Scholars' View:

1. Dividend discount model is designed to compute the intrinsic value of a share of stock under specific assumptions as to the expected growth pattern of future dividends and the appropriate discount rate to employ. - Van Horne & Wachowicz
2. Dividend discount model is a model that states that the intrinsic value of a stock is equal to the discounted value of all future dividends. - C. P. Jones

According to the dividend discount model, conceptually a very sound and appealing model, the value of the stock is equal to the present value of dividends expected from its ownership plus the present value of the market price expected when the stock is sold. For applying the model, one should make the following assumptions:

(a) Dividends are paid annually, and
(b) The first dividend is received one year after the stock is bought.

Mainly common stock is valued by dividend discount model in two ways:

(i) Single Period Model
(ii) Multi-Period Model
  (a) Constant Growth Model
  (b) Zero-Growth Model.

(1) Single Period Model:

Let us begin with a single period analysis. Suppose an investor likes to buy a common stock and to hold it for one year after which he will sell it. In this case, his income at the year end will be the amount of dividend paid him plus the price that he will be able to get by selling it. So, the present value of the common stock will be:

Formula-02 $$Ve = \frac{D_1 + MV_1}{(1+K)^1}$$

Ve = Common Stock Value
D_1 = Expected Dividend
MV = Market Value
K = Discount Rate

Example- 02

Mr. Maruf has bought common stock of RAK Real Estate Ltd. The expected dividend at the end of the year is Tk. 28 and market price is Tk. 250. If the expected return of the stock is 12%, what is the value of the stock?

Solution

$$Ve = \frac{D_1 + MV_1}{(1+K)^1}$$

$$= \frac{28 + 250}{(1+.12)} = \frac{278}{1.12}$$

= 248 Tk.

Where:
D_1 = Expected Dividend = 28
MV = Market Value = 250
K = Discount Rate = 0.12
Ve = Common Stock Value = ?

Answer: Value of the Common Stock = 248 Tk.

(2) Multi-Period Model:

In multi-period model, the same techniques of valuation for single period model are used. We assume here that the investors do not sell their stock and the value of stock will be the present value of the expected future dividends. Having learnt the basics of common stock valuation single-period model, we now discuss the more realistic and also the more complex, case of period valuation. Since common stock has no maturity period, it may be expected to dividend steam of infinite duration. The value of the common stock may be put as:

Formula-03 $$Ve = \frac{D_1}{(1+K)^1} + \frac{D_2}{(1+K)^2} + \text{--------} + \frac{D_N + MV_N}{(1+K)^N}$$

Ve = Common Stock Value
D = Expected Dividends
MV = Market Value
K = Discount Rate

Example- 03

Mrs. Roxana has purchased a common stock from Alif and Company. The expected market value is Tk. 370 and dividends from the stock are Tk. 25, 18, 27 & 36 per year respectively. If discount rate is 15%, what is the value of the common stock?

Solution

$$Ve = \frac{D_1}{(1+K)^1} + \frac{D_2}{(1+K)^2} + \text{--------} + \frac{D_4 + MV_4}{(1+K)^4}$$

$$= \frac{25}{(1+.15)^1} + \frac{18}{(1+.15)^2} + \frac{27}{(1+.15)^3} + \frac{36+370}{(1+.15)^4}$$

$$= \frac{25}{(1.15)^1} + \frac{18}{(1.15)^2} + \frac{27}{(1.15)^3} + \frac{406}{(1.15)^4}$$

$$= \frac{25}{1.15} + \frac{18}{1.3225} + \frac{27}{1.5208} + \frac{406}{1.749}$$

$$= 21.74 + 13.61 + 17.75 + 232.13$$

$$= 285 \text{ Tk.}$$

Where:
D = Dividends = 25, 18, 27, 36
K = Discount Rate = 15% = .15
MV = Market Value = 370
Ve = Value of Common Stock = ?

Answer: Value of the Common Stock = 285 Tk.

(3) Constant Growth Model:

The most widely cited dividend valuation method is the constant growth model, assumes dividends will grow at a constant rate, but a rate that is less than the required rate. F dividends of a company could jump all over the place and are expected to grow at a constant The constant growth model is commonly called **Gordon model.** The value of a common stock given by method:

Formula-04 $$Ve = \frac{D_1}{K-g}$$

Ve = Common Stock Value; D_1 = Expected Dividend
K = Discount Rate; g = Constant Growth Rate

Example- 04

Mr. Emdadul Haque has purchased a common stock of Situ Shoe Company Ltd. The company pays dividend Tk. 36 per year. When the growth rate is 6% and discount rate is 12%, what is value of the stock?

Solution $Ve = \frac{D_1}{K-g}$

$= \frac{38.16}{.12-.06}$

$= \frac{38.16}{.06}$

$= 636$ Tk.

Ve = Value of Common Stock	= ?
K = Discount Rate = 12%	= 0.12
g = Constant Growth Rate	= 6% = 0.06
D_1 = Expected Dividend	

$D_1 = D_0(1+g) = 36(1+.06) = 36\times1.06 = 38.16$

Answer: Value of the Common Stock = 636 Tk.

(4) Zero-Growth Model:

The simplest method to dividend valuation, the zero-growth model, assumes a constant, non-growing dividend steam. Zero-growth model is similar to perpetual bond or preferred stock valuation method. With zero-growth in dividends, the value of common stock would equal the present value of perpetuity of dividends discounted at given discount rate, symbolically:

Formula-05 $Ve = \frac{D_1}{(1+K)^1} + \frac{D_2}{(1+K)^2} + \text{----------} + \frac{D_N}{(1+K)^N}$

$\therefore Ve = \frac{D}{K}$

Where:
Ve = Common Stock Value
D = Dividend Amount
K = Discount Rate

Example- 05

Mr. Emran Hossain has purchased a common stock of Sonya Electronic Ltd. The company pays TK. 25 as a dividend per year without growth rate, if the discount rate is 10%, what is the value of the stock?

Solution $Ve = \frac{D}{K}$

$= \frac{25}{.10}$

$= 250$ Tk.

D = Dividend Amount = 25
K = Discount Rate = 10% = .10
Ve = Value of Common Stock = ?

Answer: Value of the Common Stock = 250 Tk.

08.07 Preferred Stock Valuation

Preferred stock, like bond usually pay fixed rate of dividend. Incase of no state maturity, their valuation is similar to perpetual bond.

Value Calculation of Preferred Stock is two types:

1. Maturity/ Redeemable Preferred Stock
2. Valuation of Perpetual Preferred Stock

(1) Maturity/ Redeemable Preferred Stock Valuation:

Preferred stock may be issued with maturity period. The holders of the stock get dividends at a fixed rate like bond. A formula similar to maturity/ redeemable bond can be used to value preferred stock with a maturity period:

Formula-06

$$Vp = D\left[\frac{1-\frac{1}{(1+K)^N}}{K}\right]+\frac{FV}{(1+K)^N}$$

Vp = Preferred Stock Value
D = Dividend Amount
K = Discount Rate
N = Maturity Years
FV = Face Value/Par Value

Example- 06

Amax Group has issued preferred stock for 10 years. The face value of the stock is Tk. 1,000 at the rate of 15% dividend. If the required rate is 10%, what is the present value of the stock?

Solution

$$Vp = D\left[\frac{1-\frac{1}{(1+K)^N}}{K}\right]+\frac{FV}{(1+K)^N}$$

FV = Face Value = 1,000
D = Dividend Amount
= $1{,}000 \times 0.15$ = 150
K = Discount Rate = 0.10
N = Maturity Years = 10
Vp = Preferred Stock Value =?

$$= 150\left[\frac{1-\frac{1}{(1.10)^{10}}}{.10}\right]+\frac{1{,}000}{(1.10)^{10}}$$

$$= \frac{150 \times .6145}{.10}+\frac{1{,}000}{2.5937}$$

$$= 921.75 + 385.55$$

$$= 1{,}307 \text{ Tk.}$$

Answer: Value of the Preferred Stock = 1,307 Tk.

(2) Perpetual Preferred Stock Valuation:

Preferred stock has no stated maturity period and given the fixed nature of its payments of the interest is similar to a perpetual bond. We use the same general approach applied to valuing a perpetual bond to the valuation of preferred stock:

Formula-07

$$Vp = \frac{D_1}{(1+K)^1}+\frac{D_2}{(1+K)^2}+\text{-----------}+\frac{D_N}{(1+K)^N}$$

$$\therefore Vp = \frac{D}{K}$$

Where:
Vp = Preferred Stock Value
D = Dividend Amount
K = Discount Rate

Example- 07

Mrs. Maria has purchased a perpetual preferred stock from Mona Electronic Ltd. The face value of the stock is Tk. 2,000 at the rate of 12% dividend. If the expected rate return is 9%, what is the value of the stock?

Solution $Vp = \frac{D}{K}$

D = Dividend Amount = 2,000×.12 = 240
K = Discount Rate = 0.09
Vp = Preferred Stock Value = ?

$= \frac{240}{.09}$

= 2,667 Tk.

Answer: Value of the Preferred Stock = 2,667 Tk.

08.08 Bond or Debenture Valuation

The value of a bond is the present value of the payments its issuer is contractually obligated to make from the current time until it matures. According to L. J. Gitman-

> A bond holder receives two cash flows from a bond if it is held to maturity-interest and the bond's face value. For valuation purposes, the interest is an annuity and the face value is a single payment received at a specified future date.

The value of a bond depends on the following terms:

(a) **Coupon Rate/ Interest Rate:** The coupon rate is the specified interest rate. The interest is payable to the bondholder on face / par value of the bond.

(b) **Par Value/ Face Value:** Par value is the value on the face of the bond. It represents the amount the entity borrows and promises to repay at the time of maturity.

(c) **Maturity Period/ Duration:** The maturity period refers to the number of years after which the par value is payable to the bondholder.

(d) **Required Return/ Discount Rate:** The required rate of return that a bondholder who buys the bond expects to receive in the future. An investor would buy the bond only if the coupon rate were equal to or greater than discount rate.

Value Calculation of Bond is four types:

1. Maturity/ Redeemable/ Coupon Bond
2. Valuation of Zero-Coupon Bond
3. Valuation of Perpetual Bond, and
4. Calculation of Yield to Maturity (YTM).

(1) Maturity/ Redeemable/ Coupon Bond Valuation:

If a bond has a finite maturity, then we must consider not only the interest stream but also the terminal or maturity value (face value) in the valuation of bond. The valuation equation for such a bond that pays interest at the end of each year is:

Formula-08

$$Vd = R\left[\frac{1-\frac{1}{(1+K)^N}}{K}\right] + \frac{FV}{(1+K)^N}$$

Vd = Valuation of Bond
R = Interest Amount
K = Discount Rate
N = Maturity Years
FV = Face Value/Par Value

Example- 08

Honey Beverage Ltd. has issued a bond, face value of which is Tk. 1000 at 10% coupon rate of interest for 10 years. If the discount rate is 10%, what is present value of the bond?

Solution $Vd = R\left[\frac{1-\frac{1}{(1+K)^N}}{K}\right]+\frac{FV}{(1+K)^N}$

FV = Face Value of Bond = 1,000
R = Interest Amount = 1,000 × 10% = 100
K = Discount Rate = 10% = 0.10
N = Duration of Bond = 10 Years
Vd = Valuation of Bond = ?

$$= 100\left[\frac{1-\frac{1}{(1+.10)^{10}}}{.10}\right]+\frac{1000}{(1+.10)^{10}}$$

$$= 100\left[\frac{1-\frac{1}{(1.10)^{10}}}{.10}\right]+\frac{1000}{(1.10)^{10}}$$

$$= \left[\frac{100 \times .6145}{.10}\right]+\frac{1000}{2.5937}$$

$$= 614.50 + 385.50$$

$$= 1{,}000 \text{ Tk.}$$

Answer: Value of the Bond = 1,000 Tk.

(2) Zero-Coupon Bond Valuation:

A zero-coupon bond makes no periodic interest payments but instead is sold at a deep discount from its face value. The valuation equation for a zero-coupon bond is a truncated version of that used for a normal interest paying bond. The present value of interest payments components is lopped off and we are left with value being determined solely by the present value of principal payment at maturity.

Formula-09 $Vd = \frac{FV}{(1+K)^N}$

FV = Face Value/Par Value; K = Discount Rate
N = Maturity Years; Vd = Valuation of Bond

Example- 09

Shifha Cement Mills Ltd. is issuing Tk. 1000 zero-coupon bond for 10 years. If expected required rate is 12%, what is the present value of the bond?

Solution $Vd = \frac{FV}{(1+K)^N}$

$$= \frac{1000}{(1+.12)^{10}}$$

Where:
FV = Face Value = 1000
K = Discount Rate = 0.12
N = Maturity Years = 10
Vd = Valuation of Bond = ?

$$= \frac{1000}{(1 \cdot 12)^{10}}$$

$$= \frac{1000}{3 \cdot 1058}$$

$= 322$ Tk.

Answer. Value of the Bond = 322 Tk.

(3) Perpetual Bond Valuation:

Perpetual bond is the bond with no maturity. The present value of a perpetual bond is simply the periodic interest payment divided by the appropriate discount rate per period. The duration period of the bond is forever. The value of such bond:

Formula-10

$$Vd = \frac{R_1}{(1+K)^1} + \frac{R_2}{(1+K)^2} + \text{----------} + \frac{R_N}{(1+K)^N}$$

$$\therefore Vd = \frac{R}{K}$$

Where:
Vd = Valuation of Bond
R = Interest Amount
K = Discount Rate

Example- 10

Mr. Rajib has purchased a perpetual bond from a pharmaceutical company. He will get Tk. 1,500 as an interest per year forever. If discount rate is 10%, what is the present value of the bond?

Solution

$$Vd = \frac{R}{K}$$

R = Interest Amount = 1,500
K = Discount Rate = 0.10
Vd = Valuation of Bond = ?

$$= \frac{1500}{\cdot 10}$$

$= 15{,}000$ Tk.

Answer: Value of the Bond = 15,000 Tk.

(4) Calculation of Yield to Maturity (YTM) or Bond Yield:

The yield to maturity (YTM) is the compound annual average rate of return that will be earned if a bond is purchased today and held to maturity. It is also the discount rate that equates the bond's market value with the present value of the future interest payments and redemption of par value. Thus, in solving for the YTM, we know the current market price of the bonds. The following example shows conceptually what is involved.

Formula-11

$$YTM = \frac{I + [(RV - NSV) \div N]}{(RV + NSV) \div 2}$$

I = Interest Amount
NSV = Net Sales Value
RV = Redeemable Value
N = Number of Years