

# Auditing Course Material

Part 26 of 61 (Chapters 2501-2600)

## 23. Jensen Alpha

Jensen's Alpha, also known simply as Alpha, is used to evaluate the risk-adjusted returns of a portfolio or investment compared to its expected performance, as predicted by the Capital Asset Pricing Model (CAPM).

$$\text{JENSEN ALPHA, } \alpha = \bar{\alpha}_P - [\bar{\alpha}_f + \beta_P (\bar{\alpha}_M - \bar{\alpha}_f)]$$

$\bar{\alpha}_P$  = EXPECTED RETURN OF PORTFOLIO

$\bar{\alpha}_M$  = EXPECTED RETURN ON MARKET

$\bar{\alpha}_f$  = RISK FREE RETURN

$\beta_P$  = SYSTEMATIC RISK OF PORTFOLIO

It measures the difference between the actual return of a portfolio and the return that would be expected given the portfolio's beta (systematic risk) and the overall market's performance.

If the portfolio has a positive alpha, it means the portfolio outperformed the market, given its level of risk (beta). This suggests the portfolio manager added value by generating returns beyond what CAPM predicts.

A negative alpha indicates that the portfolio underperformed relative to what would be expected given its beta. This suggests that the manager did not generate sufficient returns to compensate for the risk taken.

If alpha is zero, the portfolio performed as expected according to the CAPM model, meaning it earned a return consistent with its risk level and the overall market.

Jensen's Alpha is based on CAPM, which makes several assumptions, such as a linear relationship between risk and return, a single period time horizon, and the ability to borrow at the risk-free rate. In reality, markets and behaviors can deviate from these assumptions.

Alpha focuses only on systematic risk (market-related risk) as captured by beta. It does not account for unsystematic (firm-specific) risk, which can also affect a portfolio's performance if it is not fully diversified.

## 23. Jensen Alpha

Based on below data on two portfolios, A and B, compute the followings:

	<u>PORTFOLIO A</u>	<u>PORTFOLIO B</u>
$\alpha_p$	0.11	0.12
$\sigma_p$	0.10	0.13
$\beta$	0.99	1.22
$\alpha_f$	0.05	
$\alpha_m$	0.10	
$\sigma_m^2$		0.0064
$\sigma_m$		0.08

- (i) Sharpe Ratio
- (ii) Treynor Ratio
- (iii) M-squared Measure
- (iv) Jensen's Alpha

SOLUTION:

- (i) Sharpe Ratio

$$\text{SHARPE RATIO} = \frac{\alpha_p - \alpha_f}{\sigma_p}$$

$$\text{PORTFOLIO A} \rightarrow \frac{0.11 - 0.05}{0.10} = 0.60$$

$$\text{PORTFOLIO B} \rightarrow \frac{0.12 - 0.05}{0.13} = 0.54$$

- (ii) Treynor Ratio

$$\text{TREYNOR RATIO} = \frac{\alpha_p - \alpha_f}{\beta_p}$$

$$\text{PORTFOLIO A} \rightarrow \frac{0.11 - 0.05}{0.99} = 0.060$$

$$\text{PORTFOLIO B} \rightarrow \frac{0.12 - 0.05}{1.22} = 0.057$$

- (iii) M-squared Measure

$$M\text{-SQUARED} = \left( \frac{\alpha_p - \alpha_f}{\sigma_p} \right) \times \sigma_m - (\alpha_m - \alpha_f)$$

$$\text{PORTFOLIO A} \rightarrow \left( \frac{0.11 - 0.05}{0.10} \right) \times 0.08 - (0.10 - 0.05) = -0.20$$

$$\text{PORTFOLIO B} \rightarrow \left( \frac{0.12 - 0.05}{0.13} \right) \times 0.08 - (0.10 - 0.05) = -0.68$$

(iv) Jensen's Alpha

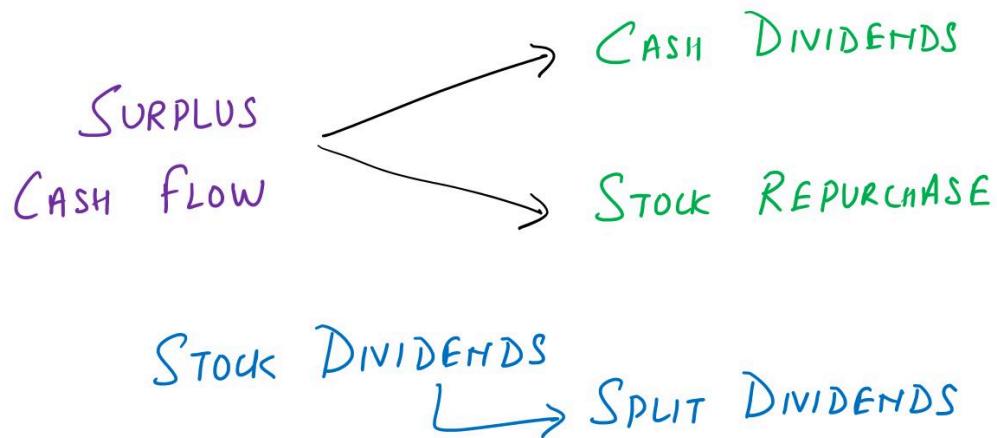
$$\text{JENSEN ALPHA} = \alpha_p - [\alpha_f + \beta_p(\alpha_m - \alpha_f)]$$

$$\text{PORTFOLIO A} \rightarrow 0.11 - [0.05 + 0.99(0.10 - 0.05)] = 0.0105$$

$$\text{PORTFOLIO B} \rightarrow 0.12 - [0.05 + 1.22(0.10 - 0.05)] = 0.0090$$

## 1. Introduction

A **dividend** is a distribution of earnings that a company pays to its shareholders as a reward for their investment in the company's stock. It is typically paid out on a regular basis, such as quarterly or annually, and is calculated based on the company's earnings and dividend policy.



When a company decides to pay dividends, it can do so in various forms.

The most common type is a **cash dividend**, where shareholders receive a certain amount of money for each share they own. This cash payout comes directly from the company's earnings and reduces both its cash reserves and its retained earnings.

Another form of dividend is a **stock dividend**, where shareholders receive additional shares of stock instead of cash. While this doesn't involve any cash leaving the company, it does increase the number of shares outstanding, which can dilute the value of each existing share.

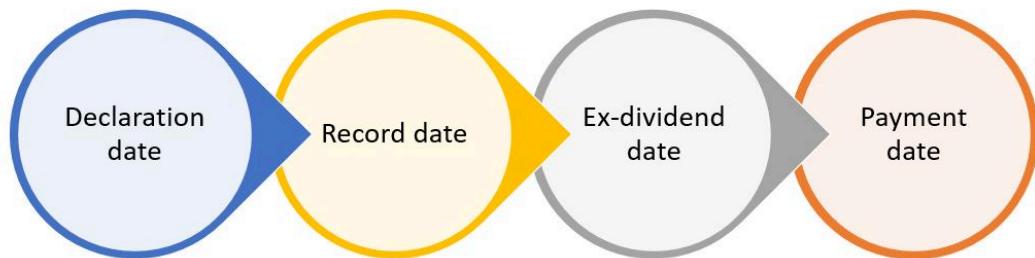
A stock dividend is often denoted as a percentage; for instance, a 20 percent stock dividend implies that a shareholder acquires one additional share for every five they currently possess (which equates to a 20 percent boost). With each shareholder receiving 20 percent more stock, the overall number of shares outstanding climbs by 20 percent.

A **stock split** is essentially the same thing as a stock dividend, except that a split is expressed as a ratio instead of a percentage. When a split is declared, each share is split up to create additional shares. For example, in a three-for-one stock split, each old share is split into three new shares.

In some cases, rather than distributing dividends or issuing stock dividends, a company may opt to repurchase its own shares from the market. This process, known as a **stock repurchase** (share buyback), reduces the number of shares outstanding and can be a way for the company to return value to shareholders or signal confidence in its own stock.

## 2. Chronology of payment dates

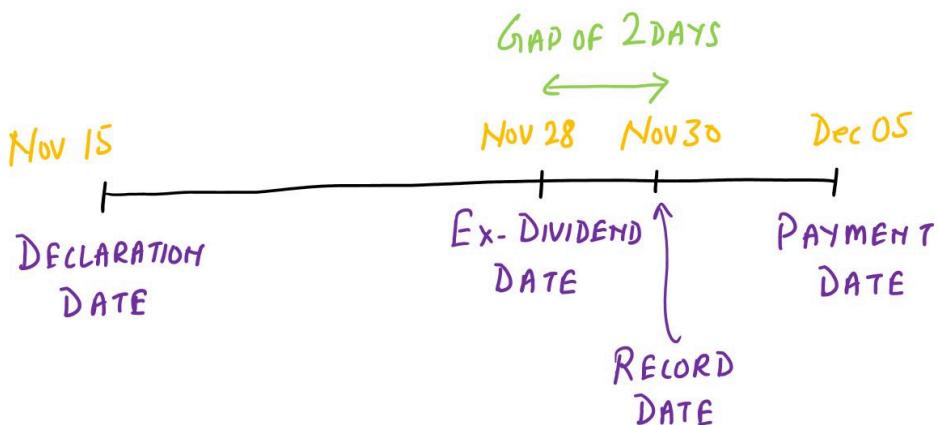
The decision to pay a dividend rests in the hands of the board of directors of the corporation.



A dividend is distributable to shareholders of record on a specific date. When a dividend has been declared, it becomes a liability of the firm and cannot be easily rescinded by the corporation.

The amount of the dividend is expressed as:

- (i) amount per share (dividend per share)
- (ii) a percentage of the market price (dividend yield)
- (iii) a percentage of earnings per share (dividend payout)



The mechanics of a dividend payment can be illustrated by the example:

1. **Declaration Date:** On November 15 (the declaration date), the board of directors passes a resolution to pay a dividend of Rs 3 per share on December 05 to all holders of record on November 30.
2. **Date of Record:** The corporation prepares a list on November 30 of all individuals believed to be stockholders as of this date. The dividend will not be paid to individuals whose notification of purchase is received by the company after November 30.
3. **Ex-dividend Date:** The procedure for the date of record would be unfair if efficient brokerage houses could notify the corporation by November 30 of a trade occurring on November 29, whereas the same trade might not reach the corporation until December 02 if executed by a less efficient house. To eliminate this problem, all brokerage firms entitle stockholders to receive the dividend if they purchased the stock 3 business days before the date of record. The second day before the date of record, which is November 28, in our example, is called the ex-dividend date. Before this date the stock is said to trade cum dividend.

The ex-dividend date is important because an individual purchasing the security before the ex-dividend date will receive the current dividend, whereas another individual purchasing the security on or after this date will not receive the dividend.

4. **Date of Payment:** The dividend checks are paid to the stockholders on December 05.

## 2. Chronology of payment dates

On Tuesday, December 8, XYZ's board of directors declares a dividend of Rs 8 per share payable on Wednesday, January 17, to shareholders of record as of Wednesday, January 3. When is the ex-dividend date? If a shareholder buys stock before that date, who gets the dividends on those shares—the buyer or the seller? January 1 is a holiday on new year.

**Solution:**

Friday, December 29 is the ex-dividend day. Remember not to count January 1 because it is a holiday, and the exchanges are closed. Anyone who buys the stock before December 29 is entitled to the dividend, assuming they do not sell it again before December 29.

## 3. Dividend Payout

Dividend payout is financing decision made by a firm regarding the allocation of its earnings. Periodically, the firm must determine whether to retain its earnings or distribute a portion or all of them to shareholders in the form of cash dividends.

$$\text{DIVIDENDS} \quad = \quad \frac{\text{DIVIDEND PER SHARE}}{\text{EARNINGS PER SHARE}}$$
$$\text{PAYOUT RATIO}$$

The **dividend-payout ratio**, is calculated by dividing annual cash dividends by annual earnings (dividends per share by earnings per share). This ratio signifies the percentage of a company's earnings that is disbursed to shareholders as cash dividends.

In the presence of investment projects yielding returns exceeding required levels (Positive NPV projects), the firm utilizes its earnings to finance these ventures. If surplus earnings remain after funding all viable investment opportunities, they are then distributed to shareholders as cash dividends. Conversely, if earnings are insufficient, no dividends are issued.

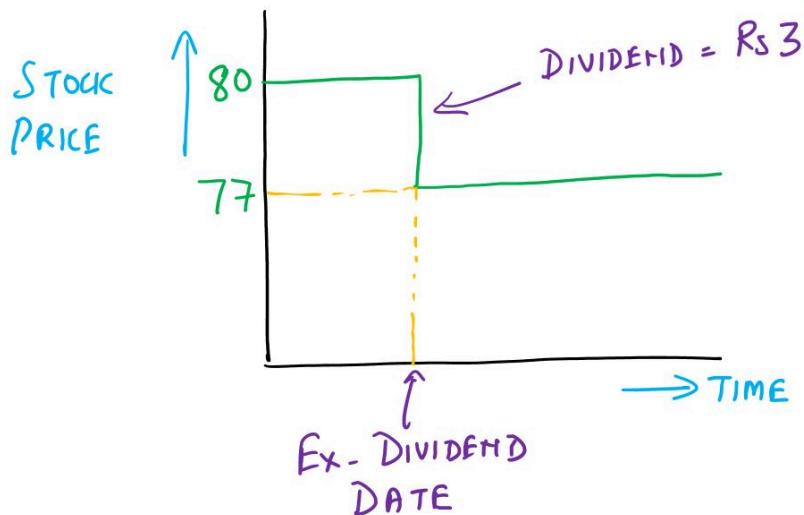
*Firms should never give up a positive NPV project to increase a dividend (or to pay a dividend for the first time).*

Cash dividend payment operates as a residual, with the percentage of earnings allocated to dividends fluctuating based on the availability of profitable investment opportunities. In periods with ample investment prospects, the dividend-payout ratio tends towards zero. Conversely, when profitable ventures are scarce, the ratio approaches 100 percent. Situations between these extremes result in dividend-payout ratios ranging from zero to one.

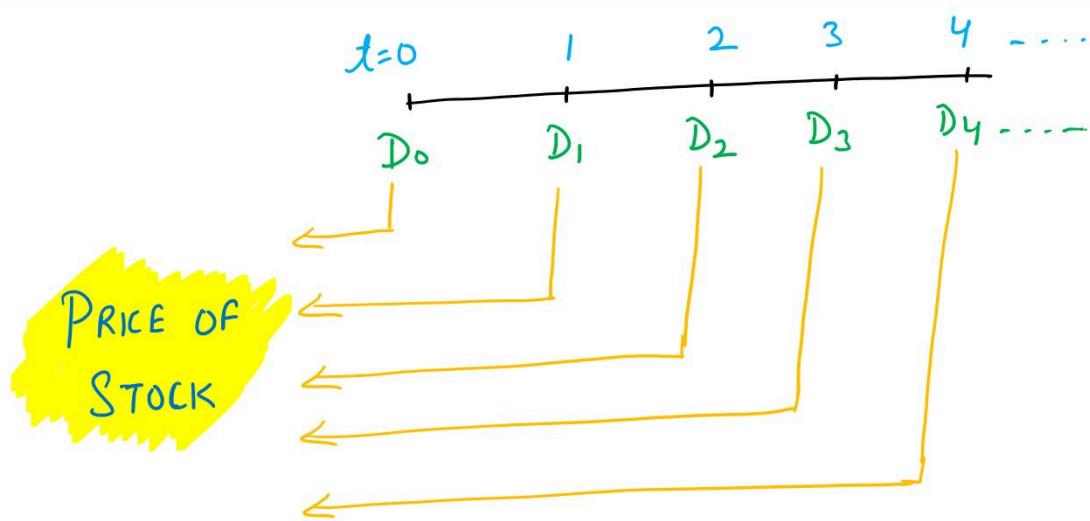
## 4. Dividend and Stock Price

When a company distributes dividends to its shareholders, it is common for the stock price to decrease on the ex-dividend date. This decline is not a sign of market inefficiency; rather, it reflects market efficiency, indicating that the market accurately values the cash dividend.

In an ideal setting without taxes or transaction costs, the **stock price would drop by the exact amount of the dividend**. For example, if the stock price is initially Rs 80 and the dividend is Rs 3, it would decrease to Rs 77 on the ex-dividend date.



We have learnt that the stock price is nothing but equal to the net present value of all future dividends. Thus, when a dividend is disbursed to shareholders, the stock's price diminishes by an equivalent sum to maintain equilibrium.



However, in the real world with taxes in place, the extent of the price drop can vary depending on tax rates. Before a stock goes ex-dividend, investors need to decide whether to purchase the stock immediately and pay tax on the upcoming dividend or wait until the next day and forego the dividend.

Assuming all investors are in the 15% tax bracket and the quarterly dividend is Rs 3, the stock price would be expected to decrease by Rs 2.55 (15% reduction in Rs 3) on the ex-dividend date. Thus, the Rs 80 stock would decrease to Rs 77.45 on the ex-dividend date.

This implies that if the stock price falls by this amount on the ex-dividend date, investors would achieve similar returns regardless of their strategy—whether they choose to buy the stock immediately and pay taxes on the dividend or wait and miss the dividend.

## 4. Dividend and Stock Price

A firm has declared a Rs 9.50 per-share dividend. Suppose capital gains are not taxed, but dividends are taxed at 15%. New government regulations require that taxes be withheld when the dividend is paid. Leena sells for Rs 115 per share, and the stock is about to go exdividend. What do you think the ex-dividend price will be?

Solution:

$$\text{DIVIDEND BEFORE TAX} = \text{Rs } 9.50$$

$$\text{DIVIDEND AFTER TAX} = 9.50 (1 - 0.15) = \text{Rs } 8.08$$

$$\text{Ex DIVIDEND PRICE OF STOCK} = 115 - 8.08 = \text{Rs } 106.92$$

## 5. M&M Theory of Dividend Irrelevancy

The M&M Theory of Dividend Irrelevance, formulated by Miller and Modigliani (M&M), posits that a firm's dividend policy has no effect on its value or the wealth of its shareholders under certain idealized assumptions.

These assumptions include:

- perfect capital markets where there are no transaction costs,
- no flotation costs for companies issuing securities,
- no taxes, and
- perfect certainty regarding the firm's future profits.

According to M&M, a firm's value is determined solely by its investment policy and the earning power of its assets, regardless of how profits are distributed between dividends and retained earnings. Therefore, whether a firm pays dividends or retains earnings for reinvestment should have no impact on its overall value.

The M&M theory should be understood from the perspective of manager as well as investor:

- (i) *Managers* are free to choose any dividend policy without influencing the firm's value or the wealth of shareholders. Whether a firm pays high dividends, low dividends, or no dividends at all, its value remains unchanged, under above assumptions.
- (ii) *Investors* have the ability to undo the effects of a firm's dividend policy through homemade dividends. If a firm does not pay dividends or pays lower dividends than desired, investors can sell a portion of their shares to create their desired income stream. Conversely, if a firm pays higher dividends than desired, investors can reinvest those dividends back into the firm or other investments to achieve their desired portfolio mix.

Let us understand both these aspects.

## 5. M&M Theory of Dividend Irrelevancy

Consider an all-equity firm, which will wind up in the next year (we assume this for the simplification of calculation). Managers anticipate a cash flow of Rs 10,000 immediately and another Rs 10,000 next year. The firm has no additional positive NPV projects to invest, with 1000 shares outstanding. The discount rate is 10%.

Let us analyze different dividend payout scenarios.

**Option 1: Dividend is equal to cash flows**

All cash flows are distributed as dividends to shareholders. With 1000 shares outstanding and a cash flow of Rs 10,000 annually, the investors will receive Rs 10 dividend per share now and Rs 10 dividend per share after 1 year.

**OPTION 1**

$$\begin{array}{ccc}
 & t=0 & t=1 \\
 \text{---} & | & | \\
 10 & & 10
 \end{array}$$

$$\text{VALUE OF FIRM} = 10,000 + \frac{10,000}{1.10} = 19,090.91$$

$$\text{VALUE OF STOCK} = 10 + \frac{10}{1.10} = 19.09$$

$$\text{STOCK PRICE BEFORE DIVIDEND} = 19.09$$

$$\text{STOCK PRICE AFTER DIVIDEND} = 19.09 - 10 = 9.09$$

**Option 2: Pay extra dividend - Issue stocks to generate additional cash flow**

Instead of Rs 10, the firm decides to pay a dividend of Rs 11 per share immediately, resulting in a total dividend payout of Rs 11,000 (since there are 1000 shares).

**OPTION 2**

$$\begin{array}{ccc}
 & t=0 & t=1 \\
 \text{---} & | & | \\
 11 & & 8.90
 \end{array}$$

HIGH DIVIDEND  
→ ISSUE STOCK

EXTRA 1000 → 10% ↑ → 1100

$$\frac{10,000 - 1100}{100} = 8.90$$

$$\text{VALUE OF STOCK} = 11 + \frac{8.90}{1.10} = 19.09$$

$$\text{STOCK PRICE BEFORE DIVIDEND} = 19.09$$

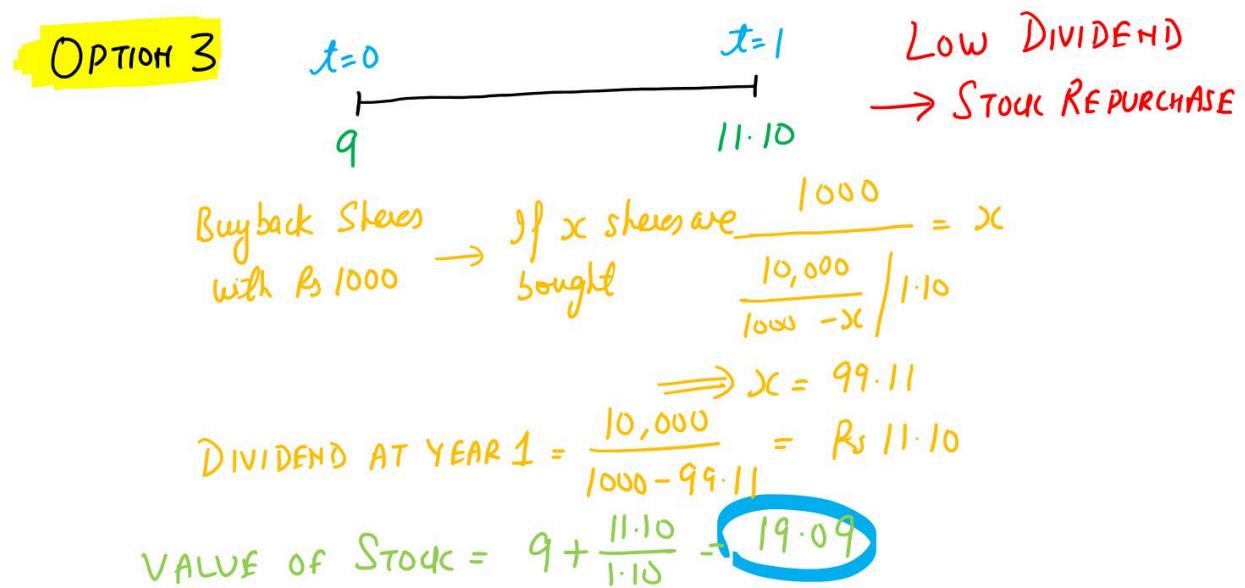
$$\text{STOCK PRICE AFTER DIVIDEND} = 19.09 - 11 = 8.09$$

However, since available cash flow is only Rs 10,000, an extra Rs 1,000 must be raised by issuing Rs 1,000 of bonds or stock now. Suppose we issue stocks. New stockholders, demanding a 10% return (discount rate is assumed to be 10%), will demand Rs 1100 after 1 year. Thus will reduce old shareholders' year 1 dividend to Rs 8.90 per share (Rs 10,000-1100 will be distributed among 1000 old shareholders).

A decrease in the proportional claim on earnings and assets of a share of common stock because of the issuance of additional shares is called *Dilution*.

### Option 3: Pay less dividend - Buy back stocks with additional cash flow

Instead of Rs 10, the firm decides to pay a dividend of Rs 9 per share immediately, resulting in a total dividend payout of Rs 9,000. With Rs 1,000 surplus, the firm buys back 99.11 shares (at a price of Rs 10.09).



After year 1, Rs 10,000 is distributed as dividends among 900.89 shareholders, resulting in a dividend of Rs 11.10 per share.

#### Conclusion

From above 3 options, we can conclude that the change in dividend policy did not affect the value of a share (price of stock) as long as all distributable cash flow is paid out. The value of stock comes out to be Rs 19.09 in all three options.

Thus, we conclude that altering the timing of dividend payments doesn't increase the dividend per share at one date while maintaining a constant dividend level per share at other dates. Instead, it simply shifts the distribution of dividends over time.

This implies that a manager's decision regarding dividend policy, such as whether to pay dividends now or later, does not affect the total wealth of shareholders (or value of a firm ).

## 5. M&M Theory of Dividend Irrelevancy

To understand, how investors are indifferent toward dividend policy, consider 3 options once again.

Let us analyze different dividend payout scenarios.

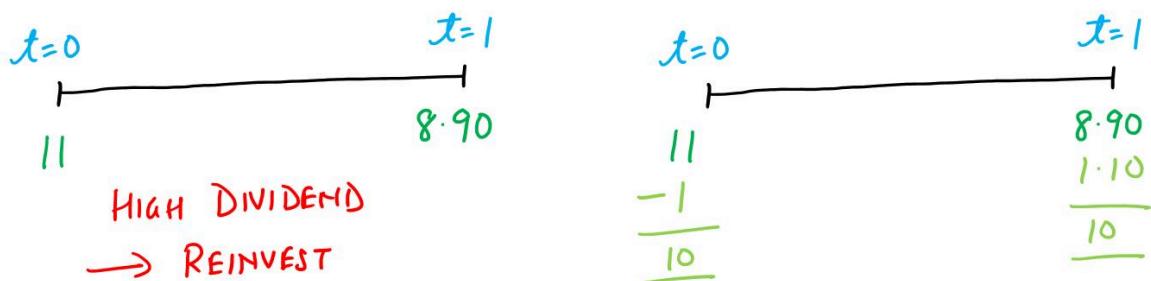
**Option 1: Dividend is equal to cash flows**

The cash flow to the investor will look like below figure.



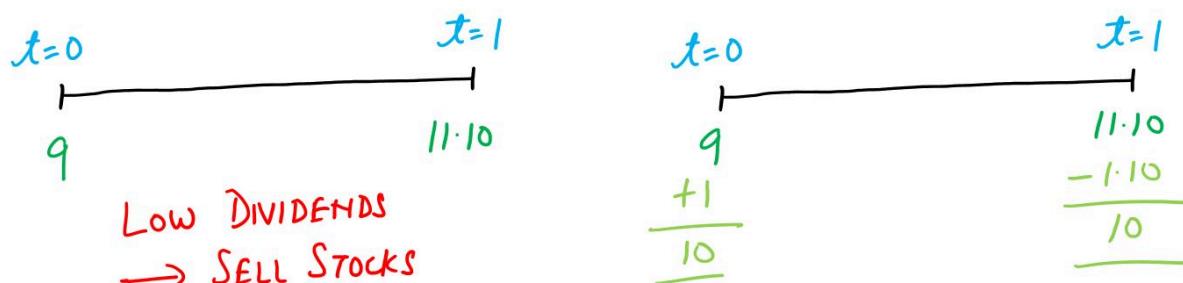
**Option 2: High dividend - reinvest additional cash**

The investor can easily reinvest Rs 1 from year 0, yielding an incremental return of Rs 1.10 at Year 1. So the revised cash flow for the investor will be same as in Option 1.



**Option 3: Pay less dividend - sell stocks**

The investor can sell off shares of Rs 1 at Year 0 to receive the desired amount of cash flow at Year 0. A Rs 1 sale of stock at Year 0 will reduce his dividends by Rs 1.10 at Year 1. His net cash flow will be same as cashflow in option 1.



Thus we see that how individuals can undo the firm's dividend policy. This is called **Homemade Dividends**.

Investors are able to replicate any dividend stream the firm might be able to pay but currently is not. If dividends are lower than desired, investors can sell some shares of stock to obtain their desired cash distribution. If dividends are higher than desired, investors can use dividends to purchase additional shares of stock in the company. Thus investors are able to manufacture "homemade" dividends in the same way that they could devise "homemade" financial leverage if they were unhappy with a firm's current capital structure.

Because investors can manufacture homemade dividends, which are perfect substitutes for corporate dividends (under M&M assumptions), dividend policy is irrelevant. As a result, one dividend policy is as good as the next. The firm is unable to create value simply by altering the mix of dividends and retained earnings.

Thus the shareholder is said to be indifferent between receiving dividends and having earnings retained by the firm.

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## 5. M&M Theory of Dividend Irrelevancy

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The Babbu Mann Company belongs to a risk class for which the appropriate discount rate is 10%. The company currently has 2,20,000 outstanding shares selling at Rs 110 each. The firm is contemplating the declaration of a Rs 4 dividend at the end of the fiscal year that just began. Assume there are no taxes on dividends. Answer the following questions based on the Miller and Modigliani model:

- (a) What will be the price of the stock on the ex-dividend date if the dividend is declared?
- (b) What will be the price of the stock at the end of the year if the dividend is not declared?
- (c) If the company makes Rs 45,00,000 of new investments at the beginning of the period, earns net income of Rs 19,00,000, and pays the dividend at the end of the year, how many shares of new stock must the firm issue to meet its funding needs?
- (d) Is it realistic to use the MM model in the real world to value stock?

**Solution:**

- (a) If the dividend is declared, the price of the stock will drop on the ex-dividend date by the value of the dividend, Rs 4. It will then trade for Rs 106.
  - (b) If it is not declared, the price will remain at Rs 110.
  - (c) The company's outflows for investments are Rs 45,00,000. These outflows occur immediately. One year from now, the firm will realize Rs 19,00,000 in net income and it will pay Rs 8,80,000 in dividends, but the need for financing is immediate. The company must finance Rs 45,00,000 through the sale of shares worth Rs 110. It must sell  $45,00,000/110 = 40,909$  shares.
  - (d) The MM model is not realistic since it does not account for taxes, brokerage fees, uncertainty over future cash flows, investors' preferences, signaling effects, and agency costs.
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## 5. M&M Theory of Dividend Irrelevancy

You own 1,000 shares of stock in Nestle Corporation. You will receive a dividend of Rs 1.10 per share in one year. In two years, Nestle will pay a liquidating dividend of Rs 56 per share. The required return on the stock is 14%.

- What is the current share price of your stock (ignoring taxes)?
- If you would rather have equal dividends in each of the next two years, show how you can accomplish this by creating homemade dividends.
- Suppose you want only Rs 500 total in dividends the first year. What will your homemade dividend be in two years?

Solution:

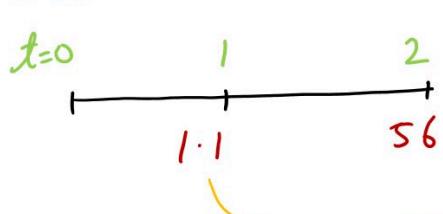
- What is the current share price of your stock (ignoring taxes)?

$$\text{Price of stock today} = \frac{1.1}{1.14} + \frac{56}{1.14^2} = \text{Rs } 44.06$$

- If you would rather have equal dividends in each of the next two years, show how you can accomplish this by creating homemade dividends.

Let equal dividend be =  $x$

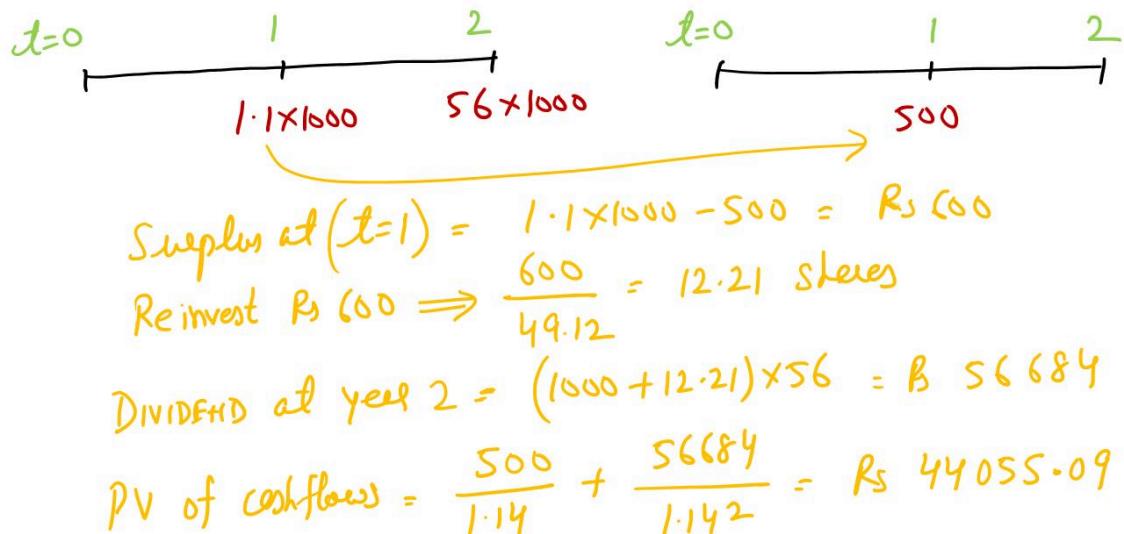
$$\frac{x}{1.14} + \frac{x}{1.14^2} = 44.06 \Rightarrow x = 26.75$$



We need additional  $(26.75 - 1.1) \times 1000$  cash flow

$$\begin{aligned} \text{PRICE OF STOCK AT } t=1 &= \frac{56}{1.14} = \text{Rs } 49.12 \\ \text{NUMBER OF SHARES TO BE SOLD} &= \frac{(26.75 - 1.1) \times 1000}{49.12} = 529.25 \text{ shares} \end{aligned}$$

- Suppose you want only Rs 500 total in dividends the first year. What will your homemade dividend be in two years?



## 5. M&M Theory of Dividend Irrelevancy

The net income of Novartis Corporation is Rs 85,000. The company has 25,000 outstanding shares and a 100 percent payout policy. The expected value of the firm one year from now is Rs 17,25,000. The appropriate discount rate is 12 percent, and the dividend tax rate is zero.

- (a) What is the current value of the firm assuming the current dividend has not yet been paid?
- (b) What is the ex-dividend price of Novartis's stock if the board follows its current policy?

Solution:

- (a) What is the current value of the firm assuming the current dividend has not yet been paid?

$$\text{VALUE OF FIRM} = 85000 + \frac{17,25,000}{1.12} = 16,25,178$$

- (b) What is the ex-dividend price of Novartis's stock if the board follows its current policy?

$$\text{STOCK PRICE} = \frac{16,25,178}{25,000} = \text{Rs } 65.01$$

$$\text{CURRENT DIVIDEND} = \frac{85,000}{25,000} = \text{Rs } 3.40$$

$$\text{EX DIVIDEND STOCK PRICE} = 65.01 - 3.40 = \text{Rs } 61.61$$

## 5. M&M Theory of Dividend Irrelevancy

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Following criticisms highlight limitations of the Modigliani-Miller (MM) approach regarding the irrelevance of dividend policy.

Let's address each criticism in the context of dividend policy irrelevance:

### **Perfect capital market does not exist in reality**

MM's dividend irrelevance proposition assumes a perfect capital market where there are no taxes, no transaction costs, and where all investors have access to the same information. In real-world imperfect markets, factors like taxes and transaction costs can influence investor preferences for dividends and thus impact firm value.

### **Information about the company is not available to all persons**

Information asymmetry can affect investors' perceptions of dividend policy. In scenarios where information about a company is not equally available to all investors, dividend policy decisions may convey important signals about the firm's financial health and future prospects, contrary to MM's assertion that dividend policy is irrelevant.

### **Firms have to incur flotation costs while issuing securities**

Flotation costs associated with issuing securities can impact a firm's dividend policy decisions. For example, if flotation costs are high, a firm may prefer to return excess cash to shareholders through dividends rather than issuing new securities, which challenges MM's proposition that dividend policy has no impact on firm value.

### **Taxes exist with different treatment for dividends and capital gains**

MM's dividend irrelevance proposition assumes no taxes. In reality, taxes on dividends may influence investor preferences for receiving dividends versus capital gains, impacting the firm's dividend policy decisions and potentially its value.

### **Firms do not follow a rigid investment policy**

Changes in a firm's investment policy can influence its dividend policy decisions. For example, if a firm embarks on an aggressive expansion strategy requiring substantial investment, it may choose to retain earnings rather than pay dividends, contradicting MM's assertion that dividend policy does not affect firm value.

### **Investors have to pay brokerage fees, etc., while doing any transaction**

Transaction costs can influence investor preferences for dividends versus capital gains. If transaction costs are significant, investors may prefer to receive dividends rather than selling shares to realize capital gains, challenging MM's proposition that dividend policy is irrelevant.

### **Shareholders may prefer current income as compared to further gains**

Investor preferences for current income versus capital gains can influence a firm's dividend policy decisions. If shareholders value current income highly, the firm may choose to pay dividends even if it reduces potential future gains, contradicting MM's assertion that dividend policy has no impact on firm value.

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## 6. Stock Repurchase

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Stock repurchase, also known as share buyback, is a strategy where a company buys back its own shares from the open market or directly from shareholders. Instead of paying dividends, the company uses its available cash to repurchase shares, effectively reducing the number of outstanding shares in the market.

There are several reasons why companies engage in stock repurchases:

### **Management Stock Option Plans**

Some companies repurchase their common stock to have it available for management stock option plans. By repurchasing shares and using them for stock options, the total number of shares outstanding remains constant even when options are exercised. This helps prevent dilution of existing shareholders' ownership.

### **Acquisitions**

Another reason for stock repurchase is to have shares available for the acquisition of other companies. By repurchasing shares and keeping them in treasury, the company can use them as a form of currency for future acquisitions.

### **Going Private**

In certain cases, companies may decide to "go private" by purchasing all of the stock of outside shareholders. This allows the company to operate without the scrutiny and reporting requirements of public markets.

### **Retiring Shares**

Some companies repurchase stock with the intention of retiring it, effectively reducing the total number of outstanding shares permanently. This can be done to boost earnings per share and return excess capital to shareholders.

### **Undervaluation**

If a company's stock is trading below its intrinsic value, repurchasing shares can be a way to signal to investors that the company believes its stock is undervalued. By buying back shares, the company can increase the ownership stake of existing shareholders and potentially boost the stock price.

### **Defensive Measure**

In certain cases, companies may repurchase shares as a defensive measure to fend off hostile takeover attempts. By reducing the number of outstanding shares, the company can make itself less attractive to potential acquirers or increase the cost of acquiring a controlling stake.

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## 6. Stock Repurchase

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Stock repurchases can be executed through various methods, each with its own set of characteristics and implications.

Here are 4 common methods of stock repurchase:

### 1. Open Market Purchases

In this method, companies buy their own stock directly from the open market, just like any other investor. The firm does not disclose itself as the buyer, maintaining anonymity. As a result, sellers are unaware if they are selling their shares back to the company or to another investor. Brokerage fees for these transactions are typically negotiated with brokerage houses.

### 2. Tender Offer

Another method is through a tender offer, where the company publicly announces its willingness to buy a fixed number of shares at a specific price. If the tender price is attractive, shareholders may decide to sell more shares than initially intended. If shareholders tender more shares than the company intended to buy, the company may choose to purchase all or part of the excess. Tender offers generally incur higher transaction costs for the company compared to open market purchases.

### 3. Dutch Auction (*a type of tender offer*)

In this method, the company conducts an auction where it announces the number of shares it intends to repurchase at different prices (usually minimum and maximum). Shareholders then indicate how many shares they're willing to sell at each price level. The company buys back shares at the lowest price necessary to achieve its desired repurchase amount.

### 4. Targeted Repurchase

This involves repurchasing shares from specific individual stockholders rather than through open market transactions or tender offers. Companies may engage in targeted repurchases for various reasons, such as buying out a large shareholder at a lower price than offered in a tender offer, reducing legal fees compared to traditional buybacks, or preventing a takeover by repurchasing shares held by large stockholders.

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## 6. Stock Repurchase

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Assuming no commissions, taxes, or other market imperfections, shareholders and the firm are indifferent between a dividend payout and a stock repurchase. This means that both shareholders and the firm perceive these two methods as equally beneficial in terms of enhancing shareholder wealth and company value.

This indifference resembles the propositions established by Miller and Modigliani (MM) regarding debt versus equity financing. MM argued that, under certain assumptions, the financial structure of a firm does not affect its market value.

The market value of shares after a repurchase is expected to be the same as the market value of shares after receiving dividends plus the dividend amount. In simpler terms, shareholders should theoretically achieve the same total return regardless of whether they receive dividends or participate in a stock repurchase.

### Effect on EPS

With a stock repurchase, the earnings per share (EPS) increases. This occurs because the repurchase reduces the number of outstanding shares, effectively lowering the denominator of the EPS ratio. Conversely, when a cash dividend is paid out, the EPS may not increase as the total earnings remain unchanged, but the number of outstanding shares remains constant.

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## 6. Stock Repurchase

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In a theoretical perfect capital market, the total value to stockholders remains the same regardless of whether a firm chooses a dividend payment strategy or a stock repurchase strategy.

However, in the real world, several factors influence why some firms opt for repurchases over dividends:

### 1. Flexibility

Firms often perceive dividends as a commitment to shareholders and are hesitant to reduce existing dividends. Repurchases, on the other hand, do not represent a similar commitment. Thus, firms experiencing a permanent increase in cash flow may prefer to increase dividends, while those with temporary cash flow increases may opt for share repurchases.

### 2. Executive Compensation

Executives frequently receive stock options as part of their compensation. Repurchasing shares instead of paying dividends increases the value of existing stock options because the stock price rises after a repurchase compared to after a dividend payment.

### 3. Offset to Dilution

The exercise of stock options increases the number of shares outstanding, leading to dilution of existing shares. Firms often repurchase shares to offset this dilution caused by stock option exercises. However, the validity of using repurchases for this purpose is debatable.

### 3. Undervaluation

Some companies buy back stock because they believe it represents their best investment option. This is particularly common when managers perceive the stock price to be temporarily undervalued, making repurchases an attractive investment opportunity.

### 4. Tax Advantages

Repurchases provide a tax advantage over dividends for both the company and its shareholders. Shareholders may prefer repurchases because they can choose when to sell their shares, potentially delaying capital gains tax liabilities. Additionally, companies may find repurchases more tax-efficient than paying dividends, especially in jurisdictions where dividend taxes are higher.

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## 6. Stock Repurchase

Vidya Corporation is evaluating an extra dividend versus a share repurchase. In either case Rs 4,000 would be spent. Current earnings are Rs 2.10 per share, and the stock currently sells for Rs 46 per share. There are 800 shares outstanding. Ignore taxes and other imperfections.

What will be the effect on Vidya's EPS and PE ratio under the two different scenarios?

Solution:

$$\text{Dividend per share} = \frac{4000}{800} = \text{Rs } 5$$

$$\text{Stock price after dividend} = 46 - 5 = \text{Rs } 41$$

$$\text{Shares repurchased} = \frac{4000}{46} = 86.96$$

### DIVIDENDS

$$\text{P-E Ratio} = \frac{41}{2.10} = \text{Rs } 19.52$$

$$\text{EPS} = \text{Rs } 2.10$$

### STOCK REPURCHASE

$$\text{EPS} = \frac{2.10 \times 800}{800 - 86.96}$$

$$= \text{Rs } 2.36$$

$$\text{P-E Ratio} = \frac{46}{2.36} = 19.52$$

## 7. Effect of Taxes

Till now, we have understood that in a perfect world without taxes or any other market imperfections, when companies distribute dividends, the exact timing doesn't really matter as long as the total cash they give out remains the same. The dividend policy is irrelevant for both managers and investors.

We have also seen that whether a company chooses to buy back its own shares or pay dividends doesn't make much of a difference.

Now, let us shift gears and dive into the world of real-world scenarios where taxes come into play. Here, we'll take a closer look at how taxes influence under following scenarios:

- (i) Paying dividends from external financing (insufficient cash flows)
- (ii) Dividends Vs investing in negative NPV Projects
- (iii) Dividends Vs purchasing financial assets
- (iv) Dividends Vs stock repurchase
- (v) Dividends Vs acquiring companies

By exploring various situations in the context of taxation, we can gain a clearer picture of how taxes impact these financial moves and what they mean for companies and their shareholders.

## 7. Effect of Taxes

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In situations where a firm finds itself without surplus cash to meet its dividend obligations, but still wishes to distribute dividends, it must resort to raising capital externally. This typically involves options like issuing new stocks or bonds. Let us consider the tax implications associated with such actions.

### Effect of personal income tax

Suppose a firm issues stock of Rs 1000 to pay dividends. However, shareholders, upon receiving dividends, are subject to personal income tax rates (assume it to be 20%). Consequently, even though the firm receives the full Rs 1000, shareholders only get to retain Rs 800 after taxes. This tax implication prompts financial experts to caution against issuing stock to pay dividends in a taxed environment.

### Costs of raising capital

Furthermore, there are additional costs involved in raising capital, such as fees paid to investment bankers. Suppose this cost is 3%. These costs diminish the net receipts received by the firm from issuing new capital. The company's net receipts from a new stock issue would be Rs 970, which is less than the total capital raised (Rs 1000). Consequently, only Rs 970 is available for distribution as dividends.

When this amount (Rs 970) is subjected to a 20% tax rate, the investor ultimately receives only Rs 776.

Thus, not only does the taxation of dividends reduce the investor's take-home earnings, but the additional costs associated with stock issuance further diminish the funds available for dividend payments.

This underscores the argument in favor of adopting a low dividend policy in scenarios where external financing is required to fund dividend payouts.

Thus, in a world with personal taxes, a firm should not issue stock to pay a dividend. **Despite this recommendation**, some financial managers might still opt for stock issuance due to practical considerations. One significant factor influencing this decision is the desire for dividend stability among stockholders. Consequently, managers might feel compelled to issue stock to maintain this stability, even though they are aware of the unfavorable tax implications associated with such a move.

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## 7. Effect of Taxes

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When a company has exhausted all available positive NPV projects, it may find itself in a position where it needs to allocate its excess cash to projects with negative net present value (NPV). While this approach contradicts traditional capital budgeting principles, many managers deliberately choose to invest in such projects instead of distributing dividends.

These managers prioritize reinvesting excess cash flows into negative NPV projects to drive the company's growth. These projects may involve expanding operations, introducing new products or services, entering new markets, or investing in research and development. Despite yielding negative NPV in the short term, these investments are seen as vital for the company's long-term sustainability and competitiveness.

Additionally, managers may have personal incentives linked to the company's growth, such as performance-based bonuses, stock options, or opportunities for career advancement (these are often tied to the firm's size). Opting for negative NPV projects that promise future growth aligns with these interests, as it can potentially enhance the company's market value and, consequently, the managers' compensation. Although managers may help themselves here, they are hurting stockholders.

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## 7. Effect of Taxes

The decision between paying dividends and purchasing financial assets can be influenced by various factors, primarily revolving around personal and corporate tax rates. The optimal choice depends on the tax implications for both the firm and its shareholders.

If personal tax rates are higher than corporate tax rates, meaning that individuals are taxed at a higher rate on dividend income compared to the tax rate applied to corporate profits, the firm may prefer to reduce dividend payouts. In this scenario, retaining excess cash and investing it in financial assets instead of paying dividends can be advantageous for shareholders. By avoiding dividend payments, shareholders can defer paying taxes on their investment income until they sell the financial assets, potentially benefiting from lower capital gains tax rates.

SURPLUS CASH = Rs 1000 MARKET RETURN RATE = 10%

DIVIDEND

PERSONAL TAX RATE = 28%

$$\text{RETURN} = 1000 (1+0.10) \times (1-0.28)$$

$$= \text{Rs } 792$$

PURCHASE FINANCIAL ASSETS

CORPORATE TAX = 34%

$$\begin{aligned}\text{RETURN} &= 1000 (1+0.10) \times (1-0.34) \\ &= \text{Rs } 726\end{aligned}$$

CORPORATE TAX = 20%

$$\begin{aligned}\text{RETURN} &= 1000 (1+0.10) \times (1-0.20) \\ &= \text{Rs } 880\end{aligned}$$

Conversely, if personal tax rates are lower than corporate tax rates, meaning that individuals are taxed at a lower rate on dividend income compared to the tax rate applied to corporate profits, the firm may have an incentive to distribute excess cash as dividends. In this case, shareholders may prefer to receive dividend income, which is taxed at a lower rate, rather than capital gains from selling financial assets. By paying out dividends, the firm effectively transfers the tax burden to its shareholders, who may face lower tax liabilities on dividend income compared to the firm's tax liabilities.

## 7. Effect of Taxes

After completing its capital spending for the year, Bira company has Rs 1,000 extra cash. The managers must choose between investing the cash in Treasury bonds that yield 8 percent or paying the cash out to investors who would invest in the bonds themselves. The corporate tax rate is 35 percent. The personal tax rate is 35 percent. What do you suggest?

Solution:

PAY DIVIDEND & INVESTOR WILL INVEST

$$\text{After tax dividend} = 1000(1-0.35) = 650$$

$$\begin{aligned}\text{After tax cashflows from bonds} &= 650(1+0.08(1-0.35)) \\ &= 668.2\end{aligned}$$

DO NOT PAY DIVIDEND & FIRM WILL INVEST

$$\text{Firm proceeds} = 1000(1+0.08(1-0.35)) = 1028$$

$$\text{What investor will receive post tax} = 1028(1-0.35) = 668.2$$

**BOTH OPTIONS → SAME RETURN TO INVESTOR**

## 7. Effect of Taxes

We have already learnt that, in a world without taxes and transaction costs, investors do not differentiate between receiving dividends or benefiting from stock repurchases—they view both options similarly. However, when taxes are taken into account, shareholders prefer stock repurchases over dividends.

SHARES OUTSTANDING = 100

TAX RATE = 15%

DIVIDEND = Rs 1

$$\text{DIVIDEND} \rightarrow \text{TAX} = 15\% \text{ of } (1 \times 100) \\ = \text{Rs 15}$$

STOCK REPURCHASE → PURCHASE PRICE = Rs 60

SELLING PRICE = Rs 100

$$\text{PROFIT} = 100 - 60 = \text{Rs 40} \\ \text{TAX} = 15\% \text{ of } 40 \\ = \text{Rs 6}$$

The preference for stock repurchases stems from the tax treatment of the two options. With dividends, shareholders are taxed on the dividend income they receive, regardless of whether they reinvest it or not.

In contrast, with stock repurchases, shareholders only incur taxes on the profit they make when they eventually sell their shares. When a company repurchases its own stock, it reduces the number of outstanding shares in the market. As a result, the value of the remaining shares often increases, generating a profit for shareholders if they choose to sell their shares later at a higher price. Importantly, shareholders are only taxed on this capital gain when they sell their shares, not when the repurchase occurs.

Therefore, even if the tax rate is the same for both dividends and stock repurchases, shareholders find stock repurchases more favorable from a tax perspective. This is because they can defer paying taxes until they sell their shares, potentially benefiting from lower capital gains tax rates compared to the tax rates applied to dividend income.

## 7. Effect of Taxes

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Instead of payment of dividends, a firm might use excess cash to acquire another company. This strategy has the advantage of acquiring profitable assets. However, a firm often incurs heavy costs when it embarks on an acquisition program.

Using excess cash to acquire another company can be a strategic move for a firm to avoid the payment of dividends for several reasons

### Strategic Expansion

Acquisitions can facilitate strategic expansion and growth opportunities for the firm. By acquiring another company, the firm can gain access to new technologies, intellectual property, distribution channels, or customer segments, which can contribute to long-term value creation.

### Enhanced Market Position

Acquiring another company can strengthen the firm's market position and competitive advantage. It may enable the firm to consolidate its market share, eliminate competitors, or achieve economies of scale and scope, leading to improved profitability and shareholder value.

### Synergies

Acquisitions often aim to capture synergies that can drive operational efficiencies and cost savings. By integrating the operations, resources, and capabilities of the acquired company with its own, the firm can realize synergistic benefits, such as increased revenue, reduced expenses, and improved overall performance.

### Market Signals

Opting for acquisitions instead of dividends may also send positive signals to the market about the company's growth prospects and confidence in its future performance. This can attract investors and support the company's stock price, further benefiting shareholders in the long term.

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## 8. Arguments favouring dividends

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We have learnt that due to personal taxes, firms are encouraged to minimize dividend payouts. Instead, they may opt for share repurchases, boost capital expenditures, acquire other companies, or invest in financial assets.

However, despite these incentives, many firms continue to pay dividends to their shareholders.

Let us explore some reasons why a firm might choose to distribute high dividends to its shareholders, even in light of personal taxes on these dividends.

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## **8. Arguments favouring dividends**

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One reason is that some investors really want regular income. This is especially true for people who rely on a steady income, like retirees. In real life, buying and selling stocks can cost money and take time. So, getting regular dividend payments can be more convenient.

The desire for current income is not a valid explanation of preference for high current dividend policy because investors can always create homemade dividends by selling a portion of their stocks.

In the real world, with transaction costs of security trading, home-made dividends can be more expensive than dividends directly paid out by the firms.

However, the existence of financial intermediaries, such as mutual funds, reduces the transaction costs for individuals greatly. Thus, as a whole, the desire for current income shouldn't be a major factor favoring high-current-dividend policy.

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## **8. Arguments favouring dividends**

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Some firms opt for high dividend payments to shareholders, despite the tax implications. One plausible explanation stems from behavioral finance, which suggests that investors prefer dividends as a form of self-control. Just as adhering to rigid rules helps maintain discipline in daily life, receiving regular dividends assists investors in sticking to their financial plans, preventing overspending or tapping into their savings. This behavioral perspective sheds light on why firms persist in paying dividends despite the tax disadvantages they entail.

Furthermore, behavioral finance argues against favoring increased stock repurchases, as investors may sell off too many shares, potentially leaving them with insufficient funds for the future. Hence, this viewpoint lends support to the preference for dividends over repurchases in a world affected by personal taxes.

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## 8. Arguments favouring dividends

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### Bondholders and Stockholders

In any company, there's a natural tension between bondholders and stockholders regarding the use of cash. Bondholders prefer that firms retain as much cash as possible to ensure it's available to pay off debts, especially during times of financial distress. Conversely, stockholders typically prefer to receive cash in the form of dividends, as it directly increases their wealth.

From the perspective of bondholders, dividends can be seen as a wealth transfer mechanism from bondholders to stockholders. This is because when a firm pays out dividends, it reduces the amount of cash available to service debt obligations, potentially increasing the risk for bondholders.

To protect their interests, bondholders often include clauses in loan agreements, known as restrictive **covenants**, which specify conditions under which dividends can be paid out. These clauses may require the firm to maintain certain levels of earnings, cash flow, and working capital to ensure that bondholders' interests are safeguarded before distributing cash to stockholders.

Usually protective covenants are expressed as a maximum percentage of cumulative earnings retained (reinvested) in the firm. When such a restriction is in force, it naturally influences the firm's dividend policy. Sometimes the management of a company welcomes a dividend restriction imposed by lenders, because then it does not have to justify the retention of earnings to its shareholders.

### Managers and Stockholders

Another aspect of agency problems arises in the relationship between managers and stockholders. Managers, who are entrusted with making decisions on behalf of shareholders, may sometimes pursue their own interests at the expense of shareholders' wealth maximization.

For instance, managers might be tempted to invest in projects with negative net present values (NPVs) if they align with their personal goals or agendas. Such projects could be driven by personal ambitions, ego, or even a desire to expand their empire within the company. In cases where a firm has excess cash flow available, managers might find it easier to indulge in such behavior.

Dividends can play a significant role in mitigating these agency problems. By paying out dividends to shareholders, the board of directors can effectively reduce the amount of surplus cash available to managers. This limits management's ability to misuse the company's resources for personal gain or non-value-adding projects. Thus, dividends act as a mechanism to align the interests of managers with those of shareholders, ultimately reducing agency costs and enhancing shareholder value.

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## 9. Information Content Effect

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The information content effect of a dividend refers to the impact that dividend announcements have on a firm's stock price. Typically, when a company announces an increase in its dividend payout, the stock price tends to rise, while a reduction in dividends usually leads to a decrease in the stock price.

This reaction in the stock price is not simply due to investors' preference for current income. Instead, it reflects the market's interpretation of the dividend announcement as a signal from management about the company's future performance. Essentially, a dividend increase is seen as a positive signal that management expects the company to do well in the future.

This positive signal triggers expectations of improved financial performance, leading investors to revise their outlook on the company's prospects. As a result, they may become more optimistic about the firm's future earnings and cash flow, which in turn drives up the stock price.

It's important to note that the information content effect implies that the stock price's reaction to dividends may not always align with conventional expectations. For example, if dividends were to remain unchanged or even decrease while future earnings or cash flow are expected to remain constant, the stock price might still increase if investors interpret the dividend announcement as a positive signal for the company's future performance.

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## 9. Information Content Effect

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Dividend signaling refers to the practice where a company's management strategically adjusts dividend payments to influence investors' perceptions about the firm's future prospects, even if the underlying fundamentals do not change significantly. The idea is that changes in dividend policy can signal information to the market about the company's financial health and future performance.

For example, when a company increases its dividends, investors may interpret this as a signal that the company expects higher earnings and cash flows in the future. This positive outlook can lead to an increase in the company's stock price. Conversely, if a company reduces its dividends, investors may perceive it as a sign of weaker future performance, leading to a decrease in the stock price.

While increasing dividends to manipulate investor perceptions may seem unethical, academic research suggests that managers often consider this strategy. They may do so for various reasons, including personal financial gain. For instance, a manager might want to sell their personal holdings of the company's stock at a higher price, so they increase dividends to boost the stock price temporarily.

Alternatively, managers may adjust dividends to benefit ordinary shareholders who wish to sell their shares. By signaling positive expectations through dividend increases, managers can help shareholders achieve better selling prices.

In essence, dividend signaling reflects the trade-off managers face between maximizing the true value of the firm and considering the impact of dividend policy on the current stock price. Even if the current stock price does not accurately reflect the firm's intrinsic value, managers may adjust dividends to influence investor perceptions and market behavior.

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## 10. Clientele Effect

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The clientele effect refers to the phenomenon where different groups of investors, characterized by their tax brackets and preferences for dividend income, shape the demand for stocks with particular dividend policies. This effect suggests that despite factors favoring either high or low dividends, the preferences of investors in various tax brackets tend to balance out.

Group	Stocks
Individuals in high tax brackets	Zero- to low-payout stocks
Individuals in low tax brackets	Low- to medium-payout stocks
Tax-free institutions	Medium-payout stocks
Corporations	High-payout stocks

In a nutshell, investors in high tax brackets generally prefer low or no dividends to minimize tax liabilities on dividend income. On the other hand, investors in low tax brackets may prefer dividends for current income, including individual investors, pension funds, and corporations that can benefit from dividend exclusions.

For example, let's say 40% of investors prefer high dividends and 60% prefer low dividends. However, only 20% of firms pay high dividends, while 80% pay low dividends. This creates a scenario where the demand for high-dividend stocks exceeds the supply, leading to higher prices for these stocks and lower prices for low-dividend stocks.

Over time, firms can adjust their dividend policies to align with investor preferences. If enough low-dividend firms increase their dividend payouts, the proportion of high-dividend paying firms may rise to meet investor demand. Once this equilibrium is reached, individual firms cannot significantly impact their stock prices by changing their dividend policies.

Considering this, the statement "In a world where many investors like high dividends, a firm can boost its share price by increasing its dividend payout ratio" is false. If there are already enough high-dividend paying firms to satisfy investors' preferences, a single firm increasing its dividend payout may not significantly impact its stock price. The key lies in catering to the preferences of dividend-seeking investors to maintain market equilibrium.

The clientele effect underscores the importance of understanding investor preferences and tax considerations in shaping dividend policies and their implications for stock prices.

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## 11. Summary till now

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Let us summarize 3 positions on dividends, which present contrasting views on the relevance and impact of dividend policy:

### 1. Irrelevancy of Dividend Policy

According to the Miller and Modigliani (MM) theory, dividend policy is irrelevant under certain assumptions, particularly in a world with no taxes and where future earnings and cash flow are constant. In this view, investors can create their desired income streams by selling shares if dividends are not satisfactory (homemade dividends).

### 2. Firm should not pay dividends

This perspective suggests that dividends are not in the best interest of shareholders due to tax implications. The stock price may be negatively affected by current dividends, especially if future earnings or cash flow are expected to remain constant. Therefore, firms may be discouraged from paying dividends to avoid adverse effects on their stock prices.

### 3. Firm should pay dividends

Despite the tax effects, there are arguments supporting the payment of dividends. This includes the desire of some investors for current income, concerns related to agency problems within firms, and insights from behavioral finance. These factors suggest that, even when future earnings or cash flow are constant, a firm's stock price may be positively related to its current dividend due to investor preferences and managerial signaling.

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# 11. Summary till now

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## Arguments for High Dividends

### Stable Cash Flow Appeal

Dividends can attract investors seeking stable cash flow without the hassle and costs associated with frequently selling shares of stock. By receiving regular dividend payments, investors can fulfill their income needs without resorting to selling their investments.

### Behavioral Finance Perspective

Investors with limited self-control may find high-dividend stocks appealing as they provide a source of current income while preserving their principal investment. This approach allows investors to meet their immediate consumption needs while adhering to a policy of not dipping into their investment capital.

### Managerial Strategy

Managers, acting on behalf of stockholders, may choose to pay dividends to limit the availability of excess cash to bondholders. By distributing cash to shareholders through dividends, managers can prevent bondholders from gaining access to these funds during times of financial distress.

### Corporate Governance Tool

The board of directors, representing the interests of stockholders, can use dividends as a means to control spending by managers. By reducing the amount of cash available for discretionary spending, dividends serve as a mechanism to curb excessive expenditures by managers.

### Signaling Optimism

Managers may increase dividend payouts as a signal to the market about their optimism concerning future cash flow. A higher dividend payment can be interpreted by investors as a positive indication of the company's financial health and growth prospects.

## Arguments for Low Dividends

### Taxation

Dividends have traditionally been taxed as ordinary income, making them less attractive to investors, especially those in higher tax brackets.

### Impact on Financing

Dividend payments reduce the internal sources of financing available to the firm. This reduction in retained earnings may constrain the firm's ability to undertake positive net present value (NPV) projects or force it to rely on more expensive external equity financing to fund its operations.

### Resistance to Dividend Cuts

Once a company establishes a pattern of paying high dividends, any decision to cut or reduce dividends can have negative repercussions on its stock price and investor confidence. This resistance to dividend cuts can limit the flexibility of the firm's dividend policy and its ability to adapt to changing financial circumstances.

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# 11. Summary till now

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Dividend policy refers to the strategy a company uses to determine how much of its earnings to pay out to shareholders as dividends versus retaining those earnings for reinvestment in the company. There are several approaches to dividend policy that companies may adopt, each with its own implications and considerations. Here are some common approaches:

## 1. Residual Dividend Policy

Under this approach, a company pays out dividends only after meeting all investment opportunities and maintaining a target capital structure. In other words, dividends are paid from residual earnings, which are what remains after funding all positive net present value (NPV) projects and maintaining the desired capital structure. This approach prioritizes investment in projects that offer the highest returns and uses dividends as a way to distribute excess cash flow.

## 2. Regular Dividend Policy

A regular dividend policy involves paying dividends at regular intervals, such as quarterly or annually, at a fixed or relatively stable rate. Companies that adopt this approach aim to provide shareholders with a predictable income stream. The dividend amount may be based on a percentage of earnings or a fixed dollar amount per share.

## 3. Constant Payout Ratio Dividend Policy

Under this policy, a company maintains a constant payout ratio, which is the proportion of earnings paid out as dividends. For example, if the company decides on a 40% payout ratio, it will distribute 40% of its earnings as dividends each period, regardless of the level of earnings. This approach provides shareholders with a dividend that grows or shrinks in line with earnings fluctuations.

## 4. Low Regular Dividend with Special Dividends

Some companies adopt a strategy of paying low regular dividends, supplemented by occasional special dividends when they have excess cash or exceptional earnings. This approach allows the company to maintain a stable dividend stream while also rewarding shareholders with additional payouts during profitable periods.

## 5. No Dividend Policy (Retention Policy)

Some companies choose not to pay dividends at all and instead retain all earnings for reinvestment in the business. This approach is common among high-growth companies that require significant capital investment to finance expansion opportunities. By retaining earnings, these companies aim to fuel growth and increase shareholder value through capital appreciation rather than dividend payouts.

## 6. Target Dividend Yield Policy

Companies may adopt a target dividend yield policy, where they aim to maintain a certain dividend yield relative to their stock price. If the stock price increases, the company may adjust dividends upward to maintain the target yield, and vice versa. This approach allows dividends to fluctuate with changes in stock price while providing shareholders with a consistent yield.

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# 11. Summary till now

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Determining dividend policy involves consideration of various factors that influence how much of a company's earnings will be distributed to shareholders as dividends.

Here are some key factors that companies typically consider when establishing their dividend policy:

## **Profitability**

The company's current and projected profitability is a fundamental factor in determining its dividend policy. Companies with stable and growing earnings are more likely to have consistent dividend payments, while those with volatile or declining earnings may adopt a more conservative approach to dividends.

## **Cash Flow**

Cash flow is critical for funding dividend payments. Companies need to ensure they have sufficient cash flow to cover dividend distributions without jeopardizing their ability to meet operational and investment needs. Thus, consistent positive cash flow is a prerequisite for maintaining a stable dividend policy.

## **Investment Opportunities**

Companies must balance dividend payments with investment opportunities to maximize shareholder value. If the company has high-return investment projects that require funding, it may choose to retain more earnings rather than distributing them as dividends. Conversely, if investment opportunities are limited, the company may opt to distribute more dividends to shareholders.

## **Capital Structure**

Maintaining an optimal capital structure is important for financial health. Companies must consider the impact of dividend payments on their capital structure, including debt levels and equity financing. High dividend payments may limit the company's ability to access debt markets or raise equity capital if needed in the future.

## **Tax Considerations**

Tax policies can influence dividend decisions for both the company and its shareholders. In some jurisdictions, dividend payments are subject to different tax rates compared to capital gains. Companies may take into account the tax implications of dividends on shareholders when determining their dividend policy.

## **Shareholder Preferences**

Understanding the preferences and expectations of shareholders is crucial in setting dividend policy. Some investors, such as income-oriented investors, may prefer higher dividend payouts, while others, such as growth-oriented investors, may prioritize capital appreciation over dividends. Companies may adjust their dividend policy to align with shareholder preferences and attract investors.

## **Industry and Market Conditions**

Industry dynamics and market trends can also influence dividend policy. Companies operating in mature or stable industries with predictable cash flows may have more consistent dividend policies, while those in cyclical or rapidly evolving industries may adopt more flexible dividend policies to adapt to changing market conditions.

## **Regulatory Environment**

Regulatory requirements and constraints may impact dividend decisions. Companies must comply with legal and regulatory guidelines governing dividend payments, including restrictions on dividend distributions based on earnings or capital levels. The Companies Act, 2013 has put several restrictions regarding payments and declaration of dividends. Similarly, Income Tax Act, 1961 also lays down certain restrictions on payment of dividends.

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## 12. Optimal Dividend Policy

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The characteristics of an optimal dividend payout policy can be summarized in following 6 points.

### 1. Utilizing Free Cash Flows

The primary objective of a dividend policy is to efficiently allocate free cash flows to shareholders. By distributing excess cash in the form of dividends or through share repurchases, the firm maximizes shareholder wealth.

### 2. Prioritizing Positive NPV Investments

While dividends are important, they should not hinder the firm's ability to invest in projects with positive NPV. Cutting such projects to pay dividends can negatively impact the firm's long-term growth prospects.

### 3. Timing of Dividend Initiation

Dividend payments should only commence when the firm consistently generates substantial free cash flow. Initiating dividends prematurely, without sufficient cash reserves, may lead to financial instability.

### 4. Consistent Dividend Policy

Establishing a regular dividend that reflects a predetermined payout ratio helps build investor confidence and trust. Consistency in dividend payments signals stability and reliability, attracting long-term investors.

### 5. Balancing Dividends and Financing

Dividends should be set at a level that avoids the need for expensive external financing in the future. Maintaining a prudent dividend policy ensures that the firm can fund its growth initiatives without resorting to costly debt or equity issuance.

### 6. Utilizing Stock Repurchases Smartly

Stock repurchases offer a flexible way to return excess cash to shareholders. Unlike dividends, which commit the firm to regular payments, repurchases can be used strategically to capitalize on temporary increases in cash flow or to adjust capital structure. This approach provides the firm with greater agility in managing its financial resources.

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## 13. Relevance Theory of Dividends

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In contrast to M&M theory, the relevance theory of dividends is attributed to several authors, such as Myron Gordon, John Lintner, James Walter, and Richardson.

These authors argue that a carefully crafted dividend policy can have a positive impact on a firm's standing in the stock market.

Now, let's delve into some of the key concepts proposed by these influential theories.

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## 13. Relevance Theory of Dividends

Prof. James Walter's approach supports the doctrine that dividend decisions are relevant and affect the price of stock (and thus the value of the firm). Prof. Walter's model is based on the relationship between the firm's :

- (i) Return on investment (internal rate of return)
- (ii) Cost of capital (required rate of return).

Assumptions of Walter's Model are listed below:

- (i) The firm undertakes its financing entirely through retained earnings. It does not use external sources of funds such as debts or new equity capital.
- (ii) The firm's business risk does not change with additional investment. This means that the firm's internal rate of return and cost of capital remain constant.
- (iii) Initially, earnings per share (EPS) and dividend per share (DPS) remain constant. The choice of values for EPS and DPS varies depending on the model, but any given values are assumed to remain constant.
- (iv) The firm has a very long life.

Walter's formula for determining the market value of a share is given by:

$$\text{MARKET VALUE OF STOCK} = \frac{D + \frac{\alpha}{K_e} (E - D)}{K_e}$$

$D$  = DIVIDEND PER SHARE

$E$  = EARNING PER SHARE

$\alpha$  = INTERNAL RATE OF RETURN

$K_e$  = COST OF EQUITY CAPITAL

Depending upon the ratio of  $r/K_e$ , the firms can be divided into 3 categories:

### 1. Growth Firms

If  $r > K_e$  i.e., if the firm earns a higher rate of return on its investment than the required rate of return, the firm should retain the earnings. Such firms are termed as growth firm and the optimum payout would be zero in their case.

$\frac{\alpha}{K_e} > 1$ , GROWTH FIRMS → LOW DIVIDENDS

$\frac{\alpha}{K_e} < 1$ , DECLINING FIRMS → HIGH DIVIDENDS

$\frac{\alpha}{K_e} = 1$ , NORMAL FIRMS → PAYOUT IS IRRELEVANT

### 2. Declining Firms

If  $r < K_e$ , the shareholders would stand to gain if the firm distributes its earnings. For such firms, the optimum payout would be 100% and the firms should distribute the entire earnings as dividends.

### **3. Normal Firms**

In case of normal firms where  $r = K_e$ , the dividend policy will not affect the market value of shares as the shareholders will get the same return from the firm as expected by them. For such firms, there is no optimum dividend payout and the value of the firm would not change with the change in dividend rate.

**Criticisms of Walter's Model** are listed below.

- The basic assumption that investments are financed through retained earnings only is seldom true in real world. Firms do raise funds by external financing.
  - The internal rate of return, i.e.  $r$ , also does not remain constant. As a matter of fact, with increased investment the rate of return also changes.
  - The assumption that cost of capital ( $k$ ) will remain constant also does not hold good. As a firm's risk pattern does not remain constant, it is not proper to assume that  $k$  will always remain constant.
-

## 13. Relevance Theory of Dividends

Based on the table shown below concerning firms A, B, and C, calculate the value of each share using Walter's approach when the dividend payment ratio is 50%, 75%, and 25%.

	Firm A	Firm B	Firm C
Internal Rate of Return	15%	5%	10%
Cost of Equity Capital	10%	10%	10%
EPS	Rs 8	Rs 8	Rs 8

Solution:

$$D \text{ at } 25\% \text{ payout} = \frac{25}{100} \times 8 = \text{Rs } 2$$

$$D \text{ at } 50\% \text{ payout} = \frac{50}{100} \times 8 = \text{Rs } 4$$

$$D \text{ at } 75\% \text{ payout} = \frac{75}{100} \times 8 = \text{Rs } 6$$

$$P = \frac{D + \frac{\alpha}{K_e}(E - D)}{K_e}$$

PAYOUT	$\alpha = 0.15$ FIRM A	$\alpha = 0.05$ FIRM B	$\alpha = 0.10$ FIRM C
25 % $D=2$	$\frac{2 + (8-2) \frac{0.15}{0.10}}{0.10} = 110$	$\frac{2 + (8-2) \frac{0.05}{0.10}}{0.10} = 50$	$\frac{2 + (8-2) \frac{0.10}{0.10}}{0.10} = 80$
50 % $D=4$	$\frac{4 + (8-4) \frac{0.15}{0.10}}{0.10} = 100$	$\frac{4 + (8-4) \frac{0.05}{0.10}}{0.10} = 60$	$\frac{4 + (8-4) \frac{0.10}{0.10}}{0.10} = 80$
75 % $D=6$	$\frac{6 + (8-6) \frac{0.15}{0.10}}{0.10} = 90$	$\frac{6 + (8-6) \frac{0.05}{0.10}}{0.10} = 70$	$\frac{6 + (8-6) \frac{0.10}{0.10}}{0.10} = 80$

## 13. Relevance Theory of Dividends

The following information is available for XYZ Corporation.

No of shares outstanding is 1 lakh

EPS is Rs. 4

Dividend per share is Rs. 2.40

Equity capitalization rate is 12%

Rate of return on investment is 15%

(i) As per Walter's model, what will be Market value per share?

(ii) To keep share price at Rs. 40, what should be payout ratio?

(iii) As per Walter's model, what is optimum payout ratio?

Solution:

(i) As per Walter's model, what will be Market value per share?

$$P = \frac{D + \frac{\delta}{K_e} (E - D)}{K_e} = \frac{2.40 + (4 - 2.40) \frac{0.15}{0.12}}{0.12} = \text{Rs } 36.67$$

(ii) To keep share price at Rs. 40, what should be payout ratio?

LET PAYOUT RATE =  $x \rightarrow$  DIVIDEND PER SHARE =  $4x$

$$\frac{4x + (4 - 4x) \frac{0.15}{0.12}}{0.12} = 40 \rightarrow x = 0.20 \quad 20\% \text{ PAYOUT}$$

(iii) As per Walter's model, what is optimum payout ratio?

SINCE  $\delta / (0.15) > K_e (0.12) \Rightarrow$  Optimum PAYOUT is 0%

(iv) What is the Market value at optimum payout ratio?

$$P = \frac{0 + (4 - 0) \frac{0.15}{0.12}}{0.12} = \text{Rs } 41.67$$

## 13. Relevance Theory of Dividends

For the firm with below information, find out if the dividend payout is optimal.

Paid-up equity capital	Rs 10,00,000
Earnings	Rs 1,00,000
Dividend Paid	Rs 80,000
P-E Ratio	20
Number of equity shares	10,000

Solution:

$$K_e = \frac{1}{P-E \text{ RATIO}} = \frac{1}{20} = 0.05$$

$$\lambda = \frac{1,00,000}{10,00,000} = 0.10$$

SINCE  $\lambda > K_e \Rightarrow$  OPTIMAL DIVIDEND PAYOUT = 0 %

CURRENT DIVIDEND PAYOUT =  $\frac{80,000}{100,000} = 0.80 = 80\%$

## 13. Relevance Theory of Dividends

Myron Gordon has also developed a model on the lines of Prof. Walter suggesting that dividends are relevant and the dividend decision of the firm affects its value.

According to Gordon's model, dividend policy does affect the value of a share. This view is based on the assumption that under conditions of uncertainty, investors tend to discount distant dividends (capital gains) at a higher rate than they discount near dividends. Investors, behaving rationally, are risk-averse and, therefore, have a preference for near dividends to future dividends. The logic underlying the dividend effect on the share value can be described as the **bird-in-the-hand argument**. The bird-in-the-hand argument was put forward first by Krishman. Bird-in-the-hand theory is also known as the **dividend preference theory**.

The **bird-in-the-hand argument** states that a dividend today is safer than the uncertain prospect of a capital gain tomorrow. It is often used to justify high dividend payout ratios.

But the bird-in-the-hand argument is based upon the erroneous assumption that increased dividends make a firm less risky. If capital spending and investment spending are unchanged, the firm's overall cash flows are not affected by the dividend policy.

Assumptions are listed below:

- The firm is an all equity firm.
- No external financing is available or used. Retained earnings are the only source of finance.
- The rate of return on the firm's investment and the cost of equity capital are constant.
- The retention ratio ( $b$ ) is constant. Thus, the growth rate of the firm is also constant.
- The cost of capital for the firm is greater than the growth rate.
- The firm has perpetual life.
- Corporate taxes do not exist.

The formula for market value of the stock is given by:

### MARKET VALUE OF STOCK

$$= \frac{D_1}{K_e - g} = \frac{D_0(1+g)}{K_e - g} = \frac{E(1-b)}{K_e - g} \quad g = b \cdot r$$

$g$  = growth rate

$b$  = retention ratio

= 1 - payout ratio

$K_e$  = Cost of Equity capital

$r$  = internal rate of return

$E$  = EPS

$D_1$  = Dividend after 1 year

$D_0$  = Dividend in current year

It is also called Dividend Growth model.

## 13. Relevance Theory of Dividends

Calculate the market price per share for the firm with below information, using Gordon formula.

Earnings per share	Rs 12
Dividend per share	Rs 3
Cost of capital	18%
Internal rate of return	22%
Retention ratio	40%

Solution:

$$P = \frac{E(1-b)}{k_e - b \cdot g} = \frac{12(1-0.40)}{0.18 - 0.40 \times 0.22} = \text{Rs } 78.26$$

## 13. Relevance Theory of Dividends

Determine the market price of a share using Gordon's model of Dividend, if total investment in the asset is Rs 10,00,000, number of shares is 50,000 with a total earning of Rs 2,00,000. The cost of capital is 16% and the payout ratio is 40%.

Solution:

$$\begin{aligned} P &= \frac{E(1-b)}{k_e - b \cdot g} & E &= \frac{2,00,000}{50,000} = \text{Rs } 4 \\ &= \frac{4(1-0.40)}{0.16 - 0.20 \times 0.60} & b &= 1 - 0.40 = 0.60 \\ &= \text{Rs } 40 & g &= \frac{2,00,000}{10,00,000} = 0.20 \end{aligned}$$

## 13. Relevance Theory of Dividends

Ramco Ltd has Net Profit of Rs 30 lakh with outstanding 12% preference shares of Rs 100 lakh. The number of equity shares are 3 lakh. The return on invest and the cost of capital are 20% and 16% respectively. Calculate price per share when dividend payout ratio is 25%.

Solution:

$$\text{NET PROFIT} = \text{Rs } 30 \text{ Lakh}$$

$$\text{PREFERENCE DIVIDEND} = \text{Rs } 12 \text{ lakh}$$

$$\text{EARNINGS FOR SHAREHOLDERS} = 30 - 12 = \text{Rs } 18 \text{ lakh}$$

$$\text{EPS} = \frac{18,00,000}{3,00,000} = \text{Rs } 6 \quad 1 - b = 25\% \\ b = 0.75$$

$$P = \frac{E(1-b)}{k_e - b \cdot g} = \frac{6(1-0.75)}{0.16 - 0.75 \times 0.20} \\ = \text{Rs } 150$$

## 13. Relevance Theory of Dividends

Stock prices respond to unexpected shifts in dividends. Therefore, managers often adopt a strategy of gradually increasing dividends over time as earnings expand, a practice known as **dividend smoothing**.

By smoothing dividends, managers aim to avoid sharp fluctuations in dividend payouts, which could cause volatility in stock prices and potentially unsettle investors. This gradual adjustment helps maintain investor confidence and stability in the market, ultimately contributing to the long-term growth and valuation of the company's stock.

In 1956, John Lintner made two important observations concerning dividend policy.

First, real-world companies typically set long-term target ratios of dividends to earnings. A firm is likely to set a low target ratio if it has many positive NPV projects relative to available cash flow and a high ratio if it has few positive NPV projects.

Second, managers know that only part of any change in earnings is likely to be permanent. Because managers need time to assess the permanence of any earnings rise, dividend changes appear to lag earnings changes by a number of periods.

Taken together, Lintner's observations suggest that two parameters describe dividend policy:

- (i) target payout ratio ( $t$ )
- (ii) speed of adjustment of current dividends to the target ( $s$ )

$$\text{CHANGE IN DIVIDEND, } \Delta D = D_t - D_0$$
$$\Delta D = s \cdot (EPS \times t - D_0)$$

↑                      ↑  
SPEED OF              PAYOUT  
ADJUSTMENT COEFFICIENT      RATIO

The limiting cases in above equation occur when  $s=1$  and  $s=0$ .

If  $s=1$ , the actual change in dividends will be equal to the target change in dividends. Here, full adjustment occurs immediately.

If  $s=0$ , the next year dividend will be equal to the current year dividend. In other words, there is no change in dividends at all.

Real-world companies can be expected to set  $s$  between 0 and 1. An implication of Lintner's model is that the dividends-to-earnings ratio rises when a company begins a period of bad times, and the ratio falls when a company starts a period of good times. Thus, dividends display less variability than do earnings. In other words, firms smooth dividends.

## 13. Relevance Theory of Dividends

Paytm has a target payout ratio of 0.30. Last year's earnings per share were Rs 10, and in accordance with the target, Paytm paid dividends of Rs 3 per share last year. However, earnings have jumped to Rs 20 this year. The speed of adjustment coefficient is 0.5. Find the dividend this year. What is dividend next year, if earning remains at Rs 20.

Solution:

Dividend this year is calculated below.

$$\text{DIVIDEND LAST YEAR} = \text{Rs } 3 \quad \Delta D = S \cdot (\text{EPS} \times t - D_0)$$
$$\Delta D = 0.5(20 \times 0.30 - 3) = \text{Rs } 1.50$$
$$\text{DIVIDEND THIS YEAR} = 3 + 1.50 = \text{Rs } 4.50$$

Dividend next year, if earning remains at Rs 20 is calculated below.

$$\Delta D = 0.5(20 \times 0.30 - 4.50) = 0.75$$
$$\text{DIVIDEND NEXT YEAR} = 4.50 + 0.75 = \text{Rs } 5.25$$

## 13. Relevance Theory of Dividends

The Shipra Co. just paid a dividend of Rs 1.80 per share of stock. Its target payout ratio is 40%. The company expects to have an earnings per share of Rs 4.95 one year from now.

- (a) If the adjustment rate is 0.3 as defined in the Lintner model, what is the dividend one year from now?
- (b) If the adjustment rate is 0.6 instead, what is the dividend one year from now?

Solution:

- (a) If the adjustment rate is 0.3 as defined in the Lintner model, what is the dividend one year from now?

Change in Dividend,  $D_1 - D_0$

$$\begin{aligned}\Delta D &= S (\text{EPS} \times t - D_0) \\ &= 0.3 (4.95 \times 0.4 - 1.80) = 0.05 \\ D_1 &= 1.80 + 0.05 = 1.85\end{aligned}$$

- (b) If the adjustment rate is 0.6 instead, what is the dividend one year from now?

Change in Dividend,  $D_1 - D_0$

$$\begin{aligned}\Delta D &= S (\text{EPS} \times t - D_0) \\ &= 0.6 (4.95 \times 0.4 - 1.80) = 0.11 \\ D_1 &= 1.80 + 0.11 = 1.91\end{aligned}$$

## 13. Relevance Theory of Dividends

According to the traditional position expounded by Graham & Dodd, the stock market places considerably more weight on dividends than on retained earnings.

Their view is expressed quantitatively in the following valuation model:

$$\begin{aligned} \text{MARKET VALUE OF STOCK} &= m \left( D + \frac{E}{3} \right) & EPS \\ &\quad \uparrow \qquad \qquad \qquad \uparrow \qquad \qquad \qquad \uparrow \\ &\quad \text{MULTIPLIER} \qquad \text{DIVIDEND PER SHARE} \qquad \text{RETAINED EARNING PER SHARE} \\ &= m \left( \frac{4D + R}{3} \right) \end{aligned}$$

According to this model, the contribution of Dividends in determining share price is 4 times of the contribution of retained earnings.

## 13. Relevance Theory of Dividends

Compute Market price of stock using Graham & Dodd approach if the EPS is Rs 30, the Dividend pay-out ratio is 60% and the Multiplier is 2.

Solution:

$$\begin{aligned} P &= m \left( D + \frac{E}{3} \right) \\ &= 2 \left( 60\% \times 30 + \frac{30}{3} \right) \\ &= \text{Rs } 56 \end{aligned}$$

## 14. Stock Dividend

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Another type of dividend is paid out in shares of stock. This type of dividend is called a stock dividend. A stock dividend is not a true dividend because it is not paid in cash. It is also called Bonus share.

The effect of a stock dividend is to increase the number of shares that each owner holds. Because there are more shares outstanding, each is simply worth less.

A stock dividend is simply the payment of additional shares of common stock to shareholders. It represents nothing more than a bookkeeping shift within the shareholders' equity account on the firm's balance sheet. A shareholder's proportional ownership in the firm remains unchanged.

Usually the accounting authorities make a distinction between small-percentage stock dividends and large-percentage stock dividends.

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## 14. Stock Dividend

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### **Small-Percentage Stock Dividends**

If a stock dividend represents an increase of less than 20-25% of the previously outstanding common stock, it is referred to as a small percentage stock dividend. It is also called small stock dividends.

Accounting for this type of stock dividend entails transferring an amount from retained earnings to common stock and additional paid-in capital.

### **Large-Percentage Stock Dividends**

Large-percentage stock dividends (typically higher than 25% of previously outstanding common stock) must be accounted for differently. It is also called small stock dividends.

Though small-percentage stock dividends are not expected to have much effect on the market value per share of stock, large-percentage stock dividends are expected to materially reduce the market price per share of stock. In the case of large-percentage stock dividends, therefore, conservatism argues for reclassifying an amount limited to the par value of additional shares rather than an amount related to the pre-stock-dividend market value of the stock.

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## 14. Stock Dividend

A company has equity value of Rs 6,55,000. It has declared a stock dividend of 25%. The stock goes exdividend tomorrow. There are 20,000 shares of stock outstanding. What will the ex-dividend price be?

Solution:

<u>BEFORE STOCK DIVIDEND</u>	<u>AFTER STOCK DIVIDEND</u>
Shares Outstanding = 20,000	Shares Outstanding $= 20,000 \times 1.25 = 25,000$
Price of stock = $\frac{6,55,000}{20,000}$ = Rs 32.75	Price of stock = $\frac{6,55,000}{25,000}$ = Rs. 26.20

## 14. Stock Dividend

A firm has 10,000 shares of stock outstanding, each selling at Rs 66. The firm announced a 10% stock dividend. Par value of stock is Rs 1. Capital in excess of par value is Rs 2,00,000. The retained earnings are Rs 2,90,000. Draw the equity portion of firm's balance sheet before and after stock dividend.

Solution:

Since stock dividend is 10%, which is less than 25%, it is Small-Percentage Stock Dividends. Accounting for this type of stock dividend entails transferring an amount from retained earnings to common stock and additional paid-in capital.

	Rs 1 par	Rs 1 par
	Before Stock Dividend	After Stock Dividend
Common Stock	10,000	11,000
Excess Capital	2,00,000	2,65,000
Retained Earnings	2,90,000	2,24,000
Shareholder's Equity	<u>5,00,000</u>	<u>5,00,000</u>
NUMBER OF SHARES	10,000	11,000

$\leftarrow (10,000 + 1000) \times 1$   
 $\leftarrow 9,00,000 + 65 \times 1000$   
 $\leftarrow 9,90,000 - 66 \times 1000$

## 14. Stock Dividend

A firm has 10,000 shares of stock outstanding, each selling at Rs 66. The firm announced a 100% stock dividend. Par value of stock is Rs 1. Capital in excess of par value is Rs 2,00,000. The retained earnings are Rs 2,90,000. Draw the equity portion of firm's balance sheet before and after stock dividend.

Solution:

If a 100% stock dividend were declared, 10,000 new shares would be distributed, so 20,000 shares would be outstanding. At a Rs 1 par value per share, the common stock account would rise by Rs 10,000, for a total of Rs 20,000. The retained earnings account would be reduced by Rs 10,000. This is case of Large-Percentage Stock Dividends.

	Rs 1 par	Rs 1 par
	Before Stock Dividend	After Stock Dividend
Common Stock	10,000	20,000
Excess Capital	2,00,000	2,00,000
Retained Earnings	2,90,000	2,80,000
Shareholder's Equity	5,00,000	5,00,000

NUMBER OF SHARES

$\leftarrow (10,000 + 10,000) \times 1$

$\leftarrow 2,90,000 - 10,000 \times 1$

## 14. Stock Dividend

The owners' equity accounts for a firm are shown below:

Common stock (Rs 1 par value) = Rs 30,000

Capital surplus = Rs 1,85,000

Retained earnings = Rs 6,27,500

Total owners' equity = Rs 8,42,500

If then firm's stock currently sells for Rs 37 per share and a 10% stock dividend is declared, show how the equity accounts would change.

**Solution:**

Since stock dividend is 10%, which is less than 25%, it is Small-Percentage Stock Dividends. Accounting for this type of stock dividend entails transferring an amount from retained earnings to common stock and additional paid-in capital.

	Rs 1 par	Rs 1 par	
	Before Stock Dividend	After Stock Dividend	
Common Stock	30,000	33,000	$\leftarrow 30,000 + 3000 \times 1$
Excess Capital	1,85,000	2,93,000	$\leftarrow 1,85,000 + 3000 \times 36$
Retained Earnings	6,27,000	5,16,500	$\leftarrow 6,27,000 - 3000 \times 37$
Shareholder's Equity	8,42,500	8,42,500	
NUMBER OF SHARES	30,000	33,000	

## 14. Stock Dividend

Sharma company with the common equity accounts shown here has declared a stock dividend of 15% when the market value of its stock is Rs 45 per share. What effects on the equity accounts will the distribution of the stock dividend have?

Common stock (Rs 1 par value) = Rs 4,10,000

Capital surplus = Rs 21,50,000

Retained earnings = Rs 53,20,000

Total owners' equity = Rs 78,80,000

Solution:

Since stock dividend is 15%, which is less than 25%, it is Small-Percentage Stock Dividends. Accounting for this type of stock dividend entails transferring an amount from retained earnings to common stock and additional paid-in capital.

	Rs 1 par	Rs 1 par
	Before Stock Dividend	After Stock Dividend
Common Stock	4,10,000	4,71,500
Excess Capital	21,50,000	48,56,000
Retained Earnings	53,20,000	25,52,500
Shareholder's Equity	78,80,000	78,80,000

NUMBER OF SHARES      4,10,000      4,71,500  
                          + 61500 (15% ↑)

$\leftarrow 4,10,000 \times 1.15 + 1$   
 $\leftarrow 21,50,000 + 61,500 \times 44$   
 $\leftarrow 53,20,000 - 61500 \times 45$

## 15. Stock Split

A stock split is essentially the same thing as a stock dividend, except that a split is expressed as a ratio instead of a percentage. When a split is declared, each share is split up to create additional shares.

For example, in a four-for-one stock split, each old share is split into four new shares.

Just like a stock dividend, no cash is paid out, and the percentage of the entire firm that each shareholder owns is unaffected.

The accounting treatment of a stock split is a little different from (and simpler than) that of a stock dividend.

With a stock dividend, the par value of common stock is not reduced, whereas with a stock split, it is reduced. As a result, the common stock, additional paid-in capital, and retained earnings accounts remain unchanged with a stock split. The total shareholders' equity, of course, also stays the same.

The only change is in the par value of the common stock, which, on a per-share basis.

Except in accounting treatment, then, the stock dividend and stock split are very similar. A stock split (or alternatively, a large-percentage stock dividend) is usually reserved for occasions when a company wishes to achieve a substantial reduction in the market price per share of common stock. A principal purpose of a split is to place the stock in a more popular trading range, thereby (hopefully) attracting more buyers.

## 15. Stock Split

The owners' equity accounts for a firm are shown below:

Common stock (Rs 1 par value) = Rs 30,000

Capital surplus = Rs 1,85,000

Retained earnings = Rs 6,27,500

Total owners' equity = Rs 8,42,500

The firm declares a four-for-one stock split. How many shares are outstanding now? What is the new par value per share?

Solution:

To find the new shares outstanding, we multiply the current shares outstanding times the ratio of new shares to old shares.

BEFORE STOCK SPLIT

NUMBER OF SHARES

$$= 30,000$$

PAR VALUE = RS 1

AFTER STOCK SPLIT

NUMBER OF SHARES

$$= 30,000 \times 4 = 1,20,000$$

PAR VALUE = RS  $\frac{1}{4}$  = RS 0.25

The equity accounts are unchanged except that the par value of the stock is changed by the ratio of new shares to old shares.

## 15. Stock Split

A firm has 10,000 shares of stock outstanding, each selling at Rs 66. The firm decides to declare a two-for-one stock split. Par value of stock is Rs 1. Capital in excess of par value is Rs 2,00,000. The retained earnings are Rs 2,90,000. Draw the equity portion of firm's balance sheet before and after stock split.

Solution:

The only equity account that will be affected is the par value of the stock. The par value will change by the ratio of old shares to new shares.

The number of shares outstanding will double to 20,000, and the par value will be halved to Rs 0.50 per share.

	Rs 1 par	Rs 0.50 par
	Before Stock Split	After Stock Split
Common Stock	10,000	10,000
Excess Capital	2,00,000	2,00,000
Retained Earnings	2,90,000	2,90,000
Shareholder's Equity	5,00,000	5,00,000

NUMBER OF SHARES      10,000      20,000

$\leftarrow 20,000 \times 0.50$

## 15. Stock Split

Vikram company with the common equity accounts shown here has declared a five-for-one stock split, when the market value of its stock is Rs 45 per share. What effects on the equity accounts will the distribution of the stock split have?

Common stock (Rs 1 par value) = Rs 4,10,000

Capital surplus = Rs 21,50,000

Retained earnings = Rs 53,20,000

Total owners' equity = Rs 78,80,000

The firm's 45% per share cash dividend on the new (postsplit) shares represents an increase of 10% over last year's dividend on the presplit stock. What effect does this have on the equity accounts? What was last year's dividend per share?

Solution:

The only equity account that will be affected is the par value of the stock. The par value will change by the ratio of old shares to new shares.

$$\text{PAR VALUE BEFORE SPLIT} = \text{Rs } 1$$

$$\text{PAR VALUE AFTER SPLIT} = \text{Rs } \frac{1}{5} = 0.20$$

$$\begin{aligned}\text{TOTAL DIVIDEND THIS YEAR} &= 45\% \text{ of } (4,10,000 \times 5) \\ &= 9,22,500\end{aligned}$$

$$\text{TOTAL DIVIDEND LAST YEAR} = \frac{9,22,500}{1.10} = 8,38,636$$

$$\text{DIVIDEND PER SHARE LAST YEAR} = \frac{8,38,636}{4,10,000} = \text{Rs } 2.05$$

## 15. Stock Split

The Kingfisher company has the following shareholders' equity account:

Common stock (Rs 8 par value) = Rs 20,00,000

Additional paid-in capital = Rs 16,00,000

Retained earnings = Rs 84,00,000

Total shareholders' equity Rs 120,00,000

The current market price of the stock is Rs 60 per share. What will happen to this account and to the number of shares outstanding with a 2-for-1 stock split?

Solution:

	Rs 8	Rs 4	
	Before Stock Split	After Stock Split	
Common Stock	20,00,000	20,00,000	$\leftarrow 5,00,000 \times 4 = 20,00,000$
Excess Capital	16,00,000	16,00,000	
Retained Earnings	84,00,000	84,00,000	
Shareholder's Equity	120,00,000	120,00,000	

$\uparrow$                                      $\uparrow$

NUMBER OF SHARES                                    NUMBER OF SHARES

$= \frac{20,00,000}{8} = 2,50,000$                              $= 2,50,000 \times 2$

$= 5,00,000$

## 16. Benefits of stock dividends and splits

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Stock dividends and stock splits do not change either the wealth of any shareholder or the wealth of the firm as a whole. They may seem like mere paper transactions at face value.

However, in practice, there are tangible benefits associated with these actions.

### Maintaining a Proper Trading Range

When a stock's price rises above a certain level, it may become less accessible to smaller investors who may not have the funds to purchase a round lot (typically 100 shares). Buying in smaller quantities (odd-lot) might incur higher commissions. By splitting the stock, the price per share decreases, making it more affordable and encouraging trading within the desired range. This can enhance accessibility and participation in the market, ultimately contributing to increased liquidity.

### Liquidity and Attractiveness

As mentioned earlier, stock splits can make shares more affordable for smaller investors, potentially increasing demand for the stock. When shares are more accessible, it can attract a broader range of investors, thus improving liquidity. Higher liquidity tends to attract more attention from institutional investors and analysts, potentially leading to increased coverage and interest in the stock, which can positively impact its price over time.

### Signal of Confidence

When a company issues stock dividends or splits its shares, it can be interpreted as a signal of confidence in the company's future prospects. This action suggests that the company's management believes the stock is undervalued or that they anticipate future growth. Investors often interpret such actions positively, which can lead to increased investor confidence and, consequently, higher demand for the stock.

### Psychological Impact

Stock splits and dividends can indeed have a psychological impact on investors. A stock split, for example, can make shareholders feel like they own more shares, even though the total value remains the same. This perception of increased ownership can lead to positive sentiment among investors, potentially boosting demand for the stock and driving up its price. Additionally, investors may interpret stock splits or dividends as a sign of management's optimism about the company's future performance, further reinforcing positive sentiment.

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## 17. Reverse Split

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A reverse stock split, also known as a stock consolidation or reverse split, is a corporate action where a company reduces the number of its outstanding shares by combining multiple shares into a single share. In other words, instead of dividing shares like in a traditional stock split, a reverse split consolidates shares.

For example, in a 1-for-5 reverse split, every five shares that an investor owns would be converted into one share. This consolidation increases the price per share proportionally, but decreases the total number of shares outstanding. The overall value of the investor's holdings remains the same, but the number of shares is reduced.

Given real-world imperfections, following 5 reasons are cited for reverse splits:

### 1. Reduced Transaction Costs

After a reverse split, shareholders may have fewer shares, which could result in reduced transaction costs when buying or selling shares. With fewer shares to trade, investors may face lower brokerage fees or commissions, potentially making it more cost-effective to trade the company's stock.

### 2. Improved Liquidity and Marketability

By raising the price of the company's stock through a reverse split, the stock may enter a more popular trading range. This increased price per share can attract more investors and improve the liquidity and marketability of the stock, as it becomes more appealing to a broader range of investors.

### 3. Enhanced Perceived Respectability

Stocks trading at very low prices may be perceived negatively by investors, who may underestimate the company's earnings, cash flow, growth potential, and stability. A reverse split can instantly increase the stock price, making it appear more respectable to investors and potentially changing their perception of the company's fundamentals.

### 4. Meeting Exchange Requirements

Some stock exchanges impose minimum price per share requirements for listed companies. If a company's stock price falls below this minimum, it may face delisting from the exchange. A reverse split can raise the stock price to meet these minimum requirements, allowing the company to maintain its listing on the exchange.

### 5. Shareholder Buyouts

In some cases, companies may perform reverse splits and simultaneously offer to buy out shareholders who end up with fewer than a certain number of shares after the split. This can help the company reduce its shareholder base, streamline ownership, and potentially eliminate small shareholders who may be less engaged or influential in corporate decision-making.

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## 17. Reverse Split

The owners' equity accounts for a firm are shown below:

Common stock (Rs 1 par value) = Rs 30,000

Capital surplus = Rs 1,85,000

Retained earnings = Rs 6,27,500

Total owners' equity = Rs 8,42,500

The firm declares a one-for-five reverse stock split. How many shares are outstanding now? What is the new par value per share?

Solution:

BEFORE REVERSE SPLIT

NUMBER OF SHARES = 30,000

PAR VALUE = RS 1

AFTER REVERSE SPLIT

NUMBER OF SHARES =  $\frac{30,000}{5} = 6,000$

PAR VALUE =  $1 \times 5 = RS 5$

## 17. Reverse Split

The Sigma company has the following shareholders' equity account:

Common stock (Rs 8 par value) = Rs 20,00,000

Additional paid-in capital = Rs 16,00,000

Retained earnings = Rs 84,00,000

Total shareholders' equity Rs 120,00,000

The current market price of the stock is Rs 60 per share. What will happen to this account and to the number of shares outstanding with a 1-for-2 reverse stock split?

Solution:

	Rs 8	Rs 16	
	Before Reverse Split	After Reverse Split	
Common Stock	20,00,000	20,00,000	← 1,25,000 × 16
Excess Capital	16,00,000	16,00,000	
Retained Earnings	84,00,000	84,00,000	
Shareholder's Equity	120,00,000	120,00,000	

$\frac{\text{NUMBER OF SHARES}}{8} = \frac{20,00,000}{8} = 2,50,000$

$\frac{\text{NUMBER OF SHARES}}{2} = \frac{2,50,000}{2} = 1,25,000$

## 1. Introduction

Capital Budgeting is the process to evaluate and select investment projects with long-term implications. It involves identifying, analyzing, and selecting investment opportunities that are expected to generate returns over a period exceeding one year.

Here are a few examples illustrating capital budgeting scenarios:

1. A manufacturing company evaluates the construction of a new facility to increase production capacity and meet growing demand in the market.
2. A utility company considers investing in renewable energy projects, such as solar or wind farms, to diversify its energy portfolio and reduce carbon emissions.
3. A technology firm examines the acquisition of cutting-edge software or hardware solutions to enhance operational efficiency and maintain a competitive edge in the industry.
4. A retail chain assesses the expansion of its store network into new geographic regions to capture additional market share and increase revenue streams.

# 1. Introduction

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Capital budgeting decisions typically involve long-term commitments, irreversibility, and significant investment amounts.

1. **Long-Term Commitments:** Capital budgeting decisions often involve committing resources to projects that have implications for several years or even decades. Whether it's constructing a new manufacturing facility, acquiring major equipment, or launching a new product line, these investments require careful consideration of their long-term impact on the organization's financial health and competitive position.
2. **Irreversibility:** Many capital expenditures involve irreversible actions, meaning that once the investment is made, it's challenging or costly to reverse or undo the decision. For example, if a company invests in building a new infrastructure or acquiring a piece of expensive technology, it may not be feasible to sell or dispose of these assets easily if the investment doesn't yield the expected returns.
3. **High Investment:** Capital budgeting decisions often entail substantial financial outlays. Whether it's purchasing expensive machinery, acquiring real estate, or funding research and development initiatives, these investments require a significant allocation of financial resources. As such, they carry inherent risks and potential consequences for the organization's financial stability and liquidity.

Given these characteristics, organizations need to conduct thorough analysis, risk assessment, and evaluation of alternative investment options before committing to capital budgeting decisions. They must consider factors such as projected cash flows, return on investment, payback period, risk factors, and strategic alignment to ensure prudent allocation of resources and maximize long-term value creation.

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## 2. Types of Project Decisions

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Capital Budgeting decisions are typically made for two types of project scenarios:

### 1. Independent Projects

Independent projects are those where the decision to accept or reject one project does not affect the acceptance or rejection of other projects. For instance, consider McDonald's contemplating opening a hamburger outlet on a remote island. This decision would likely be unaffected by the status of other restaurants in the chain. Acceptance or rejection of independent projects is often based on meeting a minimum return on investment criterion.

If a proposal yields a rate of return higher than the required minimum or the cost of capital, it is accepted; otherwise, it is rejected.

### 2. Mutually Exclusive Projects

Mutually exclusive projects are those where selecting one project automatically excludes the acceptance of others. For example, a company may have to choose between buying a new machine, purchasing a second-hand machine, or leasing an old machine. Once a decision is made to proceed with one option, the others are automatically rejected.

Similarly, two projects, A and B, are mutually exclusive if accepting one means rejecting the other. For instance, you can either build an apartment house (project A) or a movie theater (project B) on a corner lot, but you cannot pursue both simultaneously.

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### 3. Methods of Capital Budgeting

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#### Non-discounted Cash Flow techniques

- 1. Payback period
- 2. Accounting rate of return (ARR)

#### Discounted Cash Flow techniques

- 1. Discounted payback period
- 2. Net present value (NPV)
- 3. Internal rate of return (IRR)
- 4. Modified internal rate of return (MIRR)
- 5. Profitability index (PI)

There are several methods of capital budgeting analysis, broadly categorized into two groups: discounted cash flow techniques and non-discounted cash flow techniques.

**Non-discounted cash flow techniques** include (also called conventional methods or traditional methods.):

1. Payback period
2. Accounting rate of return (ARR)

**Discounted Cash Flow methods** take into account the time value of money and involve discounting future cash flows at a specified rate to determine their present value. It's important to note that when assessing the value of an entire firm, the free cash flows are discounted at the weighted average cost of capital (WACC). However, when evaluating a specific project, the cash flows are discounted at the project's own risk-adjusted cost of capital.

Discounted cash flow techniques include (also called Present Value Techniques or Scientific methods):

1. Discounted Payback period
2. Net present value (NPV)
3. Internal rate of return (IRR)
4. Modified Internal rate of return (MIRR)
5. Profitability index (PI)

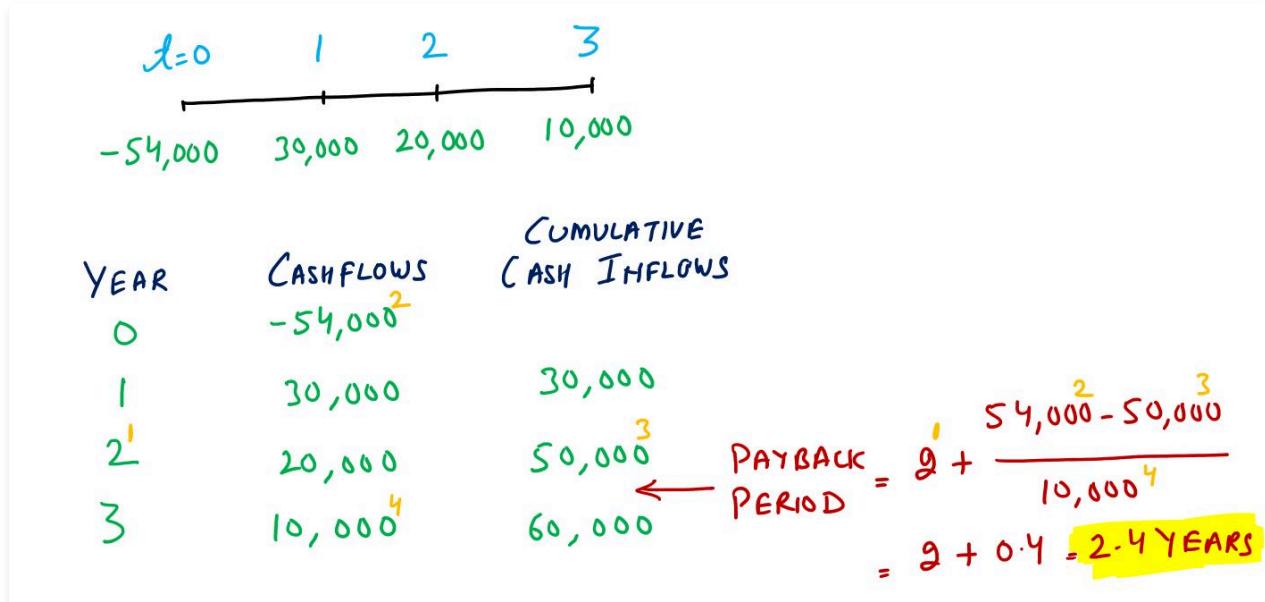
Let us discuss these methods, one by one.

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## 4. Payback Period Method

The Payback Period (PBP) of an investment project tells us the number of years required to recover our initial cash investment based on the project's expected cash flows.

Consider a project with an initial investment of 54,000. Cash flows are Rs 30,000, Rs 20,000, and Rs 10,000 in the first three years, respectively. These flows are illustrated in the Figure. The minus sign in front of the Rs 50,000 reminds us that this is a cash outflow for the investor, and others are cash inflows.



This means that the firm has recovered its investment within 2.4 years. In this case 2.4 years is the payback period of the investment.

### Acceptance Criterion

The payback period rule for making investment decisions is simple. A particular cutoff date, say 3 years, is selected (called maximum acceptable payback period). All investment projects that have payback periods of 3 years or less are accepted, and all of those that pay off in more than 3 years are rejected.

A project with shortest payback period will be given the highest preference. This method is more suitable in industries where the risk of obsolescence is high or for the firms which prefer liquidity or when there are uncertain market conditions. The shorter the payback, other things held constant, the greater the project's liquidity. This factor is often important for smaller firms that don't have ready access to the capital markets.

### Advantages of Payback period method:

- Simple to understand and easy to calculate.
- As the project with a short payback period is preferred the chance of obsolescence is reduced.
- A firm which has shortage of funds finds this method very useful.

### Limitations of Payback period method:

- This method fails to consider cash flows occurring after the expiration of the payback period; consequently, it cannot be regarded as a measure of profitability.
- This method ignores the time value of money. It simply adds cash flows without regard to the timing of these flows.
- The maximum acceptable payback period, which serves as the cutoff standard, is a purely subjective choice. There is no comparable guide for choosing the payback cutoff date, so the choice is somewhat arbitrary.

### Payback Reciprocal

As the name indicates it is the reciprocal of payback period. A major drawback of the payback period method of capital budgeting is that it does not indicate any cut off period for the purpose of investment decision. It is, however, argued that the reciprocal of the payback would be a close approximation of the Internal Rate of Return of the life of the project. In practice, the payback reciprocal is a helpful tool for quick estimation of rate of return of a project provided its life is at least twice the payback period.

$$\text{PAYBACK RECIPROCAL} = \frac{\text{AVERAGE ANNUAL CASH FLOWS}}{\text{INITIAL INVESTMENT}}$$

## 4. Payback Period Method

A project cost Rs. 50000 and yields annual cash inflow of Rs. 10000 for 7 years. Calculate its payback period.

Solution:

$$\text{PAYBACK PERIOD} = \frac{50,000}{10,000} = 5 \text{ YEARS}$$

## 4. Payback Period Method

An investment project provides cash inflows of Rs 840 per year for eight years. What is the project payback period if:

- (i) the initial cost is Rs 3,200?
- (ii) the initial cost is Rs 7,300?

Solution:

- (i) the initial cost is Rs 3,200?

$$\text{PAYBACK PERIOD} = \frac{3200}{840} = 3.81 \text{ YEARS}$$

- (ii) the initial cost is Rs 7,300?

$$\text{PAYBACK PERIOD} = \frac{7300}{840} = 8.79 \text{ YEARS}$$

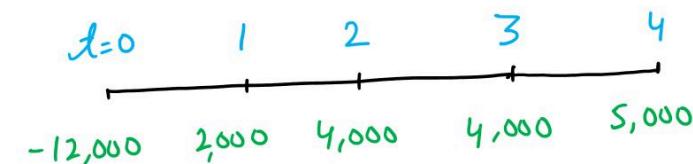
7300 IS MORE THAN 840 × 8  
⇒ NO PAYBACK

This answer does not make sense since the cash flows stop after 8 years, so there is no payback period in this case.

## 4. Payback Period Method

Determine the Payback Period for a project which requires a cash outlay of Rs. 12000 and generate cash inflows of Rs. 2000, Rs. 4000, Rs. 4000 and Rs. 5000 in the 1st, 2nd, 3rd and 4th year respectively.

Solution:



YEAR	CASHFLOWS	CUMULATIVE CASH INFLOWS
0	-12,000	
1	2,000	2,000
2	4,000	6,000
3	4,000	10,000
4	5,000	15,000

$\text{PAYBACK} = 3 + \frac{12,000 - 10,000}{5,000}$   
 $\text{PERIOD} = 3 + 0.4 = 3.4 \text{ Years}$

## 5. Discounted Payback Period

One of the limitations of Payback period method is that it ignores the time value of money. It simply adds cash flows without regard to the timing of these flows.

This limitation has been improved in the **discounted payback period** method. Under this approach, we first discount the cash flows. Then we ask how long it takes for the discounted cash flows to equal the initial investment.

For example, suppose that the discount rate is 10% and the cash flows on a project are (-100, 50, 50, 20). This investment has a payback period of two years because the investment is paid back in that time.

To compute the project's discounted payback period, we first discount each of the cash flows at the 10% rate.

	$t=0$	1	2	3	
YEAR	CASHFLOWS	DISCOUNTED CASHFLOWS		CUMULATIVE CASH INFLOWS	
0	-100		-100		
1	50	$\frac{50}{1.10} = 45.45$		45.45	$2 + \frac{100 - 86.77}{15.03}$
2	50	$\frac{50}{(1.10)^2} = 41.32$		86.77	$2.88 \text{ YEARS}$
3	20	$\frac{20}{(1.10)^3} = 15.03$		101.80	

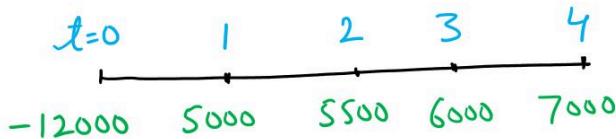
We can see that the payback period for the discounted cash flows (2.88 years) is more than payback period for the non-discounted cash flows (2 years). As long as the cash flows and discount rate are positive, the discounted payback period will never be smaller than the payback period because discounting reduces the value of the cash flows.

At first glance discounted payback may seem like an attractive alternative, but on closer inspection we see that it has some of the same major flaws as payback. Like payback, discounted payback first requires us to choose an arbitrary cutoff period, and then it ignores all cash flows after that date.

## 5. Discounted Payback Period

An investment project has annual cash inflows of Rs 5,000, Rs 5,500, Rs 6,000, and Rs 7,000, and a discount rate of 14%. What is the discounted payback period for these cash flows if the initial cost is Rs 12,000?

Solution:



YEAR	CASH FLOWS	DISCOUNTED CASH FLOWS	CUMULATIVE CASH FLOWS	
0	-12000	-12000		
1	5000	$5000 / (1.14) = 4386$	4386	$2 + \frac{12000 - 8618}{4050}$
2	5500	$5500 / (1.14)^2 = 4232$	8618	
3	6000	$6000 / (1.14)^3 = 4050$	12668	= 2.84 YEARS
4	7000	$7000 / (1.14)^4 = 4144$	16812	

## 5. Discounted Payback Period

Calculating Discounted Payback An investment project costs Rs 15,000 and has annual cash flows of Rs 3,800 for six years. What is the discounted payback period if the discount rate is 10%?

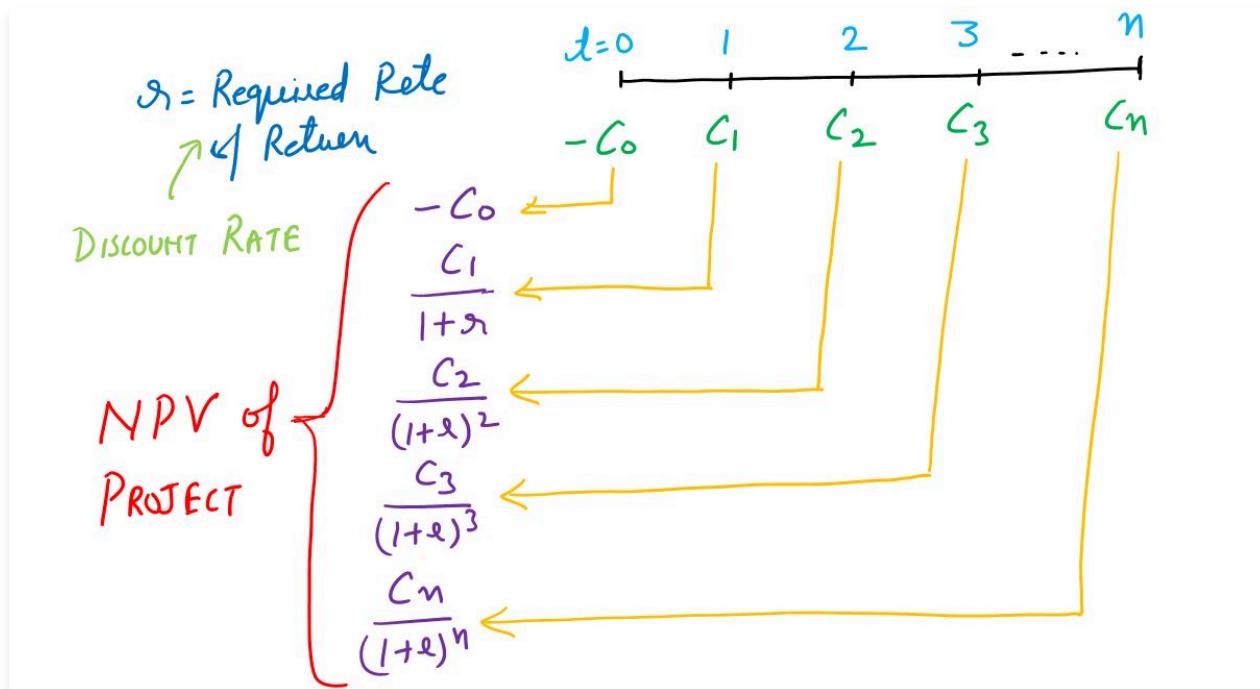
Solution:

YEAR	CASHFLOWS	DISCOUNTED CASHFLOWS		CUMULATIVE CASH INFLOWS
		1	2	
0	-15000	-15000		
1	3800	3454		3454
2	3800	3140		6594
3	3800	2855		9449
4	3800	2595		12044
5	3800	2359		14403
6	3800	2145		16548

$$\text{Discounted Payback Period} = 5 + \frac{15000 - 14403}{2145} = 5.28 \text{ YEARS}$$

## 6. Net Present value

The Net Present Value (NPV) method is a discounted cash flow approach used in capital budgeting. It calculates the net present value (NPV) of an investment proposal by subtracting the initial cash outflow from the present value of the proposal's net cash flows.



### Acceptance Criterion

The basic rule for investment decisions is to accept a project if its NPV is greater than zero and reject it if NPV is less than zero. Alternatively, a project is accepted if the present value of cash inflows exceeds the present value of cash outflows.

$NPV > 0 \Rightarrow \text{ACCEPT}$

$NPV < 0 \Rightarrow \text{REJECT}$

$NPV = 0 \Rightarrow \text{INDIFFERENT TO ACCEPTANCE/REJECTION}$

$HIGHER THE NPV \Rightarrow BETTER IT IS$

In the case of independent projects, positive NPV projects are chosen. In mutually exclusive projects, the project with the highest positive NPV is selected among multiple options.

### Discount Rate

The discount rate is the interest rate used to calculate the present value of future cash flows in capital budgeting. It reflects the time value of money, accounting for factors like risk, inflation, and opportunity cost. A higher discount rate reduces the present value of future cash flows, while a lower rate increases it.

Other common names for the discount rate in this context include:

- *Required Rate of Return* – This is the minimum return that an investor or company expects to receive from an investment.
- *Cost of Capital* – This is the overall cost of financing for a project, including both debt and equity financing, and is used as the discount rate in many capital budgeting models.

- *Hurdle Rate* – This refers to the minimum acceptable return on an investment, which is often set by management or investors to decide if a project is worth pursuing.
  - *Interest Rate* – Sometimes used interchangeably with discount rate, particularly when the future cash flows are assumed to be discounted at a rate similar to the interest rate on borrowed funds.
  - *Opportunity Cost of Capital* – This term refers to the return that could have been earned if the funds were invested elsewhere with a similar level of risk.
  - *Benchmark Rate* – This is a reference rate against which the performance of an investment or project is measured, often tied to market interest rates or other external indicators.
  - *Required Return on Investment* – This is the return an investor expects based on the risk and other factors of the project or investment.
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## 6. Net Present value

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The **Value Additivity Principle** states that the Net Present Value (NPV) of a set of independent projects is simply the sum of the NPVs of the individual projects. In other words, the total value created by undertaking multiple projects is equal to the sum of the values created by each project individually.

This principle is a desirable property of the NPV criterion because it allows managers to consider each project separately when making investment decisions. Instead of evaluating the combined impact of multiple projects, managers can analyze each project's potential benefits and risks independently. This simplifies the decision-making process and facilitates more accurate assessments of project viability.

Furthermore, the Value Additivity Principle implies that when a firm undertakes several investments, its overall value increases by an amount equal to the sum of the NPVs of the accepted projects. This aligns with the objective of maximizing shareholder wealth, as it indicates that the firm's value grows proportionally with the value of its investment portfolio.

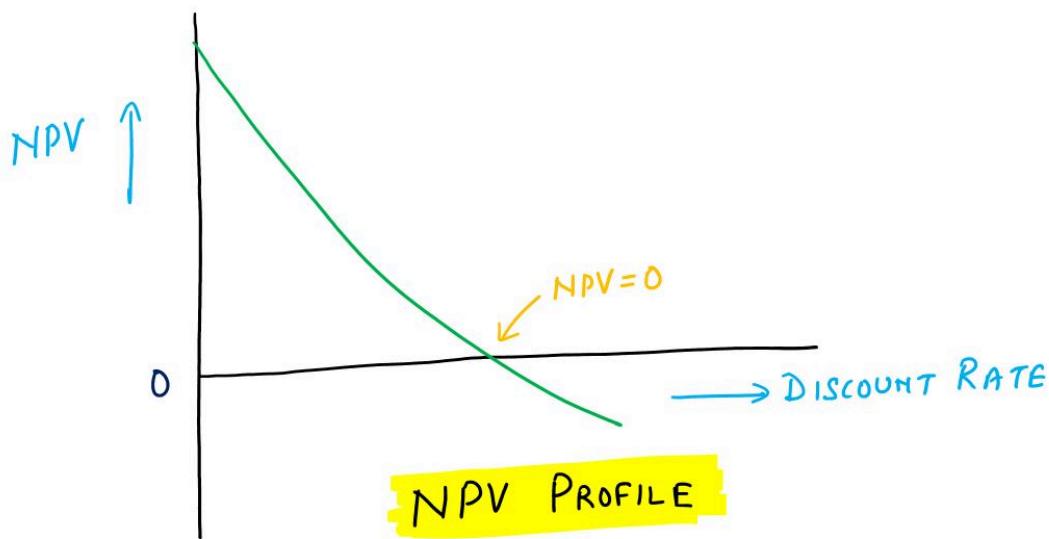
### NPV and Firm Value

Accepting positive NPV projects benefits shareholders as it adds value to the firm. The value of the firm is the sum of the values of its different projects, divisions, or entities. This property, known as value additivity, implies that the contribution of any project to the firm's value is simply its NPV. Therefore, the total market price of the firm's stock should change by an amount equal to the NPV of the project. Taking a project with an NPV of zero should leave the market price of the firm's stock unchanged, while the value of the firm increases by the NPV of the project.

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## 7. NPV Profile

NPV Profile is a graph showing the relationship between a project's net present value (NPV) and the discount rate employed.



When the discount rate is zero, NPV is simply the total cash inflows less the total cash outflows of the project. Assuming a conventional project – one where total inflows exceed total outflows and where the initial outflow(s) is (are) followed by inflows – the highest NPV will occur when the discount rate is zero.

As the discount rate increases, the NPV Profile slopes downward to the right. At the point where the NPV curve intersects the horizontal axis on the graph, the NPV of the project is zero. By definition, the discount rate at that point represents the *internal rate of return (IRR)* – the discount rate at which the project's net present value equals zero.

For discount rates greater than the IRR, the NPV of the project is negative.

## 8. NPV and Payback Period- a comparison

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We have learned that the Payback Period has 3 main limitations:

1. It does not account for cash flows occurring after the payback period ends, making it inadequate as a measure of profitability.
2. It disregards the time value of money by simply summing cash flows without considering their timing.
3. The choice of the maximum acceptable payback period is subjective and lacks a clear guideline, making it somewhat arbitrary.

These limitations are addressed by the NPV method. While the Discounted Payback Period method addresses the limitation under point 2, it still retains the limitation mentioned in point 1 and 3.

The NPV method tackles all three limitations, making it a superior choice compared to the both Payback period or Discounted Payback Period methods.

### NPV and Payback Period

Assuming conventional cash flows, a payback period less than the project's life means that the NPV is positive for a zero discount rate, but nothing more definitive can be said.

For discount rates greater than zero, the payback period will still be less than the project's life, but the NPV may be positive, zero, or negative, depending on whether the discount rate is less than, equal to, or greater than the IRR.

The discounted payback includes the effect of the relevant discount rate. If a project's discounted payback period is less than the project's life, it must be the case that NPV is positive.

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## 8. NPV and Payback Period- a comparison

Consider a project requires an initial investment of Rs. 225,000 and is expected to generate the following net cash inflows:

Year 1: Rs. 95,000

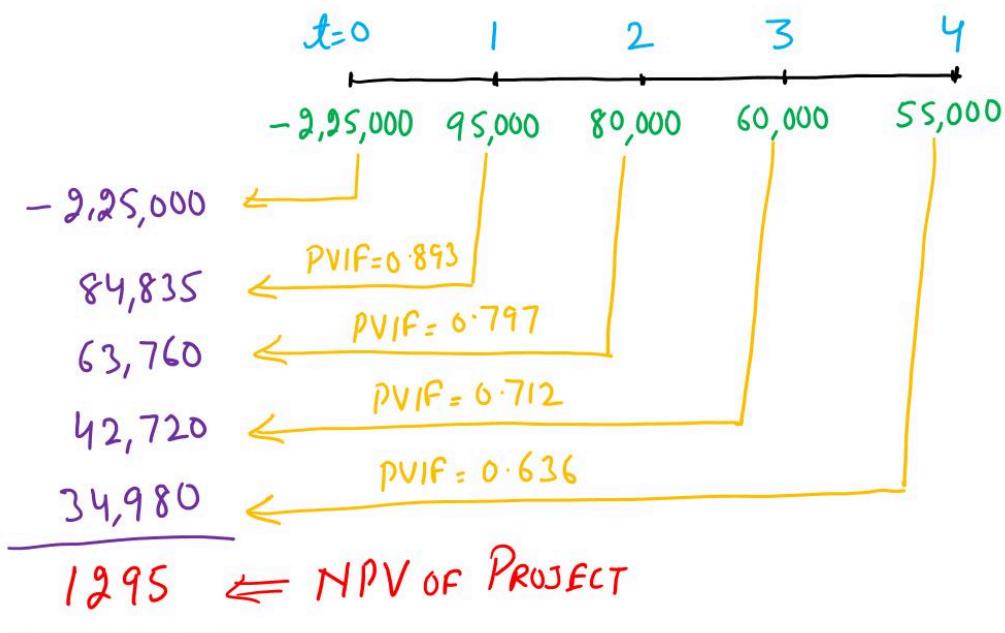
Year 2: Rs. 80,000

Year 3: Rs. 60,000

Year 4: Rs. 55,000

We have to compute net present value (NPV) of the project if the minimum desired rate of return is 12%.

Solution:

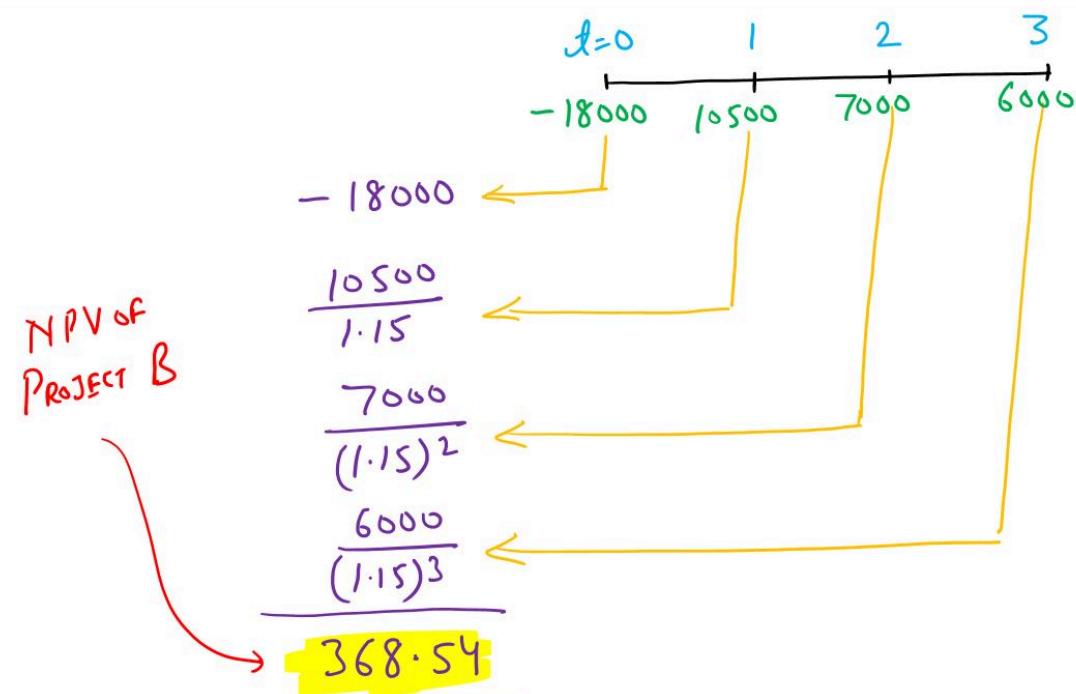
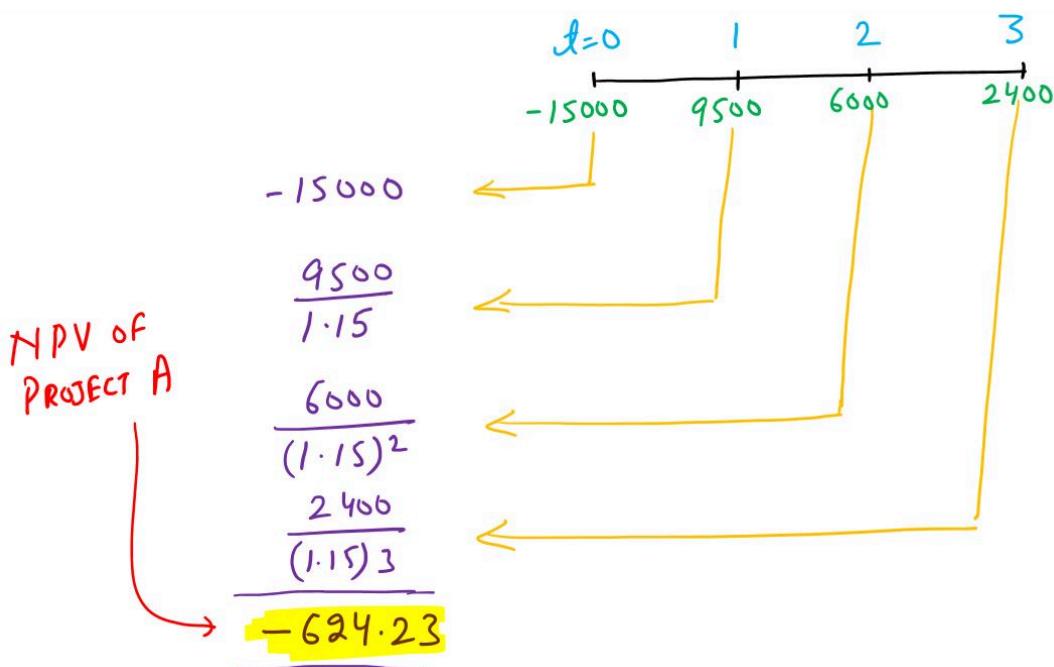


## 8. NPV and Payback Period- a comparison

A company has the following mutually exclusive projects. The company uses the NPV rule to rank these two projects. Which project should be chosen if the appropriate discount rate is 15 percent?

Year	Project A	Project B
0	-15000	-18000
1	9500	10500
2	6000	7000
3	2400	6000

Solution:



The company should choose Project B since it has a higher NPV than Project A has.

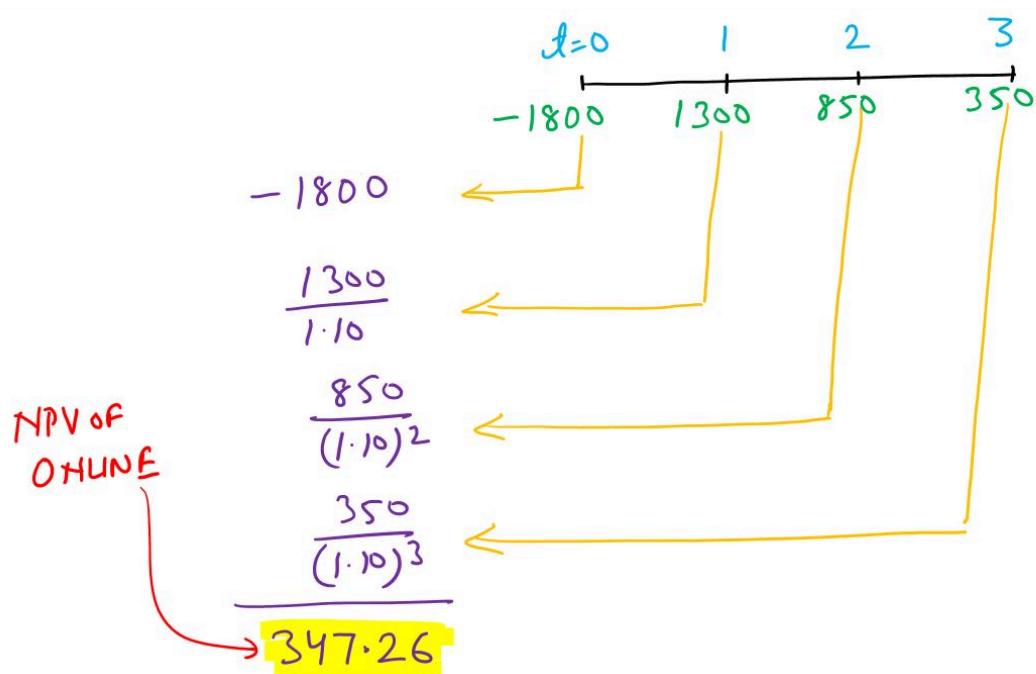
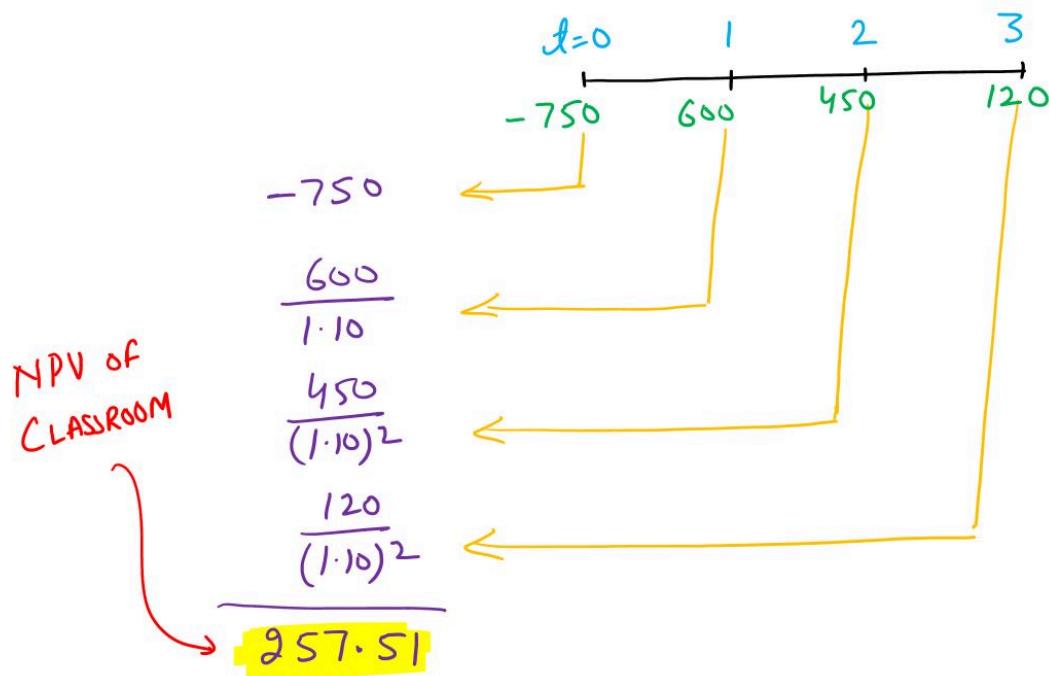
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## 8. NPV and Payback Period- a comparison

A coaching institute has two options of offering courses, classroom and online. It can choose either of these two but not both. Consider the following cash flows of the two options. Assume the discount rate for the coaching institute is 10%. Based on the NPV, which project should be chosen?

Year	Classroom	Online
0	-750	-1800
1	600	1300
2	450	850
3	120	350

Solution:



Since the NPV of the Online is greater than the NPV of the Classroom, choose the Online option.

---

## 9. Internal Rate of Return

The Internal Rate of Return (IRR) of an investment proposal is the discount rate at which the present value of expected net cash flows equals the initial cash outflow.

The fundamental principle behind the IRR method is its ability to provide a single metric summarizing a project's merits, independent of prevailing market interest rates. This intrinsic quality makes it known as the 'internal' rate of return, as it's solely based on the project's 'internal' cash flows.

$$C_0 = \frac{C_1}{1+IRR} + \frac{C_2}{(1+IRR)^2} + \frac{C_3}{(1+IRR)^3} + \dots + \frac{C_n}{(1+IRR)^n}$$

OR  $NPV = 0$

The IRR represents the rate at which the project's net present value (NPV) is zero.

### Acceptance Criterion

With the IRR method, the acceptance criterion involves comparing the IRR to a predetermined required rate of return, often called the cutoff or hurdle rate. If the IRR surpasses the required rate, the project is accepted; otherwise, it is rejected.

IRR > REQUIRED RATE OF RETURN  
→ ACCEPT PROJECT

IRR < REQUIRED RATE OF RETURN  
→ REJECT PROJECT

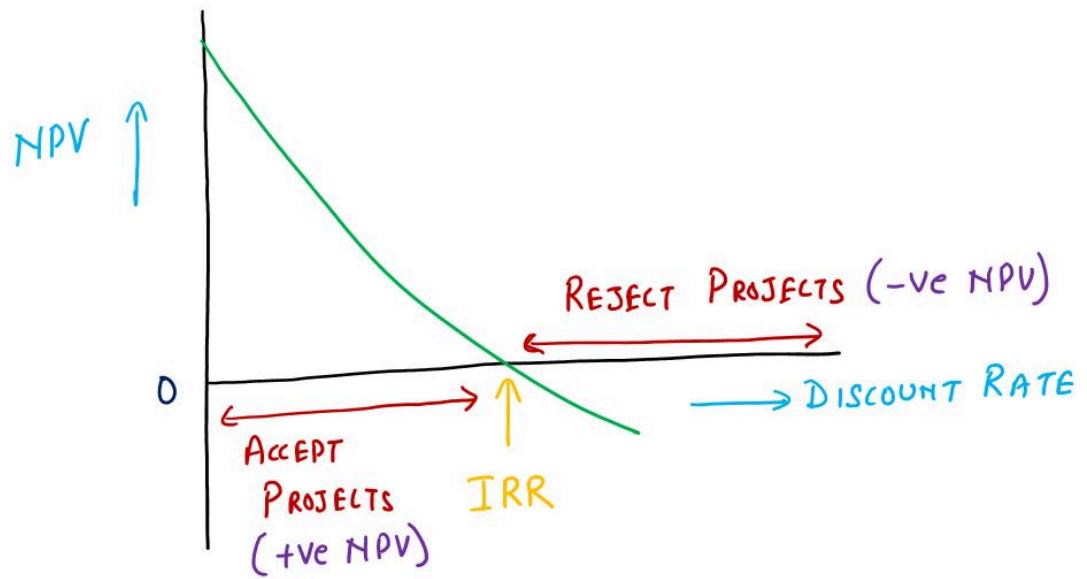
HIGHER THE IRR ⇒ BETTER IT IS

### IRR and Firm Value

If the required rate of return reflects investors' expectations for the firm's project, approving a project with an IRR higher than the required rate should lead to an increase in the stock's market price. This is because accepting such a project implies earning returns exceeding those needed to maintain the current market price per share.

### NPV Profile and IRR

We can see in the NPV profile that the curve crosses the horizontal axis at the IRR because this is where the NPV equals zero.



It is also clear from the figure that the NPV is positive for discount rates below the IRR and negative for discount rates above the IRR. If we accept projects when the discount rate is less than the IRR, we will be accepting positive NPV projects.

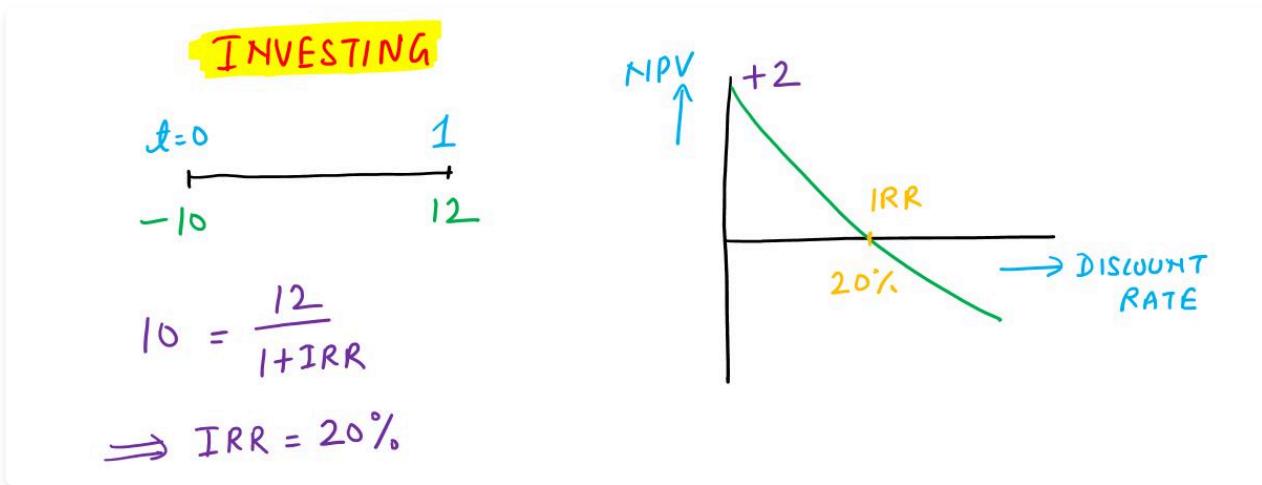
Thus, the IRR rule should always coincide with the NPV rule. But the IRR rule and the NPV rule are NOT consistent in many situations.

Unlike NPV, the IRR method does not follow value additivity principle.

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## 10. IRR- Investing or Financing

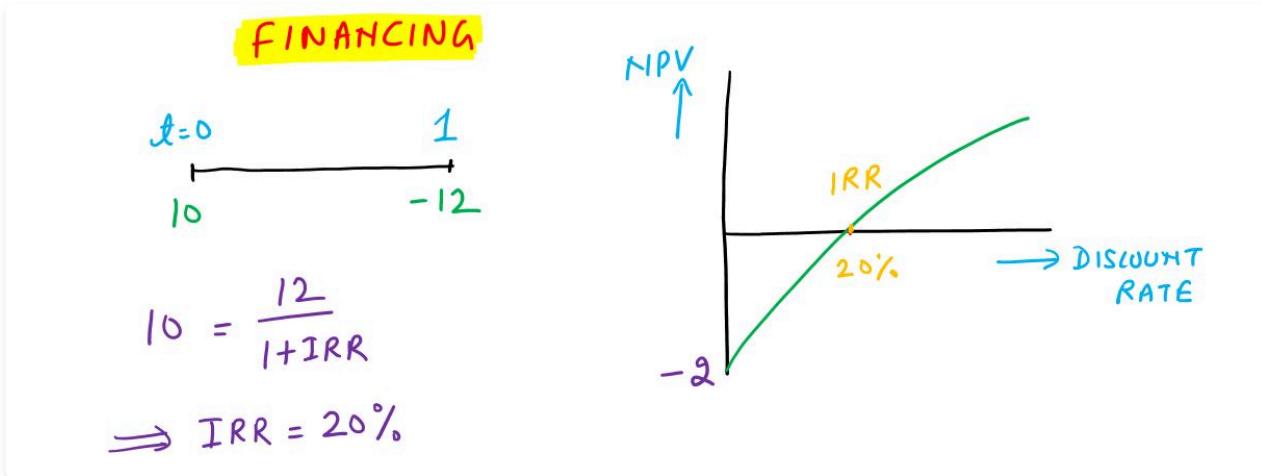
So far, our calculations of IRR have revolved around scenarios where we invest money upfront and receive cash flows in the future. For instance, if we invest Rs 10 today and receive Rs 12 after a year, the Internal Rate of Return (IRR) for this project would be 20%.



Look at the NPV Profile. In this investment scenario, we accept a project when the calculated IRR exceeds the discount rate.

Now, let us consider another scenario where we finance the project instead of investing in the project. For example, as a coaching institute, we collect fees upfront and then incur expenses over the following months/years.

Consider that we receive Rs 10 today and have an outflow of Rs 12 after a year, the IRR still remains 20%.



However, observe the NPV Profile: the net present value is negative when the discount rate is below 20%, but it is positive when the discount rate is above 20%. The decision rule here is the opposite of our previous scenario.

Therefore, for financing projects, we accept the project when the IRR is lower than the discount rate, and reject it when the IRR exceeds the discount rate. Thus the traditional IRR rule is reversed for financing type projects.

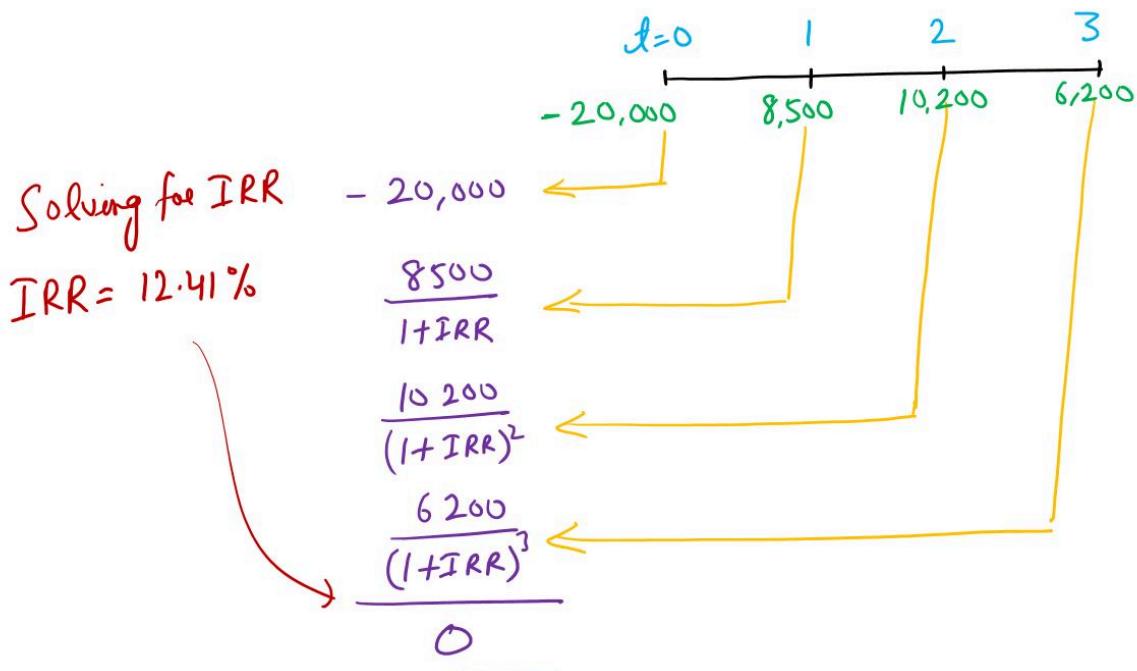
	INVESTING	FINANCING
IRR > DISCOUNT RATE	ACCEPT	REJECT
IRR < DISCOUNT RATE	REJECT	ACCEPT

## 10. IRR- Investing or Financing

A firm has a project with the following cash flows. The company evaluates all projects by applying the IRR rule. If the appropriate interest rate is 9 percent, should the company accept the project?

Year	Cashflows
0	-20000
1	8500
2	10200
3	6200

Solution:



Since the calculated IRR (12.41%) is greater than the required return (9%) we would accept the project.

## 10. IRR- Investing or Financing

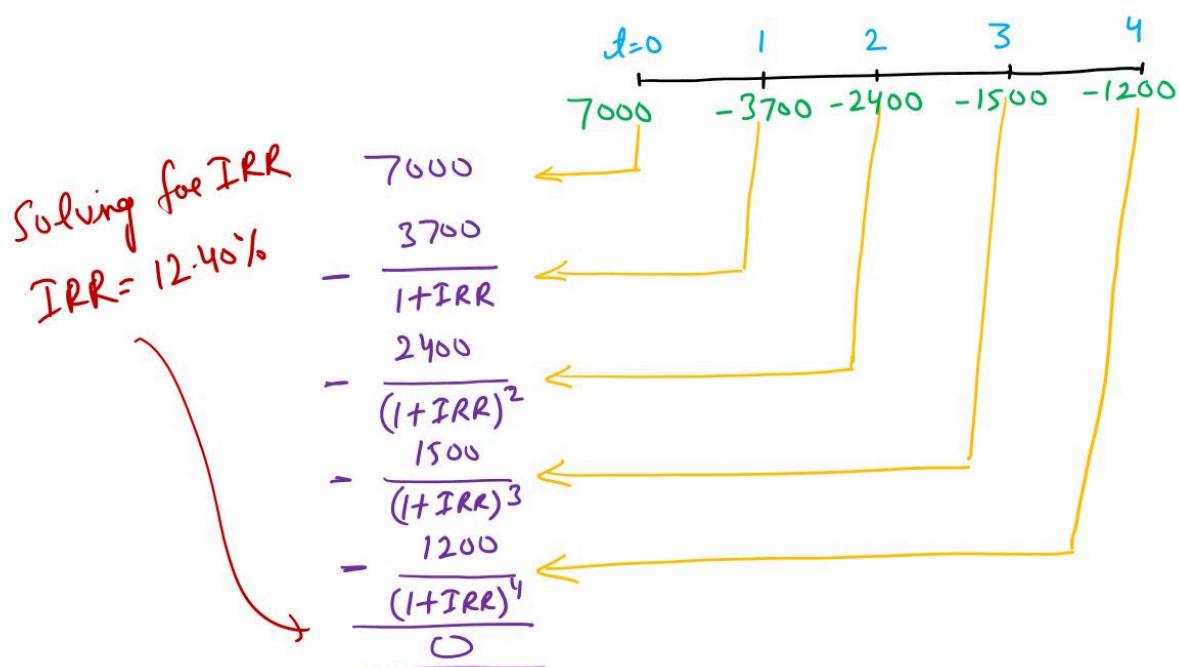
Suppose you are offered Rs 7000 today but must make the following payments.

- (i) What is the IRR of this offer?
- (ii) If the appropriate discount rate is 10%, should you accept this offer?
- (iii) If the appropriate discount rate is 20%, should you accept this offer?

Year	Cashflows
0	7000
1	-3700
2	-2400
3	-1500
4	-1200

Solution:

- (i) What is the IRR of this offer?



- (ii) If the appropriate discount rate is 10%, should you accept this offer?

The initial cash flow is positive and all future cash flows are negative. In other words, this is a financing-type project (not investing). For financing situations, accept the project when the IRR is less than the discount rate. Reject the project when the IRR is greater than the discount rate.

*SINCE IRR > DISCOUNT RATE  
⇒ Reject the Project*

- (iii) If the appropriate discount rate is 20%, should you accept this offer?

SINCE  $IRR < \text{DISCOUNT RATE}$   
 $\Rightarrow$  Accept the Project

## 10. IRR- Investing or Financing

A firm has a project with the following cash flows:

Year	Cashflows
0	20000
1	-26000
2	13000

What is the IRR of the project?

Solution:

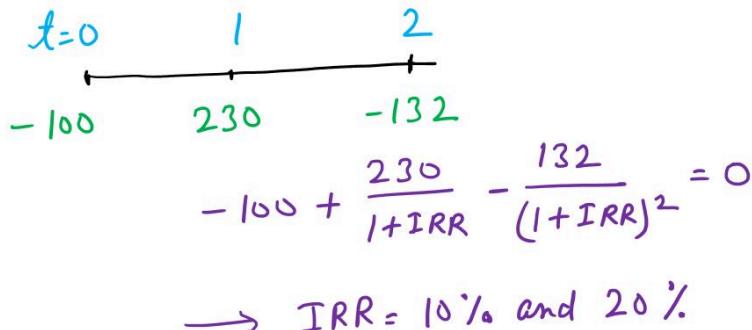
$$20000 - \frac{20000}{1+IRR} + \frac{13000}{(1+IRR)^2} = 0$$

Solving, we are getting IRR as Complex Number  
 $b^2 - 4ac < 0$

$\Rightarrow$  No Real IRR

## 11. MIRR method

Consider a project with cash flows of (-100, 230, -132).

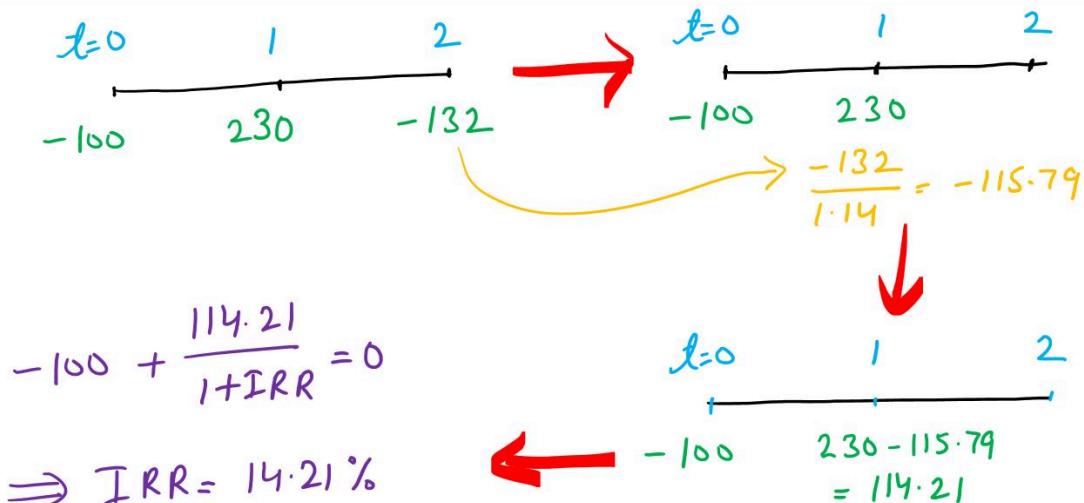


After calculation we find that this project presents not one but two Internal Rates of Return (IRR), calculated at 10% and 20%. Such instances make the traditional IRR method unsuitable.

The occurrence of multiple IRRs arises because both inflows and outflows happen after the initial investment. In general, these shifts in sign lead to multiple IRRs. As a rule, a cash flow stream with K changes in sign can theoretically have up to K IRRs. Given our project has 2 changes in sign, it could potentially have 2 IRRs.

Of course, the NPV method can be used in such cases.

To address the challenge of multiple IRRs, we can also turn to the Modified IRR (MIRR) method. MIRR resolves this issue by combining cash flows until only one change in sign remains.



### MIRR METHOD

By discounting and aggregating cash flows, we eliminate multiple changes in sign, enabling the application of the IRR rule. We continue this process of discounting and combining later cash flows until only one change of sign persists.

#### Limitations of MIRR

One of the interpretations of the acronym MIRR is "meaningless internal rate of return."

Although this adjustment does correct for multiple IRRs, it violates the "spirit" of the IRR approach. As stated earlier, the basic rationale behind the IRR method is that it provides a single number summarizing the merits of a project. That number does not depend on the discount rate. In fact, that is why it is called the internal rate of return: The number is internal, or intrinsic, to the project and does not depend on anything except the project's cash flows. By contrast, MIRR is clearly a function of the discount rate.

## 12. NPV and IRR Conflicts

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Let us delve into scenarios where NPV and IRR recommendations may clash.

It is important to note that these conflicts arise solely in the case of mutually exclusive projects, not independent ones. Mutually exclusive projects refer to situations where the firm can only accept one of multiple options.

There are 3 cases:

### 1. Scale Problem

This occurs when the costs of projects differ, leading to differing initial cash outflows. In some cases, comparing the NPV and IRR of mutually exclusive investment projects becomes challenging due to the difference in initial investment amounts. For example, if Project A requires a larger initial investment than Project B, solely comparing NPV or IRR may not provide a clear indication of which project is more preferable.

### 2. Timing Problem

Timing discrepancies in cash flows can create conflicts between NPV and IRR evaluations. For instance, one project may generate increasing cash flows over time, while another project's cash flows decrease over the same period. In such cases, the IRR may favor the project with earlier cash flows, whereas the NPV may favor the project with later cash flows. This discrepancy can make it difficult to determine the most financially beneficial option.

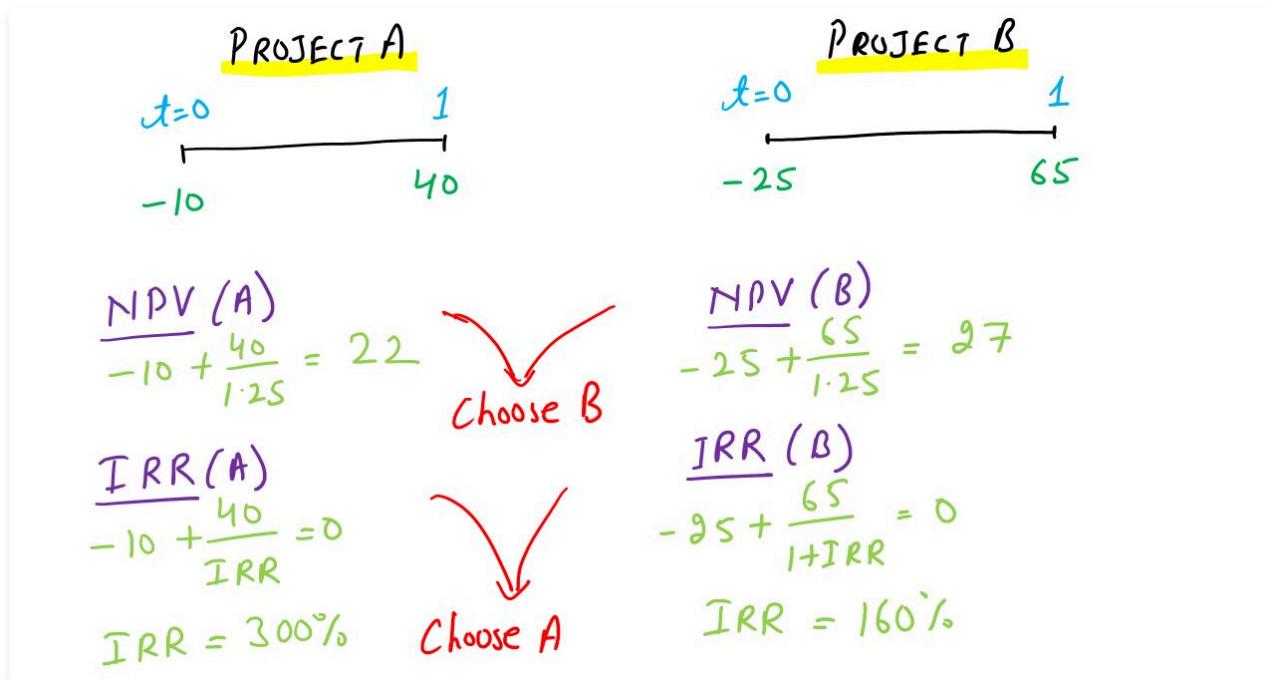
### 3. Projects with unequal Lives

Projects with different useful lives pose another challenge. When comparing investments with unequal lifespans, the NPV and IRR methods may provide conflicting recommendations. For example, if one project has a shorter lifespan than another, its IRR may appear higher due to the quicker return of initial investment. However, the NPV may favor the project with a longer lifespan, as it generates cash flows over a more extended period, potentially resulting in higher cumulative profits.

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## 12. NPV and IRR Conflicts

Consider Project A with cash flows of (-10, 40) and Project B with cash flows of (-25, 65). Upon calculating NPV and IRR for both projects, we observe conflicting recommendations. NPV is calculated at discount rate of 25%. Using NPV method, Project B is recommended, as it has higher NPV. Using IRR method, Project A is recommended, as it has higher IRR.



This conflict is known as the **Scale Problem**.

Where does IRR fall short?

The issue with IRR lies in its disregard for scale considerations. While Project A boasts a higher IRR, its initial investment is significantly smaller. In essence, the impressive percentage return of Project A is overshadowed by the potential to earn a decent return on a much larger investment in Project B.

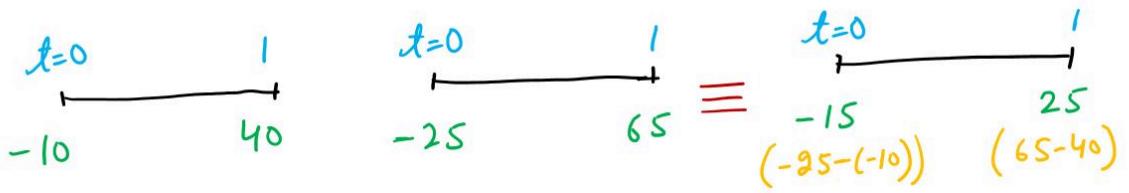
We can resolve the conflict between NPV and IRR for mutually exclusive projects in one of 3 ways:

### 1. NPV Comparison

Compare the NPVs of the two projects. For instance, if the NPV of Project B (27) exceeds that of Project A (22), then Project B is chosen.

### 2. Incremental NPV Calculation

Calculate the incremental NPV by subtracting the cash flows of the smaller project from those of the larger project. If the incremental NPV is positive (5 in our case), then choose the larger project. We choose Project B.



PROJECT A

PROJECT B

B-A

INCREMENTAL NPV

$$-15 + \frac{25}{1+25} = 5$$

INCREMENTAL IRR (IIRR)

$$-15 + \frac{25}{1+IRR} = 0$$

$$\Rightarrow IRR = 66.67\%$$

### 3. Incremental IRR Comparison

Compare the incremental IRR to the discount rate. If the incremental IRR exceeds the discount rate (e.g., 66.67% > 25%), then select the larger project, which in this case is Project B.

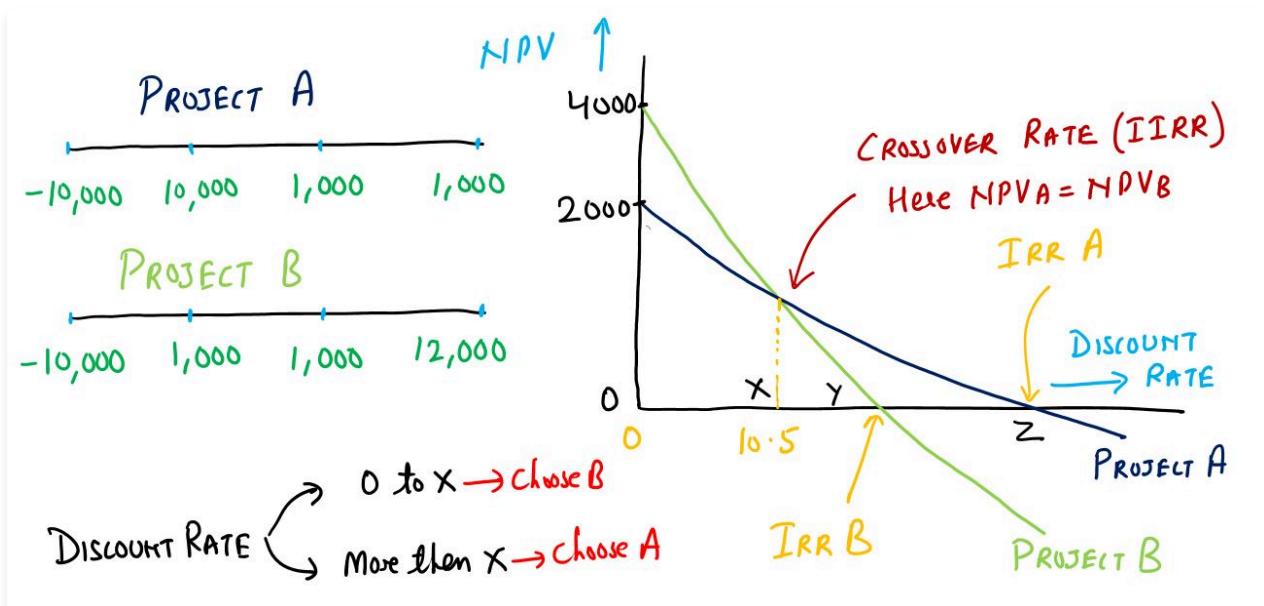
Remember that the incremental IRR rule is always consistent with the NPV rule.

## 12. NPV and IRR Conflicts

Let us explore another scenario where NPV and IRR may provide conflicting recommendations, known as the Timing Problem. This is also called problem of cashflow pattern.

Consider Project A with cash flows (-10000, 10000, 1000, 1000) and Project B with cash flows (-10000, 1000, 1000, 12000).

Let us analyze the NPV Profiles for both projects. We observe that although the IRR of Project A exceeds that of Project B, the NPV of Project B is higher for all discount rates ranging from 0 to 10.5%.



Why does this occur?

Project A offers early cash flows at lower discount rates, which can be reinvested at higher rates, boosting its NPV.

The conflict between the NPV and IRR methods arises from differing implicit assumptions regarding the reinvestment rate for intermediate cash flows generated by the projects.

Each discounted cash flow method assumes that the project's cash inflows can be reinvested at the rate used to discount the cash flows. The IRR method assumes that these funds can be reinvested at the internal rate of return over the project's remaining life. In contrast, the NPV method assumes reinvestment at a rate equal to the required rate of return, which is used as the discount rate.

In the IRR method, the implicit reinvestment rate varies from project to project based on the cash flow pattern of each proposal. A project with a high internal rate of return assumes a high reinvestment rate, while one with a low internal rate of return implies a lower reinvestment rate. Reinvestment rates would only be identical if the projects had the same internal rate of return.

On the other hand, the NPV method uses a consistent implicit reinvestment rate—the required rate of return—for all projects.

The point where the NPV Profiles intersect for both projects is termed the **Crossover rate** (10.5% in figure). Interestingly, the crossover rate equals the Incremental IRR rate (IIRR) of the two projects. Alternatively, we can say that the crossover rate is the discount rate at which the Incremental NPV is zero or where NPV is equal for both projects. It is also referred to as Fisher's rate of intersection after the noted economist Irving Fisher.

We choose the Project A for discount rates exceeding the crossover rate and select Project B for discount rates below the crossover rate.

We can also compare the **NPVs of the two projects** to make recommendations.

Further, we can also examine the **NPV of the incremental cash flows** to make our recommendations.

All these methods will give same recommended actions.

## 12. NPV and IRR Conflicts

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Another factor contributing to the potential conflict between NPV and IRR arises from projects with unequal useful lives.

The central question in such cases is: What happens when the shorter-lived project reaches its end? Typically, the firm has two options:

(i) **Replace the investment with a similar project:** This approach involves creating replacement chains, where each project is repeated until the earliest date when all projects can be terminated simultaneously. This ensures that the firm has identical options at the end of each chain, regardless of the initial choice.

This is done using *Replacement Chain* method.

The Replacement Chain method is used to compare projects with unequal lives. It aims to standardize the comparison by creating replacement chains that allow for an equal comparison over the shortest common life span of the projects.

(i) We find the shortest common life span among the projects. This is the period over which you will compare the projects. This is LCM of two or more project durations.

(ii) Repeat each project until you reach the end of the shortest common life span. This results in multiple chains of projects, each covering the same duration.

(iii) For each replacement chain, calculate the Net Present Value (NPV) using the same discount rate. This ensures consistency in the evaluation process.

(iv) Compare the NPVs of the replacement chains to determine the most favorable option.

The advantage of the Replacement Chain method is that it allows for a like-for-like comparison between projects with different durations. By extending shorter projects to match the longest duration, you create comparable scenarios, enabling a more accurate evaluation of the projects' profitability.

(ii) **Reinvest in other projects:** Alternatively, the cash flows from the shorter-lived project can be reinvested in other projects until the termination date of the longer-lived project. The reinvestment is assumed to occur at the firm's required rate of return, representing the opportunity cost of capital. This rate reflects what the firm could earn on its next-best project when additional funds become available.

When faced with mutually exclusive projects possessing unequal lives, we can compare the projects as of a common termination date. To do so, we assume that the shorter-lived project's cash flows are reinvested up to the termination date of the longer-lived project at the firm's required rate of return (i.e., its opportunity cost of capital). We use this reinvestment rate, as opposed to some higher rate, because this is the rate we assume that the firm would be able to earn on the next-best (marginal) project when additional funds are made available.

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## 12. NPV and IRR Conflicts

A coaching institute has two options of offering courses, classroom and online. It can choose either of these two but not both options. Consider the following cash flows of the two options.

- (i) Based on the IRR, which option should be chosen?
- (ii) Based on the incremental IRR, which option should be chosen?
- (iii) What do you infer?

Year	Classroom	Online
0	-750	-1800
1	600	1300
2	450	850
3	120	350

Solution:

- (i) Based on the IRR, which option should be chosen?

IRR of Classroom

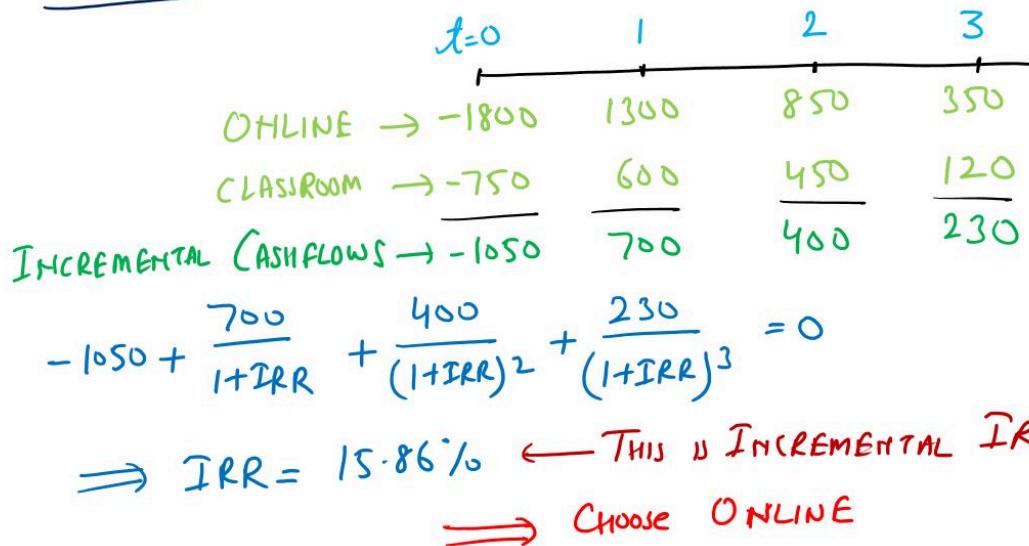
$$-750 + \frac{600}{1+IRR} + \frac{450}{(1+IRR)^2} + \frac{120}{(1+IRR)^3} = 0$$
$$IRR = 33.79\% \quad \Rightarrow \text{Choose Classroom}$$

IRR of Online

$$-1800 + \frac{1300}{1+IRR} + \frac{850}{(1+IRR)^2} + \frac{350}{(1+IRR)^3} = 0$$
$$IRR = 23.31\%$$

- (ii) Based on the incremental IRR, which option should be chosen?

## INCREMENTAL IRR



(ii) What do you infer?

Since the IRR of the Classroom option (33.79%) is greater than the IRR of the Online option (23.31%), IRR implies we choose the Classroom.

Since the incremental IRR (15.86%), is greater than the required rate of return of 10%, choose the Online option.

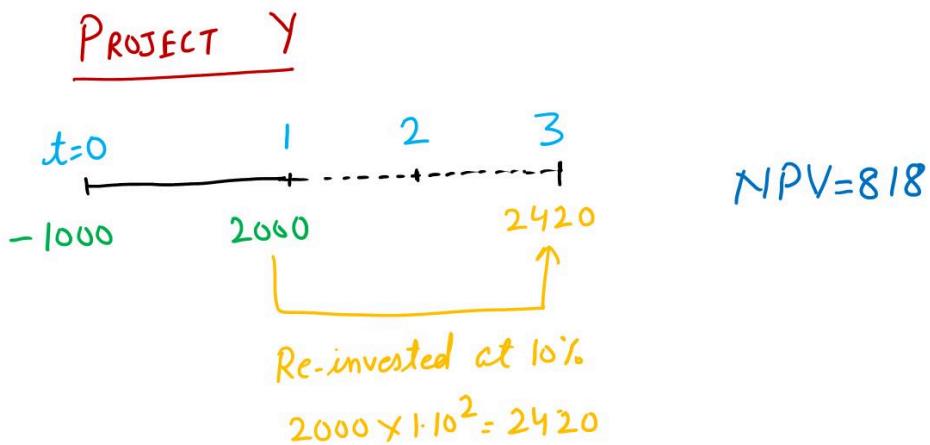
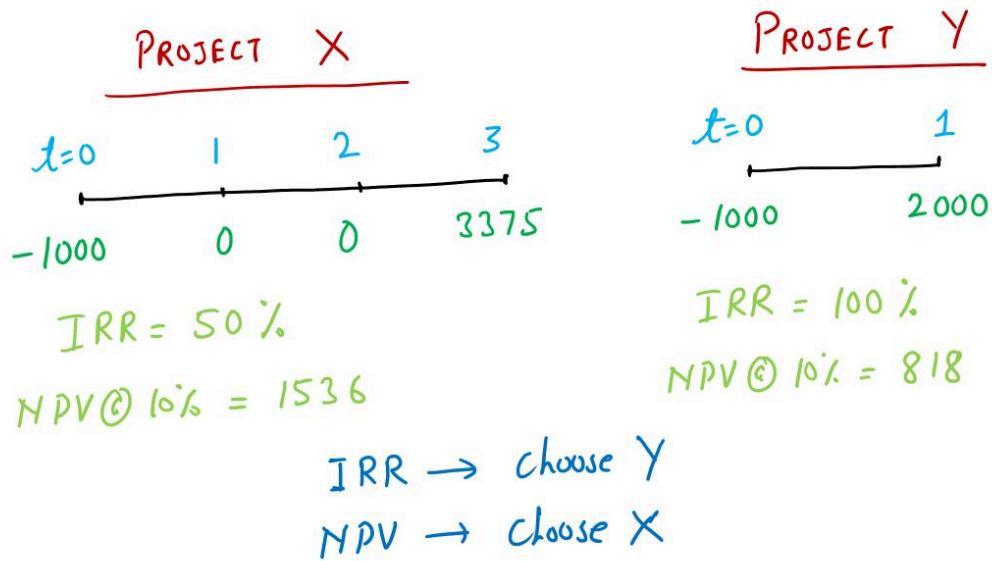
The IRR decision rule is flawed because there is a scale problem. That is, the Online Option has a greater initial investment than does the Classroom Option. This problem is corrected by calculating the IRR of the incremental cash flows. We can also evaluate the NPV of each project.

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## 12. NPV and IRR Conflicts

Compare the investment viability of two mutually exclusive projects, X and Y, with differing durations and cash flow patterns. Project X spans 3 years with cash flows of (-1000,0,0,3375), while project Y lasts only 1 year with cash flows of (-1000,2000). Determine the recommendation based on Net Present Value (NPV) using a discount rate of 10% and Internal Rate of Return (IRR). Additionally, assess the recommendation if the cash flows from Project Y are reinvested at a rate of 10% at the end of year 1.

Solution:



We can rank the projects by NPV values based on terminal values and initial cash outflows. On this basis, project X, the project with higher NPV, is preferred.

Notice that project Y's net present value does not change when we switch from actual cash flows to imputed flows. This is because we have used the same required rate of return for both compounding and discounting.

## 13. Equivalent Annual Cost (EAC)

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The Equivalent Annual Cost (EAC) method is used when comparing investments of unequal lives, such as in the case of selecting between two machines with different operating costs and lifespans.

The traditional NPV approach might lead to a biased decision favoring the machine with the lower initial cost, overlooking the potential cost implications of its shorter lifespan.

This method assumes that both machines can be replaced.

We begin by identifying the investment alternatives under consideration, each with different lifespans and associated costs. First, we determine the present value of all cash outflows associated with each investment alternative.

Once the present value of cash outflows is determined, the next step is to calculate the equivalent annual cost (EAC). This is achieved by equating the present value of cash outflows to an annuity payment over the investment's lifespan.

Finally we compare the equivalent annual costs of each investment alternative. The alternative with the lowest EAC represents the most cost-effective option over its lifespan.

This type of analysis is necessary so that the projects have a common life span over which they can be compared. For example, if one project has a 3-year life and the other has a 5-year life, then a 15-year horizon is the minimum necessary to place the two projects on an equal footing, implying that one project will be repeated five times and the other will be repeated three times.

Note the shortest common life may be quite long when there are more than two alternatives and/or the individual project lives are relatively long.

Let us understand this with help of few illustrations.