Stock valuation

Features of common stock

- The term common stock is usually applied to stock that has no special preference either in receiving dividends or in bankruptcy.
- The conceptual structure of the corporation assumes that common stockholders (shareholders) elect directors who, in turn, hire managers to carry out their directives. Shareholders, therefore, control the corporation through the right to elect the directors. Generally, only shareholders have this right.
- Directors are elected each year at an annual meeting. Although there are exceptions (discussed next), the general idea is “one share, one vote” (*not* one share*holder*, one vote).

- In addition to the right to vote for directors, shareholders usually have the following rights:

➢ The right to share proportionally in dividends paid.

➢ The right to share proportionally in assets remaining after liabilities have been paid in a liquidation.

➢ The right to vote on stockholder matters of great importance, such as a merger. Voting is usually done at the annual meeting or a special meeting.

- In addition, stockholders sometimes have the right to share proportionally in any new stock sold. This is called the *preemptive right*. Essentially, a preemptive right means that a company that wishes to sell stock must first offer it to the existing stockholders before offering it to the general public. The purpose is to give stockholders the opportunity to protect their proportionate ownership in the corporation.

Dividends

- A distinctive feature of corporations is that they have shares of stock on which they are authorized by law to pay dividends to their shareholders. Dividends paid to shareholders represent a return on the capital directly or indirectly contributed to the corporation by the shareholders. The payment of dividends is at the discretion of the board of directors.
- **Some important characteristics of dividends** include the following:

➢ Unless a dividend is declared by the board of directors of a corporation, it is not a liability of the corporation. A corporation cannot default on an undeclared dividend.

➢ The payment of dividends by the corporation is not a business expense. Dividends are not deductible for corporate tax purposes.

➢ Dividends received by individual shareholders are taxable

Preferred stock features

- **Preferred stock** differs from common stock because it has preference over common stock in the payment of dividends and in the distribution of corporation assets in the event of liquidation. *Preference* means only that the holders of the preferred shares must receive a dividend (in the case of an ongoing firm) before holders of common shares are entitled to anything.
- **Preferred stock is a form of equity** from a legal and tax standpoint. It is important to note that holders of preferred stock have no voting privileges.
- Preferred are issued with a fixed par value and pay dividends based on a percentage of that par, usually at a fixed rate. Preferred stock is attractive as it usually offers higher fixed-income payments than bonds with a lower investment per share.
- Preferred technically have an unlimited life because they have no fixed maturity date. However, they often have a **callable feature** that allows the issuing corporation to forcibly cancel the outstanding shares for cash. This precludes the investor from participating in any future price appreciation.

- A preferred dividend is *not* like interest on a bond. The board of directors may decide not to pay the dividends on preferred shares, and their decision may have nothing to do with the current net income of the corporation.
- Dividends payable on preferred stock are either *cumulative* or *noncumulative*; most are cumulative. If preferred dividends are cumulative and are not paid in a particular year, they will be carried forward as an *arrearage*. Usually, both the accumulated (past) preferred dividends and the current preferred dividends must be paid before the common shareholders can receive anything.

Valuation of stocks

- A share of common stock is more difficult to value in practice than a bond for at least three reasons. First, with common stock, not even the promised cash flows are known in advance. Second, the life of the investment is essentially forever because common stock has no maturity. Third, there is no way to easily observe the rate of return that the market requires. Nonetheless, as we will see, there are cases in which we can come up with the present value of the future cash flows for a share of stock and thus determine its value.
- Because these cash flows are risky, we cannot compute their present value using the risk-free interest rate. Instead, we must discount them based on the **required rate of return**, for the stock, which is the expected return of other investments available in the market with equivalent risk to the firm’s shares.

Dividend discount Model

- Imagine that you are considering buying a share of stock today. You plan to sell the stock in one year. You somehow know that the stock will be worth Rs 70 at that time. You predict that the stock will also pay a Rs 10 per share dividend at the end of the year. If you require a 25 percent return on your investment, what is the most you would pay for the stock? In other words, what is the present value of the Rs 10 dividend along with the Rs 70 ending value at 25 percent?
- If you buy the stock today and sell it at the end of the year, you will have a total of Rs 80 in cash.

At 25 percent: Present value = (Rs 10 + 70)/1.25 = Rs 64

Therefore, Rs 64 is the value you would assign to the stock today

- More generally, let P_0 be the current price of the stock, and assign P_1 to be the price in one period. If D_1 is the cash dividend paid at the end of the period, then:

$$\mathbf{P_0 = (D_1 + P_1)/(1 + R)}$$

where *R* is the required return in the market on this investment

- Suppose we don't know the price of the stock in one period P_1. Instead, suppose we somehow knew the price in two periods, P_2. Given a predicted dividend in two periods, *D*2, the stock price in one period would be:

$$\boldsymbol{P_1 = (D_2 + P_2)/(1 + R)}$$

- If we were to substitute this expression for P_1 into our expression for P_0, we would have

$$P_0 = \frac{D_1 + P_1}{1 + R} = \frac{D_1 + \frac{D_2 + P_2}{1 + R}}{1 + R} = \frac{D_1}{(1 + R)^1} + \frac{D_2}{(1 + R)^2} + \frac{P_2}{(1 + R)^2}$$

- Now we need to get a price in two periods

$$\boldsymbol{P_2 = (D_3 + P_3)/(1 + R)}$$

If we substitute this back in for P_2, we have

$$\mathbf{P_0} = \frac{D_1}{(1 + R)^1} + \frac{D_2}{(1 + R)^2} + \frac{D_3}{(1 + R)^3} + \frac{P_3}{(1 + R)^3}$$

- You should start to notice that we can push the problem of coming up with the stock price off into the future forever. **Note that no matter what the stock price is, the present value is essentially zero if we push the sale of the stock far enough away**.
- What we are eventually left with is the result that the current price of the stock can be written as the present value of the dividends beginning in one period and extending out forever.
- The **price of the stock today is equal to the present value of all of the future dividends**. In principle, there can be an infinite number of future dividends. This means that we still can’t compute a value for the stock because we would have to forecast an infinite number of dividends and then discount them all.

Special cases

- In a few useful special circumstances, we can come up with a value for the stock. What we have to do is make some simplifying assumptions about the pattern of future dividends.
- The **three cases** we consider are the following: (1) The dividend has a zero growth rate, (2) the dividend grows at a constant rate, and (3) the dividend grows at a constant rate after some length of time.

Zero growth

- A share of common stock in a company with a constant dividend is much like a share of preferred stock. For a zero-growth share of common stock, this implies that:

$$\boldsymbol{D_1 = D_2 = D_3 = D = \text{constant}}$$

So the value of the stock is

$$P_0 = \frac{D}{(1+R)^1} + \frac{D}{(1+R)^2} + \frac{D}{(1+R)^3} + \frac{D}{(1+R)^4} + \frac{D}{(1+R)^5} + \cdots$$

- Because the dividend is always the same, the stock can be viewed as an ordinary perpetuity with a cash flow equal to *D* every period. The per-share value is given by:

$$\mathbf{P_0 = D/R}$$

where *R* is the required return

Constant growth

- Suppose we know that the dividend for some company always grows at a steady rate. Call this growth rate g. If we let D_0 be the dividend just paid, then the next dividend, D_1, is:

$$\boldsymbol{D_1 = D_0 \times (1 + g)}$$

- The dividend in two periods is:

$$\begin{aligned} D_2 &= D_1 \times (1 + g) \\ &= [D_0 \times (1 + g)] \times (1 + g) \\ &= D_0 \times (1 + g)^2 \end{aligned}$$

- We could repeat this process to come up with the dividend at any point in the future. In general $\boldsymbol{D_t = D_0 \times (1 + g)^t}$. An asset with cash flows that grow at a constant rate forever is called a **growing perpetuity**.

- If the dividend grows at a steady rate, then we have replaced the problem of forecasting an infinite number of future dividends with the problem of coming up with a single growth rate, a considerable simplification. In this case, if we take D_0 to be the dividend just paid and g to be the constant growth rate, the value of a share of stock can be written as

$$P_0 = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \frac{D_3}{(1+R)^3} + \cdots$$
$$= \frac{D_0(1+g)^1}{(1+R)^1} + \frac{D_0(1+g)^2}{(1+R)^2} + \frac{D_0(1+g)^3}{(1+R)^3} + \cdots$$

- As long as the growth rate, g, is less than the discount rate, r, the present value of this series of cash flows can be written as

$$P_0 = \frac{D_0 \times (1+g)}{R-g} = \frac{D_1}{R-g}$$

- **Thus, the dividend growth model determines the current price of a stock as its dividend next period divided by the discount rate less the dividend growth rate.**

- We can actually use the dividend growth model to get the stock price at any point in time, not just today. In general, the price of the stock as of time *t* is:

$$P_t = \frac{D_t \times (1 + g)}{R - g} = \frac{D_{t+1}}{R - g}$$

- What would happen with the dividend growth model if the growth rate, *g,* were greater than the discount rate, *R*. It looks like we would get a negative stock price because *R* − *g* would be less than zero. This is not what would happen. **Instead, if the constant growth rate exceeds the discount rate, then the stock price is infinitely large**. Why? If the growth rate is bigger than the discount rate, the present value of the dividends keeps getting bigger. Essentially the same is true if the growth rate and discount rate are equal.

- The constant growth case will work for any growing perpetuity, not just dividends on common stock. If C_1 is the next cash flow on a growing perpetuity, then the present value of the cash flows is given by:

$$\textbf{Present value} = C_1/(R - g) = C_0(1 + g)/(R - g)$$

Q. The next dividend for XYZ Company will be Rs 4 per share. Investors require a 16 percent return on companies such as XYZ. XYZ’s dividend increases by 6 percent every year. Based on the dividend growth model, what is the value of XYZ’s stock today? What is the value in four years?

- The only tricky thing here is that the next dividend, D_1, is given as Rs 4, so we won't multiply this by (1 + g). With this in mind, the price per share is given by:

$$P_0 = D_1/(R - g) = \text{Rs } 4/(.16 - .06) = \text{Rs } 4/.10 = \text{Rs } 40$$

- Because we already have the dividend in one year, we know that the dividend in four years is equal to $D_1 \times (1 + g)^3$ = Rs 4 × 1.063 = Rs 4.764. So, the price in four years is:

$$P_4 = D_4 \times (1 + g)/(R - g) = \text{Rs } 4.764 \times 1.06/(.16 - .06) = \text{Rs } 5.05/.10 = \text{Rs } 50.50$$

- Notice in this example that P_4 is equal to $P_0 \times (1 + g)^4$. P_4 = Rs 50.50 = Rs 40 × 1.064 = $P_0 \times (1 + g)^{4.}$ To see why this is so, notice first that: $P_4 = D_5/(R - g)$ However, D_5 is just equal to $D_1 \times (1 + g)^4$, so we can write P_4 as:

$$\begin{aligned} P_4 &= D_1 \times (1 + g)^4/(R - g) \\ &= [D_1/(R - g)] \times (1 + g)^4 \\ &= P_0 \times (1 + g)^4 \end{aligned}$$

- **This example illustrates that the dividend growth model makes the implicit assumption that the stock price will grow at the same constant rate as the dividend**. This really isn't too surprising. What it tells us is that if the cash flows on an investment grow at a constant rate through time, so does the value of that investment.

Non constant growth

- The next case we consider is non constant growth. The main reason to consider this case is to allow for “supernormal” growth rates over some finite length of time. The growth rate cannot exceed the required return indefinitely, but it certainly could do so for some number of years. To avoid the problem of having to forecast and discount an infinite number of dividends, we will require that the dividends start growing at a constant rate sometime in the future.
- For a simple example of non constant growth, consider the case of a company that is currently not paying dividends. You predict that, in five years, the company will pay a dividend for the first time. The dividend will be Rs .50 per share. You expect that this dividend will then grow at a rate of 10 percent per year indefinitely. The required return on companies such as this one is 20 percent. What is the price of the stock today?

- To see what the stock is worth today, we first find out what it will be worth once dividends are paid. We can then calculate the present value of that future price to get today's price. The first dividend will be paid in five years, and the dividend will grow steadily from then on.
- Using the dividend growth model, we can say that the price in four years will be:

$$P_4 = D_4 \times (1 + g)/(R - g)$$
$$= D_5 /(R - g)$$
$$= \text{Rs } .50/(.20 - .10) = \text{Rs } 5$$

- If the stock will be worth Rs 5 in four years, then we can get the current value by discounting this price back four years at 20 percent:

$$P_0 = \text{Rs } 5/1.20^4 = \text{Rs } 5/2.0736 = \text{Rs } 2.41$$

The stock is worth Rs 2.41 today

- The problem of non constant growth is only slightly more complicated if the dividends are not zero for the first several years.

Year	Expected dividend
1	1
2	2
3	2.5

- After the third year, the dividend will grow at a constant rate of 5 percent per year. The required return is 10 percent. What is the value of the stock today?
- The important thing is to notice when constant growth starts. As we've shown, for this problem, **constant growth starts at Time 3**. This means we can use our constant growth model to determine the stock price at Time 3, P_3.

- The value of the stock is the present value of all the future dividends. To calculate this present value, we first have to compute the present value of the stock price three years down the road. We then have to add in the present value of the dividends that will be paid between now and then. So, the price in three years is:

$$P_3 = D_3 \times (1 + g)/(R - g)$$

$$= \text{Rs } 2.50 \times 1.05/(.10 - .05) = \text{Rs } 52.50$$

- We can now calculate the total value of the stock as the present value of the first three dividends plus the present value of the price at Time 3, P_3.

$$P_0 = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \frac{D_3}{(1+R)^3} + \frac{P_3}{(1+R)^3}$$

P_0= Rs 43.88

Q. XYZ, Inc. has been growing at a phenomenal rate of 30 percent per year because of its rapid expansion and explosive sales. You believe this growth rate will last for three more years and will then drop to 10 percent per year and remain at 10 percent indefinitely. What is the value of the stock if there are 2 crore shares outstanding? The total dividends just paid were Rs 50 lakhs, and the required return is 20 percent.

- The price at Time 3 can be calculated as:

$$P_3 = D_3 \times (1 + g)/(R - g) \text{ where g is the long run growth rate}$$

- To determine the value today, we need the present value of this amount plus the present value of the total dividends.

Two stage growth

- The last case we consider is a special case of non constant growth: two-stage growth. Here, the idea is that the dividend will grow at a rate of g_1 for t years and then grow at a rate of g_2 thereafter, forever.

$$P_0 = \frac{D_1}{R - g_1} \times \left[1 - \left(\frac{1 + g_1}{1 + R}\right)^t\right] + \frac{P_t}{(1 + R)^t}$$

- Notice that the first term in our expression is the present value of a growing annuity. In this first stage, g_1 can be greater than R. The second part is the present value of the stock price once the second stage begins at time t.

- We can calculate P_t as follows $P_t = \frac{D_{t+1}}{R - g_2} = \frac{D_0 \times (1 + g_1)^t \times (1 + g_2)}{R - g_2}$

- In this calculation, we need the dividend at time t + 1, D_{t+1}, to get the stock price at time t, P_t. Notice that to get the dividend at time t + 1, we grew the current dividend, D_0, at rate g_1 for t periods and then grew it one period at rate g_2. Also, in this second stage, g_2 must be less than R.

Q. ONGC's dividend is expected to grow at 20 percent for the next five years. After that, the growth is expected to be 4 percent forever. If the required return is 10 percent, what's the value of the stock? The dividend just paid was Rs 2.

Components of the required rate of return

- We want to examine the implications of the dividend growth model for this required return.

$$P_0 = D_1/(R - g)$$

- If we rearrange this to solve for *R*, we get:

$$\mathbf{R - g = D_1 / P_0}$$

$$\mathbf{R = D_1 / P_0 + g}$$

- This tells us that **the total return, *R*, has two components**. The first of these, D_1 / P_0, is called the **dividend yield**. Because this is calculated as the expected cash dividend divided by the current price, it is conceptually similar to the current yield on a bond.
- The second part of the total return is the growth rate, *g*. The dividend growth rate is also the rate at which the stock price grows. This growth rate can be interpreted as the **capital gains yield**—that is, the rate at which the value of the investment grows.

Q. Suppose you expect Glenmark to pay dividends of Rs 1.40 per share and trade for Rs 80 per share at the end of the year. If investments with equivalent risk to Glenmark's stock have an expected return of 8.5%, what is the most you would pay today for Glenmark's stock? What dividend yield and capital gain rate would you expect at this price?

- Find P_0
- Glenmark's dividend yield is D_1/P_0 = 1.40/75.02 = 1.87%.
- The expected capital gain is Rs 80.00 - Rs 75.02 = Rs 4.98 per share, for a capital gain rate of 4.98/75.02 = 6.63%.
- Therefore, at this price, Glenmark's required rate of return is 1.87% + 6.63% = 8.5%.

Dividends versus Investment and Growth

- The firm's share price increases with the current dividend level, D_1, and the expected growth rate, g. To maximize its share price, a firm would like to increase both these quantities. Often, however, the firm faces a trade-off: Increasing growth may require investment, and money spent on investment cannot be used to pay dividends. We can use the constant dividend growth model to gain insight into this trade-off.
- If we define a firm's **dividend payout rate** as the fraction of its earnings that the firm pays as dividends each year, then we can write the firm's dividend per share at date t as follows

$$Div_t = \underbrace{\frac{\text{Earnings}_t}{\text{Shares Outstanding}_t}}_{EPS_t} \times \text{Dividend Payout Rate}_t$$

- That is, the dividend each year is the firm's earnings per share (EPS) multiplied by its dividend payout rate. Thus the firm can increase its dividend in three ways:

➢ It can increase its earnings (net income).

➢ It can increase its dividend payout rate.

➢ It can decrease its shares outstanding.

- Let's suppose for now that the firm does not issue new shares (or buy back its existing shares), so that the number of shares outstanding is fixed, and explore the potential tradeoff between options 1 and 2.
- A firm can do one of two things with its earnings: It can pay them out to investors, or it can retain and reinvest them. By investing more today, a firm can increase its future earnings and dividends. For simplicity, let's assume that if no investment is made, the firm does not grow, so the current level of earnings generated by the firm remains constant.
- If all increases in future earnings result exclusively from new investment made with retained earnings, then

Change in Earnings = New Investment * Return on New Investment

- New investment equals earnings multiplied by the firm's **retention rate**, the fraction of current earnings that the firm retains:

New Investment = Earnings * Retention Rate

- Now we have an expression for the growth rate of earning

  Earnings Growth Rate =Change in Earnings/Earnings

  = Retention Rate * Return on New Investment
- If the firm chooses to keep its dividend payout rate constant, then the growth in dividends will equal growth of earnings:

  ***g* = Retention Rate * Return on New Investment**
- This growth rate is sometimes referred to as the firm's **sustainable growth rate**, the rate at which it can grow using only retained earnings.
- A firm can increase its growth rate by retaining more of its earnings. However, if the firm retains more earnings, it will be able to pay out less of those earnings and, it will have to reduce its dividend. If a firm wants to increase its share price, should it cut its dividend and invest more, or should it cut investment and increase its dividend? Not surprisingly, the answer will depend on the profitability of the firm's investments.

Q. XYZ expects to have earnings per share of Rs 6 in the coming year. Rather than reinvest these earnings and grow, the firm plans to pay out all of its earnings as a dividend. With these expectations of no growth, XYZ 's current share price is Rs 60.

Suppose XYZ could cut its dividend payout rate to 75% for the foreseeable future and use the retained earnings to open new stores. The return on its investment in these stores is expected to be 12%. Assuming its required rate of return is unchanged, what effect would this new policy have on XYZ 's stock price?

- First, let's estimate XYZ's required rate of return. Currently, XYZ plans to pay a dividend equal to its earnings of Rs 6 per share. Given a share price of Rs 60, XYZ's dividend yield is Rs 6/Rs 60 = 10%. With no expected growth (g = 0), we can estimate R :

$$\boldsymbol{R = D/P_0 + g = 10\% + 0\% = 10\%}$$

- In other words, to justify XYZ's stock price under its current policy, the expected return of other stocks in the market with equivalent risk must be 10%.
- Next, we consider the consequences of the new policy. If XYZ reduces its dividend payout rate to 75%, then from its dividend this coming year will fall to

$$D_1 = EPS_1 * 75\% = \text{Rs } 6 * 75\% = \text{Rs } 4.50.$$

- At the same time, because the firm will now retain 25% of its earnings to invest in new stores, its growth rate will increase to

$$\boldsymbol{g = \text{Retention Rate} * \text{Return on New Investment} = 25\% * 12\% = 3\%}$$

- Assuming XYZ can continue to grow at this rate, we can compute its share price under the new policy using the constant dividend growth model:

$$P_0 = D_1/(R - g) = \text{Rs } 4.50/(0.10 - 0.03)$$
$$= \text{Rs } 64.29$$

- Thus, XYZ's share price should rise from Rs 60 to Rs 64.29 if it cuts its dividend to invest in projects that offer a return (12%) greater than their cost of capital (which we assume remains 10%). These projects are positive NPV, and so by taking them XYZ has created value for its shareholders.

Q. Suppose XYZ decides to cut its dividend payout rate to 75% to invest in new stores. But now suppose that the return on these new investments is 8% rather than 12%. Given its expected earnings per share this year of Rs 6 and required rate of return of 10%, what will happen to XYZ's current share price in this case?

- XYZ's dividend will fall to Rs 6 * 75% = Rs 4.50. Its growth rate under the new policy, given the lower return on new investment, will now be

$$g = 25\% * 8\% = 2\%.$$

- The new share price is therefore

$$\boldsymbol{P_0 = D_1/(R - g) = \text{Rs } 4.50/(0.10 - 0.02)}$$

$$= \text{Rs } 56.25$$

- Thus, even though XYZ will grow under the new policy, the new investments have negative NPV. XYZ's share price will fall if it cuts its dividend to make new investments with a return of only 8% when its investors can earn 10% on other investments with comparable risk.

Limitations of the Dividend growth model

- The dividend-discount model values the stock based on a forecast of the future dividends paid to shareholders. But unlike a Treasury bond, whose cash flows are known with virtual certainty, a tremendous amount of uncertainty is associated with any forecast of a firm's future dividends. Even small changes in the assumed dividend growth rate can lead to large changes in the estimated stock price.
- Forecasting dividends requires forecasting the firm's earnings, dividend payout rate, and future share count. But future earnings depend on interest expenses (which in turn depend on how much the firm borrows), and the firm's share count and dividend payout rate depend on whether the firm uses a portion of its earnings to repurchase shares. **Because borrowing and repurchase decisions are at management's discretion, they can be difficult to forecast reliably**.

Valuation using total payout

- In our discussion of the dividend-discount model, we implicitly assumed that any cash paid out by the firm to shareholders takes the form of a dividend. However, in recent years, an increasing number of firms have replaced dividend payouts with **share repurchases**.
- In a share repurchase, the firm uses excess cash to buy back its own stock. Share repurchases have two consequences for the dividend-discount model. First, the more cash the firm uses to repurchase shares, the less it has available to pay dividends. Second, by repurchasing shares, the firm decreases its share count, which increases its earnings and dividends on a per-share basis.

- In the dividend-discount model, we valued a share from the perspective of a single shareholder, discounting the dividends the shareholder will receive:

$$P_0 = PV(\text{Future Dividends per Share})$$

- An alternative method that may be more reliable when a firm repurchases shares is the **total payout model**, which values *all* of the firm's equity, rather than a single share. To do so, we discount the total payouts that the firm makes to shareholders, which is the total amount spent on both dividends *and* share repurchases. Then, we divide by the current number of shares outstanding to determine the share price

Total Payout Model

$$P_0 = \frac{PV(\text{Future Total Dividends and Repurchases})}{\text{Shares Outstanding}_0}$$

- We can apply the same simplifications that we obtained by assuming constant growth in to the total payout method. **The only change is that we discount total dividends and share repurchases and use the growth rate of total earnings (rather than earnings per share) when forecasting the growth of the firm's total payouts.** This method can be more reliable and easier to apply when the firm uses share repurchases.

Q. Titan Industries has 21.7 crore shares outstanding and expects earnings at the end of this year of Rs 86 crores. Titan plans to pay out 50% of its earnings in total, paying 30% as a dividend and using 20% to repurchase shares. If Titan's earnings are expected to grow by 7.5% per year and these payout rates remain constant, determine Titan's share price assuming required rate of return of 10%.

- Titan will have total payouts this year of 50% * Rs 86 crore = Rs 43 crore. Based on the required rate of return of 10% and an expected earnings growth rate of 7.5%, the present value of Titan's future payouts can be computed as a constant growth perpetuity:

  PV (Future Total Dividends and Repurchases) = Rs 43 crore/(0.10 - 0.075)

- This present value represents the total value of Titan's equity (i.e., its market capitalization). To compute the share price, we divide by the current number of shares outstanding.

Stock valuation using multiples

- An obvious problem with our dividend-based approach to stock valuation is that many companies don't pay dividends. In the **method of comparables** (or "comps"), rather than value the firm's cash flows directly, we estimate the value of the firm based on the value of other, comparable firms or investments that we expect will generate very similar cash flows in the future. We can adjust for differences in scale between firms by expressing their value in terms of a **valuation multiple**, which is a ratio of the value to some measure of the firm's scale.
- The most common valuation multiple the PE ratio, which is the ratio of a stock's price per share to its earnings per share (EPS) over the previous year. The idea here is to have some sort of benchmark or reference PE ratio, which we then multiply by earnings to come up with a price:

$$\textbf{Price at Time t} = P_t = \textbf{Benchmark PE ratio} \times EPS_t$$

- The benchmark PE ratio could come from one of several possible sources. It could be based on similar companies (perhaps an industry average or median), or it could be based on a company's own historical values.
- Often we will be interested in valuing newer companies that both don't pay dividends and are not yet profitable, meaning that earnings are negative. In such instances, **we could use the price-sales ratio** (price per share on the stock divided by sales per share). You use this ratio just like you use the PE ratio, except you use sales per share instead of earnings per share.

Q. Suppose XYZ has earnings per share of Rs 1.38. If the average P/E of comparable firms in the industry is 21.3, estimate a value for XYZ using the P/E as a valuation multiple. What are the assumptions underlying this estimate?

- We estimate a share price for XYZ by multiplying its EPS by the P/E of comparable firms. Thus, P_0 = Rs 1.38 * 21.3 = Rs 29.39. This estimate assumes that XYZ will have similar future risk, payout rates, and growth rates to comparable firms in the industry.

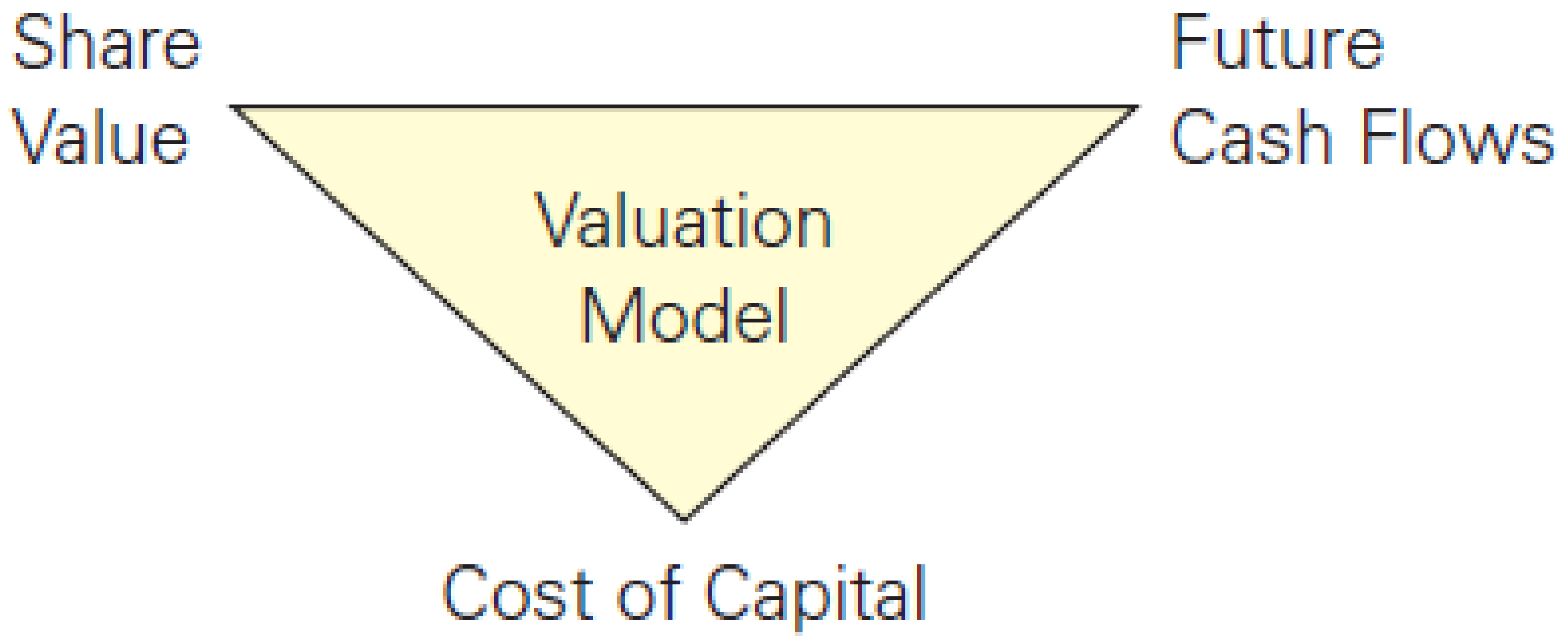
Limitations of multiples

- If comparable firms were identical, their multiples would match precisely. Of course, firms are not identical. Thus, the usefulness of a valuation multiple will depend on the nature of the differences between firms and the sensitivity of the multiples to these differences.
- Thus, a key shortcoming of the comparables approach is that it does not take into account the important differences among firms. One firm might have an exceptional management team, another might have developed an efficient manufacturing process, or secured a patent on a new technology. Such differences are ignored when we apply a valuation multiple.

Information in Stock Prices

- When a buyer seeks to buy a stock, the willingness of other parties to sell the same stock suggests that they value the stock differently, as the NPV of buying and selling the stock cannot *both* be positive. Thus, the information that others are willing to trade should lead buyers and sellers to revise their valuations. Ultimately, investors trade until they reach a consensus regarding the value of the stock. In this way, stock markets aggregate the information and views of many different investors
- Thus, if your valuation model suggests a stock is worth Rs 30 per share when it is trading for Rs 20 per share in the market, the discrepancy is equivalent to knowing that thousands of investors—many of them professionals who have access to the best information—disagree with your assessment. This knowledge should make you reconsider your original analysis.

The Valuation Triad



- **A valuation model links the firm’s future cash flows, its cost of capital, and its share price**. In other words, given accurate information about any two of these variables, a valuation model allows us to make inferences about the third variable. Thus, the way we use a valuation model will depend on the quality of our information: The model will tell us the most about the variable for which our prior information is the least reliable.
- For a publicly traded firm, its market price should already provide very accurate information, aggregated from a multitude of investors, regarding the true value of its shares. Therefore, in most situations, a valuation model is best applied to tell us something about the firm’s future cash flows or the required rate of return on its stock, based on its current stock price. Only in the relatively rare case in which we have some superior information that other investors lack regarding the firm’s cash flows and cost of capital would it make sense to second-guess the stock price.

- **Suppose XYZ will pay a dividend this year of Rs 5 per share. The required rate of return is 10%, and you expect its dividends to grow at a rate of about 4% per year, though you are somewhat unsure of the precise growth rate. If XYZ's stock is currently trading for Rs 76.92 per share, how would you update your beliefs about its dividend growth rate?**
- We apply the constant dividend growth model based on a 4% growth rate, we would estimate a stock price of P_0 = 5/(0.10 - 0.04) = Rs 83.33 per share. The market price of Rs 76.92, however, implies that most investors expect dividends to grow at a somewhat slower rate. If we continue to assume a constant growth rate, we can solve for the growth rate consistent with the current market price.

$$g = R - D_1/P_0 = 10\% - 5/76.92 = 3.5\%$$

- Thus, given this market price for the stock, we should lower our expectations for the dividend growth rate unless we have very strong reasons to trust our own estimate.

Efficient market hypothesis

- The idea that markets aggregate the information of many investors, and that this information is reflected in security prices, is a natural consequence of investor competition. If information were available that indicated that buying a stock had a positive NPV, investors with that information would choose to buy the stock; their attempts to purchase it would then drive up the stock's price. By a similar logic, investors with information that selling a stock had a positive NPV would sell it and the stock's price would fall.
- The idea that competition among investors works to eliminate *all* positive-NPV trading opportunities is referred to as the **efficient markets hypothesis**. It implies that securities will be fairly priced, based on their future cash flows, given all information that is available to investors.