earnings)
3) the weighted average cost of capital

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8.5 MARGINAL COST OF CAPITAL (MCC)

As a firm tries to have more new capital, the cost of each birr will rise at some point. Thus, the marginal cost of capital (MCC) is the cost of obtaining additional new capital. Technically speaking, the MCC is the weighted average cost of the last birr of new capital obtained. So the concept of marginal cost of capital is discussed in the context of the weighted average cost of capital.

As a firm raises larger and larger amounts of capital, the weighted average cost of capital also rises. But the question would be at what point the firm's costs of debt, preferred stck, and common equity as well as WACC increase?

The first point, therefore, in computing the MCC is to determine the breaking points where the cost of capital will increase.

The technical aspects of the MCC can be better understood using an example.

Example: The target capital structure of Shala Corporation and other pertinent data are given below.

Long-term debt ---------- 40%; cost of preferred stock (Kps) = 12.06%
Preferred stock ----------10% cost of retained earnings (Kr) = 14%
Common equity ---------- 50% cost of common stock (Ks) = 15%

Shala Corporation has Br. 900,000 available retained earnings. But when the firm fully utilizes its retained earnings, it must use the more expensive new common stock financing to meet its equity needs. In addition, the firm expects that it can borrow up to Br. 1,200,000 of debt at 7.3% after-tax cost. Additional debt will have an after-tax cost of 9.1%.

Required

1) What is the breaking point associated with the
    a. exhausting of retained earnings?
    b. Increment of debt between Br. 0 to Br. 1,200,000?
2) Determine the ranges of total new financing where the WACC will rise
3) Calculate the WACC for each range of finance.

Solutions

1) a. Breaking point (BP) common equity = $\frac{\text{Br. 900,000}}{}$ = Br. 1,800,000

50%

b. Breaking point (BP) long-term debt = Br. 1,200,000 = Br. 3,000,000

40%

The breaking points computed above can be interpreted as:

Shala can meet its equity needs using retained earnings until its total finance need is Br. 1,800,000. But when total capital required is more than Br. 1,800,000, its equity needs should be met with common stock. Similarly, until the firm's total finance need reaches Br. 3,000,000, shala can raise any debt at 7.3% cost. Any further finance need beyond Br. 3,000,000 will cause the cost of debt to rise to 9.1%.

2) There are three ranges of finance that could be identified on the basis of the breaking points:

1st Range : Br. 0 to Br. 1,800,000,

2nd Range : Br. 1,800,000 to Br. 3,000,000, and

3rd Range : Br. 3,000,000 and above

3) WACC (1st range) = 0.40 (7.3%) + 0.10 (12.06%) + 0.50 (14%)

= 2.92% + 1.21% + 7.00%

= 11.13%

WACC (2nd range) = 0.40 (7.3%) + 0.10 (12.06%) + 0.50 (15%)

= 2.92% + 1.21% + 7.50%

= 11.63%

WACC (3rd range) = 0.40 (9.1%) + 0.10 (12.06%) + 0.50 (15%)

= 3.64% + 1.21% + 7.50%

= 12.35%

Check your progress VI

In the example above why have we used 14% for cost of common equity in the 1st range and 15% in the 2nd and 3rd ranges respectively?

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8.6 SUMMARY

This unit showed the concept of the cost of capital. The key points covered are:

- the cost of capital is the minimum rate of return a firm should earn on its invested capital.
- the individual cost of capital is computed on an after-tax basis and is stated as an annual percentage.
- generally, the cost of dept is the cheapest and the cost of common stock is the most expensive among all other component costs of capital.
- the cost of capital to be used in evaluating investment proposals is the WACC.
- the WACC of a firm increases as the firm raises more and more new capital.
- a break point will occur each time one of the specific costs of capital increases.