

VALUATION OF SECURITIES (VALUATION MODELS)

THE CONCEPT OF VALUE

The term value is often used in different concepts as follows:

- **Book value**

This is the value of the firm's balance sheet. It often represents a historical rather than a measure of the current worth. Thus the net book value of a firm represents the depreciated value of assets less outstanding liabilities. From the accounting perspective, this net book value represents the amount of owners' equity in the firm.

$$\text{Book value per share} = \frac{\text{Total assets} - \text{intangible fixed assets} - \text{all liabilities (Including preference share capital)}}{\text{Number of ordinary shares}}$$

Criticism

- ✓ *It is based on accounting conventions policies and estimates that are subject to a great deal of subjectivity.*
- ✓ *Historical balance sheet figures of which the book values are based are often very divergent from economic values. They do not reflect a firm's earnings power. Hence book values cannot be regarded as good estimates of true investment values.*
- **Liquidation/ disposal value**

This is the value that could be realized if an asset(s) were sold individually and not as part of a going concern e.g. If a product line is discontinued, the machinery used in its production might be sold. The sale price would be its disposal value and would be determined independently of the firm's value. Similarly, if a firms operations were discontinued and all its assets were sold as a separate as a separate collection and then used to repay liabilities, the total net sales proceeds would represent the firms liquidation value. Hence the liquidation valuation model involves the computation of the liquidation value per share (LVPS).

$$\text{LVPS} = \frac{\text{Amount owed to all creditors and preference shareholders} - \text{Value realised from all assets of the firm}}{\text{Number of ordinary shares}}$$

Criticism

Although the LVPS appears better than BVPS, it has several limitations, namely:

- ✓ *It is often difficult to estimate what amount would be realized from the liquidation of the various assets.*
- ✓ *It does not reflect the firm's earnings capability. LVPS only makes sense for those firms that are better dead than alive. Such firms are not viable and their intrinsic values cannot be determined.*

▪ **Going concern value**

This is the amount realized if the firm is sold as a going concern rather than on the basis of liquidating its assets. The buyer is willing to pay a price on the basis of the expectations of the firm's future profits/ cash flows.

▪ **Substitution value**

This is the amount of money that could be paid to purchase the next available substitute for the production process. It involves determining the value of a security by looking at the value of a similar security of a competitor company in the same industry. The problem arises when the competitor in question has much higher (or lower) earnings capacity that makes comparison faulty e.g. EABL vs. Keroche

Criticism

- ✓ *Firms do not have similar productive assets for the purpose of using one security as a substitute of another.*
- ✓ *No two firms are identical operating characteristics. Even firms in the same industry have different operating policies, management styles, different sizes, different sizes of diversification, technology, e.t.c.*

▪ **Replacement value**

Replacement value is based on the cost of replacing the existing assets. This is the amount that will be needed in order to purchase an asset with the same productive capacity like the one being replaced. However, only productive fixed assets can be replaced at a go since current assets are circulating assets.

$$\text{Replacement value} = \frac{\text{Replacement cost of productive fixed assets}}{\text{Number of ordinary shares}}$$

Criticism

- ✓ *Based only on a portion of the assets.*
- ✓ *Replacement value can be subjectively determined.*

- **Intrinsic value**

This is the theoretical value of the asset (security) and can be defined as the present value of the expected future cash flows. It is the value as perceived by investors given the amount, timing, and riskiness of future cash flows. Given the riskiness, uncertainty of future cash flows, the investor determines an appropriate discount rate to use in computing the present (intrinsic) value of the asset. Once the investor has determined the intrinsic value of the security, it is compared with the market value. If intrinsic value is greater than market value, then the security is undervalued and vice versa.

Criticism

- ✓ *Is based on historical data.*
- ✓ *Different models may provide different intrinsic values.*

- **Market values**

This is the observable value of an asset/ security in the market place. It the market price of a security that is influenced by market forces i.e. demand and supply. Other factors, however, do affect the market value of securities, namely economic factors, political factors, nature or quality of management, the firms earnings power (both current and expected), rumors and speculations on the part of investors, the industry in which the company operates, the investors required rate of return e.t.c.

VALUATION MODELS

Valuation models are classified into the following categories:

- The general/ basic valuation model.*
- The bond valuation model.*
- The equity valuation models.*
 - ✓ *Dividend valuation model.*
 - ✓ *Earnings capitalization model.*
 - ✓ *Liquidation valuation model.*
 - ✓ *Book valuation model.*

1. THE GENERAL VALUATION MODEL

The model states that the value of any real asset or financial security equals the present value of the benefits (expressed as cash flows) expected from it, discounted at a given rate of return. In other words the value of a security is equivalent to the present value of a capital project.

The value of a security, therefore, depends on two factors, namely:

- *The expected cash flow from the security.*
- *The appropriate discounting rate: if the discounting rate used is that of an individual investor or a group of investor, the obtained value is known as intrinsic, fair or true value of the security to a particular investor or group of investors. However if the*

discounted rate used is the market rate, then the value obtained value is called the market value of a security. It is important to determine the intrinsic value of a security so that the investor can make correct judgment as to whether the security is over-valued or under-valued by the market.

$$V_{jo} = \sum_{t=1}^n \frac{C_{jt}}{(1 + K_j)^t}$$

V_{jo} Is the value of the assets now.

C_{jt} Is the cash flow expected from asset j in year t .

K_j Is the required rate of return on the assets.

n Is the useful life of the assets.

The general valuation model is applied in bond valuation.

BOND VALUATION

A bond/ debenture is an instrument of debt issued either by a business or a government. Valuation model of bonds depend on whether it is redeemable or perpetual. The value of a redeemable debt is the total present value of all expected future cash flows discounted at a given rate of return.

Redeemable bonds

$$V_o = \sum_{t=1}^n \frac{I(1 - T)}{(1 + K_d)^t} + \frac{F}{(1 + K_d)^n}$$

V_o is the value of the bond today.

I is the periodic interest payment based on the par value.

T is the tax rate.

F is the fixed redemption value of the bond.

K_d is the cost of the bond.

n is the maturity period of the bond.

Example 1

Suppose you buy Ksh. 1,000,000 worth of 10% 10 year bonds with a Ksh. 1000 par value per bond. If your required rate of return is 12%, what is the most that you would pay for this bond? For simplicity, assume interest is payable once a year. Take tax rate of 30%.

Solution

$$V_0 = \sum_{t=1}^n \frac{I(1-T)}{(1+Kd)^t} + \frac{F}{(1+Kd)^n}$$

$$V_0 = \sum_{t=1}^n \frac{100(1-0.3)}{(1+0.12)^t} + \frac{1000}{(1+0.12)^n}$$

There is an annuity of Ksh. 100 (1-0.3) per bond per year for 10 years, and a final payoff of Ksh. 1000 per bond in the 10th year.

$$V_0 = 100(1-0.3) \times PVIAF(10, 12\%) + 1000 \times PVIF(10, 12\%)$$

$$V_0 = 70 \times 5.65 + 1000 \times 0.322 = \text{Ksh. } 717.50 \text{ per bond.}$$

In reality interest on bonds is paid more than once in a year. In Kenya, for example, the government and corporations pay interest twice per annum, with each payment being half of the annual coupon.

$$V_0 = \sum_{t=1}^{mn} \frac{I/m(1-T)}{(1+Kd/m)^t} + \frac{F}{(1+Kd/m)^{mn}}$$

Example 2

We shall evaluate the above example 1, where coupons are paid semi-annually.

$$V_0 = \sum_{t=1}^{20} \frac{100/2(1-0.3)}{(1+0.12/2)^t} + \frac{1000}{(1+0.12/2)^{20}}$$

$$V_0 = \sum_{t=1}^{20} \frac{35}{(1.06)^t} + \frac{1000}{(1.06)^{20}}$$

There is an annuity of Ksh. 35 per bond per half year for 20 periods. At the 20th period, there is a lump sum payment of Ksh. 1000 per bond. Note that the discount rate will now be 12%/2 = 6%.

$$V_o = 35 \times PVIAF(20, 6\%) + 1000 \times PVIF(20, 6\%)$$

$$V_o = 35 \times 11.47 + 1000 \times 0.312$$

$$V_o = \text{Ksh. } 713.45 \text{ per bond.}$$

This is the actual value of the bond.

Example 3

You plan to buy a 12%, 5 year bond with a par value of Ksh. 1000. Coupons are payable semi-annually. What is the most you would pay for the bond given that your required rate of return is 12 %?

= Ksh. 1,177.00 you would be willing to pay a premium on the bond (Show your workings).

IMPORTANT NOTE: The Interest Tax Shield

*An interesting element introduced into the capital structure decision is the reduction of taxes due to the payment of interest on debt. We refer to the benefit from interest deductibility as the **interest tax shield**, since the interest expense shields income from taxation. The tax shield from interest deductibility is:*

$$\text{Tax shield} = (\text{Tax rate}) (\text{Interest expense})$$

If Firm L has Ksh.10, 000 of 10% debt and is subject to a tax of 30% on net income, the tax shield is:

$$\text{Tax shield} = 0.30 [\text{Ksh. } 10,000(0.10)] = 0.30(\text{Ksh. } 1,000) = \text{Ksh. } 300. \text{ A Ksh. } 1,000 \text{ interest expense means that Ksh. } 1,000 \text{ of income is not taxed at 30\%.}$$

How does this tax shield affect the value of the firm? The tax shield reduces the net income of the firm that goes to pay taxes. This is the reason why, in bond valuation, taxes are considered. Note that on the contrary, ordinary and preferred dividends are not allowable for tax purposes. As a result, they generate no tax shield.

Irredeemable bonds

The value of a perpetual/ irredeemable bond is given by:

$$MV = \frac{i(1 - T)}{K_d}$$

Where i is annual interest.

K_d is the cost of debt/ RRR of bondholder.

EQUITY VALUATION MODELS

1. The dividend capitalization model (The Gordon Sharpone Model) (The Gordon Dividend Growth Model)

The value of an equity share is equal to the present value of dividends expected from its ownership plus the present value of the proceeds from its sales.

Single period model

$$P_0 = \frac{D_1}{(1+K_s)} + \frac{P_1}{(1+K_s)} = \frac{D_1+P_1}{(1+K_s)}$$

D₁ is the dividend expected at the end of year 1.

P₁ is the price expected at the end of year 1.

K_s is the cost of equity or RRR by investor.

P₀ is the value of a share now.

Suppose that the price is expected to increase at a constant rate, g, annually.

$$P_0 = \frac{D_1 + P_0(1+g)}{(1+K_s)}$$

$$P_0(1 + K_s) = D_1 + P_0(1 + g)$$

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

NB: $D_1 = D_0 (1+g)$

Example 1

ABC Company LTD has a cost of equity of 16%. The company has just paid a dividend of Ksh. 0.75 per share, and dividends are expected to grow at 8% p.a. Determine the value of a share of ABC Company LTD.

Example 2

H Company LTD has a cost of equity of 16%. The company expects to pay a dividend of Ksh. 0.75 per share in its next payout (Year end), and dividends are expected to grow at 8% p.a. Determine the value of a share of H Company LTD.

Example 3

The table below shows the dividend payout for Harbin LTD for 5 years.

| <i>YEAR</i> | <i>DIVIDEND PER SHARE (KSH)</i> |
|------------------------|---------------------------------|
| 2006 | 0.20 |
| 2007 | 0.25 |
| 2008 | 0.35 |
| 2009 | 0.50 |
| 2010 (Latest dividend) | 0.60 |

- i. What is the worth of a share of Harbin LTD given a cost of equity of 35%?
- ii. Suppose, instead, that YOU as an individual investor have an interest in the stock and your required rate of return is 12%. If the share is currently selling at Ksh. 60 per share, is it overvalued or undervalued? Why? Show all your workings.

2. Equity valuation using the earnings capitalization method

$P/E \text{ Ratio} = MPS/EPS$

Thus given P/E and EPS, then

$P_o (MPS) = P/E \times EPS.$

Practitioners prefer the earnings capitalization model approach mainly due to its simplicity. The procedure used to estimate intrinsic or theoretical value of an equity share involves the following steps:

- Estimate the EPS.
 - Forecast the growth rate of EPS.
 - Assess the risk exposure, K_s .
 - Establish the P/E multiple or ratio.
 - Develop a value anchor and a value range $\rho_o \pm \sigma\rho_o$
- I. The investment analyst typically begins equity valuation by forecasting the EPS for the current year and probably for the next year. This is done by examining the pattern of the reported EPS over a number of years and also by the impression garnered by plant visits and interviews with the management.
 - II. The growth rate can be estimated by evaluating the past pattern of EPS to determine any consistency in growth. If the growth is relatively stable, then the growth rate could be estimated by:

$$g = \sqrt[n]{\text{Latest EPS}/\text{Earliest EPS}} - 1$$

n is the duration/ periods of growth.

g is the constant growth rate.

Alternatively, if a relatively stable profit and cost structure is expected in the foreseeable future, g may be equated to the growth rate in sales (turnover).

III. The assessment of risk exposure

The equity analysts are interested in three types of business risks:

- **Business risk**- *this refers to the variability in operating income (EBIT). It is influenced by among others, variability in demand, prices, inputs costs, and the use of operating leverage.*
- **Financial risk**- *it represents the risk arising from the use of debt capital (Financial leverage).*
- **Market risk (Beta)** - *this refers to variability in share prices and the most commonly used measure of market risk. Equality beta reflects the sensitivity of the common shares to the general price movements.*

The assessment of risk helps determine the cost of equity (Ks).

IV. ESTABLISHING THE P/E MULTIPLE/RATIO

There are a number of factors that influence the P/E multiple. These are- growth prospects, risk exposure, shareholder perception of the management and liquidity of the stock. The P/E ratio can be developed from the constant growth model as:

$$Po = \frac{D1}{Ks - g}$$

Dividing both sides by E, we get

$$\frac{Po}{E} = \frac{D1}{Ks - g} \div E$$

Where Ks is the risk exposure/ cost of equity.

And g represents the growth prospects.

EXAMPLE 1

The projected EPS of XYZ ltd is Ksh. 5.00 and the appropriate P/E ratio is estimated at 12.

$$\sigma po = 10$$

Determine the value anchor and value range.

$$Po = EPS \times P/E \text{ Multiple}$$

$$= 5.00 \times 12 = \text{Ksh. } 60$$

Value range= 60 ± 10

Ksh. $50 \leq P_o \leq$ Ksh. 70

EXAMPLE 2

XYZ LTD expects to pay a dividend of Ksh.4.00 per share. The payout ratio is normally 40%. The dividends are expected to grow at 10%. The required rate of return by the investor is 12%. Using the earnings capitalization model, what is the value of a share of XYZ LTD, given $\sigma_{po} = 5$?

$$P_o = \frac{D_1}{K_s - g} \quad \text{dividing both sides by } E, \text{ we shall get:}$$

$$\frac{P_o}{E} = \frac{D_1}{K_s - g} \div E$$

$$D_1 = 4.00,$$

$$D_1 = 40\% * EPS$$

$$EPS = D_1 / 40\% = 4 / 40\% = 10$$

$$\frac{P_o}{E} = \frac{4}{12\% - 10\%} \div 10 = 20$$

Thus P/E ratio is 20

$$P_o = EPS \times P/E \text{ Multiple}$$

$$P_o = 10 \times 20 = \text{Ksh. } 200.00$$

Value range is Value range= $200 \pm 5 =$ Ksh. $195 \leq P_o \leq$ Ksh. 205

2. Equity valuation using the book value model

This involves the computation of the book value per share (BVPS).

$$BVPS = \text{net worth} / \text{number of shares outstanding}$$

$$\text{Net worth} = \text{share capital} + \text{All reserves}$$

BVPS is fundamentally rooted in financial accounting. Hence it can be established relatively quickly from published sources. The proponents of this measure also argue that it is an objective measure of value. However, critics argue that BVPS is based on accounting conventions and policies which are characterized by a great deal of subjectivity. The balance sheet figures on which BVPS is based are often very divergent from economic values. They do not reflect earnings power. Hence BVPS cannot be regarded as a good proxy or good estimate of true investment values.

3. Equity valuation- the liquidation valuation model

This involves the computation of liquidation value per share (LVPS).

$$LVPS = \frac{\text{value realized from the liquidation of all assets of the firm—amount payable to creditors and preference shareholders}}{\text{Number of outstanding equity shares}}$$

VALUATION OF REDEEMABLE PREFERENCE SHARES

These are preference shares issued that has a definite maturity period. A holder of preference shares is entitled to a fixed return on his/ her investment known as the preference dividend (Do). The annual preference dividend is based on:

- *The par value of the security (Po).*
- *The dividend rate.*

Annual preference dividend (Do) = coupon rate x par value.

Valuation of preference shares is based on the general valuation model. The value of a preference share is arrived at by discounting the annual dividend to be received over the life of the security and the par value to be received back on maturity. Since the dividend received is constant, then for redeemable preference shares, it is an annuity: thus---

$$MV_p = Do \times PVIAF_{n, i\%} + P_o \times PVIF_{n, i\%}$$

Example 1

ABC LTD issued Ksh. 10, 10% preference shares on January 1, 2010. The shares will be redeemable on 31st December, 2013. If your required rate of return is 16%, what is the worth of this share to you?

VALUATION OF IRREDEEMABLE PREFERENCE SHARES

These are preference shares that are perpetual. Holders of these shares expect to earn a constant or fixed annual dividend per annum in perpetuity. The model used to determine their value is similar to the one used in valuing perpetuities.

$$MV_p = D_p / K_p$$

D_p is the annual preference dividend based upon the coupon rate and par value.

K_p is the cost of preference share capital or the minimum required rate of return by preference shareholder.

MV is the market value.

APPLICABILITY OF VALUATION MODELS IN DEVELOPING COUNTRIES

Most of the valuation models we have discussed are based on several limiting assumptions.

1. Perfect capital markets

- *No transaction costs.*
- *No taxation.*
- *No restrictions on trading.*
- *Borrowing and trading at risk free rates.*
- *Many investors such that no one investor can influence the market price.*

2. Efficient capital markets

- *Information is freely available to all market participants.*
- *Share prices quickly adjust to incorporate all the new information in an unbiased manner.*
- *The operational efficiency- low operational costs.*
- *Pricing efficiency.*
- *Allocative efficiency.*

Most of the developing capital markets do not satisfy the assumptions underlying both perfect and efficient markets. Hence the applicability of many financial models based on these assumptions are doubtful.