Auditing Course Material

Part 24 of 61 (Chapters 2301-2400)

4. Growth Rate of Dividends

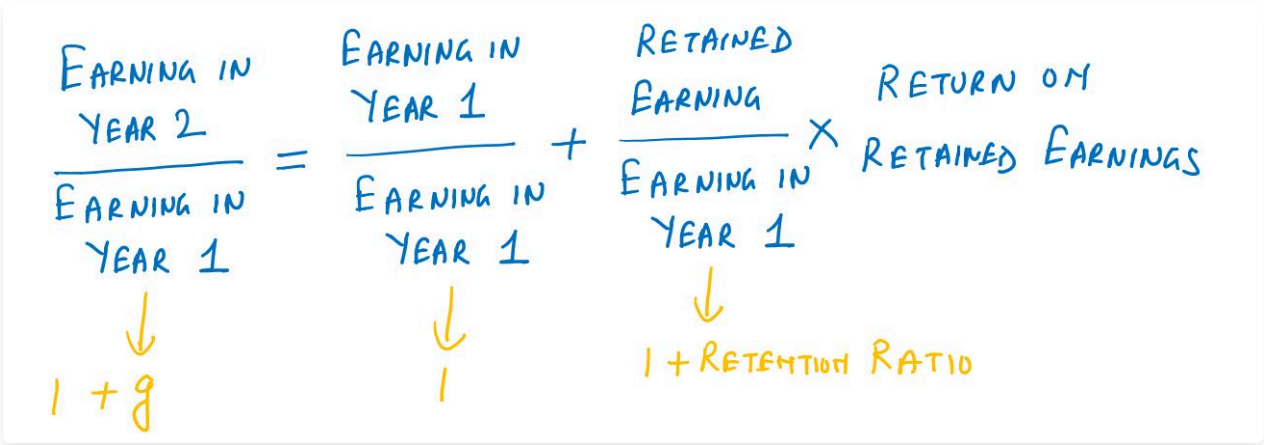
Let us understand, how we can estimate growth rate (g) of dividends.

In a business, if no extra money is put into improving things like equipment or facilities, the amount of money the business makes next year will likely be the same as what it made this year. The earnings of a business in the next year will be same as the earnings this year unless a net investment is made.

When we talk about net investment, we are talking about how much extra money the business is spending on improving or maintaining things, after taking into account any wear and tear on its stuff. So, if a company spends some money on new equipment but also has to account for the fact that its old equipment has lost some value due to aging, that's net investment. If this net investment is zero, it means the business is just keeping things running as they are, not making any big changes or improvements. The net investment in a firm is equal to gross investment (total investment) minus depreciation.

So, when a business decides to put some of its earnings back into itself rather than giving it all to the owners, it can use that money to grow and improve. This could mean buying better equipment or expanding the business in other ways. Positive net investment helps a business grow and can lead to higher earnings in the future.

We now divide both sides of the above eqution by 'earning in year 1', we get:



The ratio of retained earnings to earnings is called the retention ratio. Thus the formula for Firm's Growth Rate (g) is:

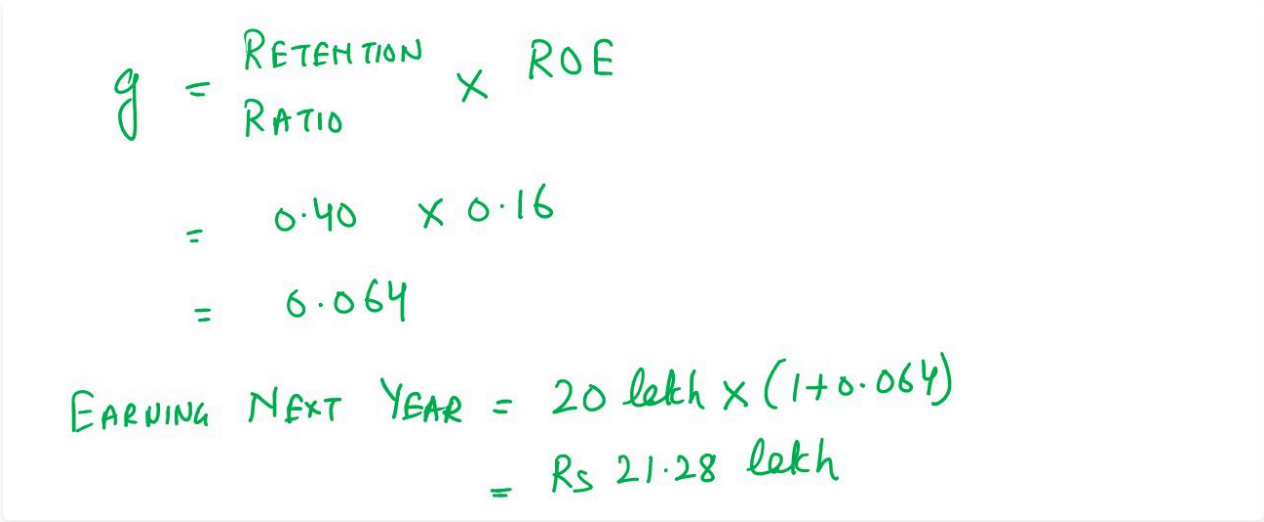
It may be noted that, predicting the future return on the earnings a company holds onto can be challenging. This is because upcoming projects that could influence these earnings aren't usually publicly disclosed. However, there's a common assumption that projects chosen in the present year are likely to yield returns similar to those from past projects. To estimate the expected return on the current retained earnings, we can look at the historical Return on Equity (ROE). Essentially, ROE represents the return on the company's total equity, which encompasses the returns from all the projects the company has undertaken in the past.

---

4. Growth Rate of Dividends

Haldiram just reported earnings of 20 lakhs. The firm plans to retain 40 percent of its earnings in all years going forward. The historical return on equity (ROE) has been 0.16. How much will earnings grow over the coming year?

Solution:

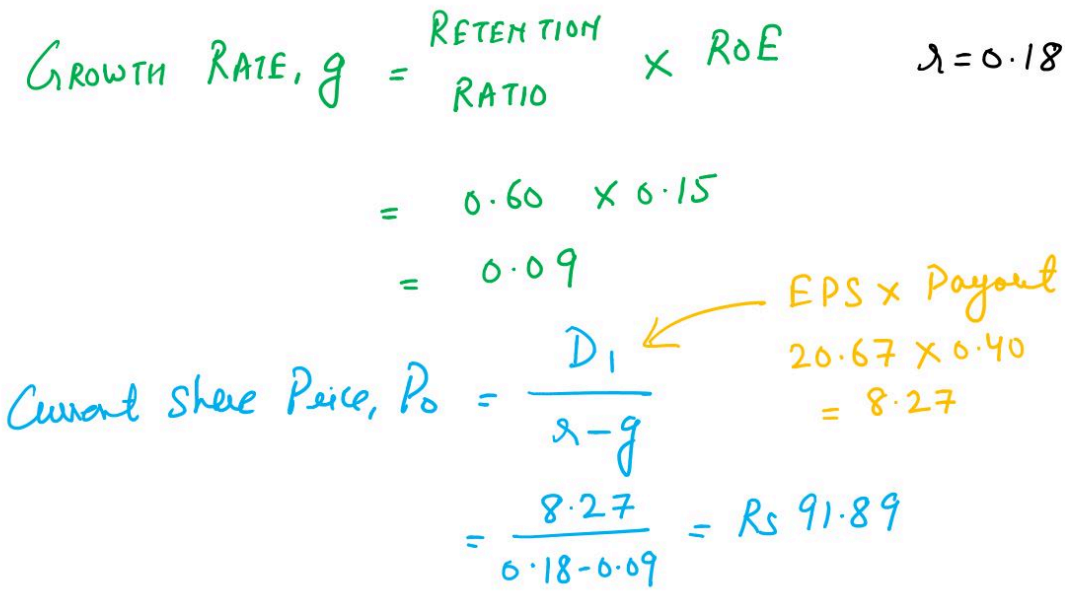


---

4. Growth Rate of Dividends

A company has EPS of Rs 20.67, after a year. Its return on equity is 15% and it follows a policy of retaining 60% of its earnings. If the Opportunity Cost of Capital is 18%, compute is the price of the share today using Dividend Growth Model?

Solution:

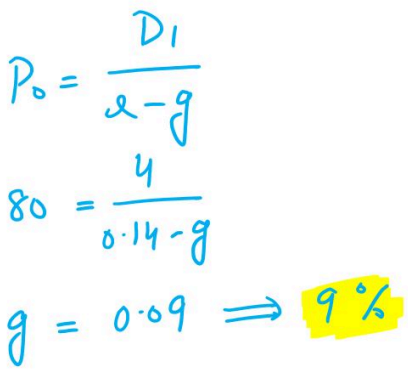


---

4. Growth Rate of Dividends

A stock is trading at Rs. 80 per share. The stock is expected to have a year-end dividend of Rs. 4 per share, and it is expected to grow at some constant rate g throughout time. The stock's required rate of return is 14%. If markets are efficient, what is your forecast of g?

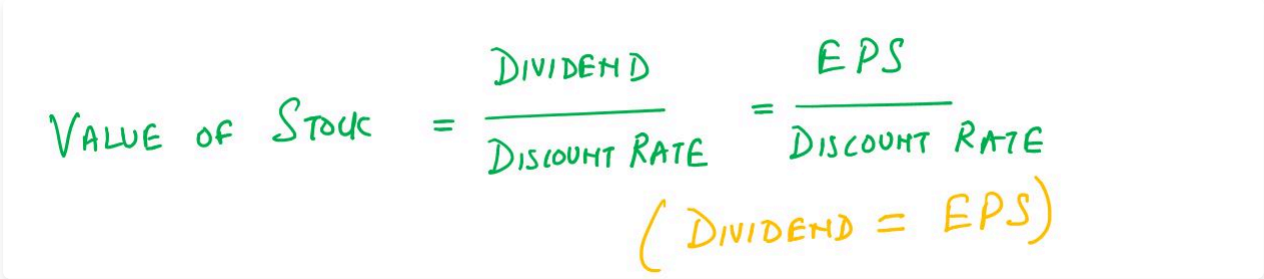
Solution:



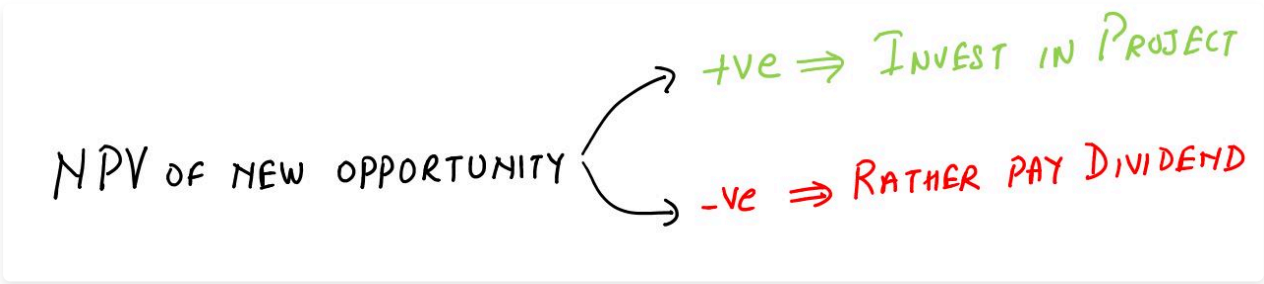
---

5. Reinvest or Pay Dividends

Let us envision a company that consistently generates earnings per share (EPS) and distributes all these earnings as dividends to its shareholders. In such a scenario, the value of the company's stock can be calculated by dividing the dividend (which is essentially EPS) by the discount rate.



Now, consider a different situation where the company has the option to invest its earnings into a new project instead of paying them out as dividends. In making this decision, the company evaluates whether the projected cash flows from the investment justify forgoing immediate dividend payouts. To do this, the company calculates the net present value (NPV) of the project, which compares the present value of the expected cash inflows from the project to the initial investment cost. If the NPV is positive, it indicates that the project is expected to generate returns higher than the discount rate, making it a financially viable investment for the company.



Conversely, if the NPV of the project is negative, it signifies that the expected returns from the project are insufficient to cover the cost of the investment, resulting in a value destruction for the company. In essence, negative NPV projects erode the overall value of the firm, as they represent investments with rates of return lower than the discount rate, implying that the company could have achieved better returns by investing elsewhere or distributing the funds to shareholders as dividends.

It's crucial to note that the growth trajectory of a company's earnings and dividends is closely tied to the profitability of its investment decisions. Positive NPV projects contribute to the growth of the company's earnings and dividends over time, reflecting the company's ability to generate value for its shareholders through strategic investments. Therefore, prudent investment decisions that yield positive NPV are integral to enhancing the long-term value of the company and maximizing shareholder wealth.

---

5. Reinvest or Pay Dividends

A company expects to earn Rs 10 lakh per year in perpetuity if it undertakes no new investment opportunities. There are 1,00,000 shares of stock outstanding. The firm also has an opportunity to spend Rs 10 lakh on a new project, this year. The new project will increase earnings in every subsequent period by Rs 2.10 lakh (there is 21% return per year on the project). The firm's discount rate is 10%.
(i) What is the value per share before undertaking new project?
(ii) What is the value per share after after deciding to accept the new project?

Solution:

(i) What is the value per share before undertaking new project?

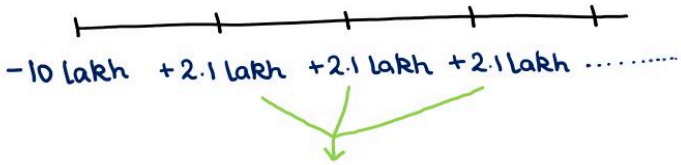
Earnings per year = Rs. 10 lakh $r = 0.10$

$$EPS = \frac{\text{Rs. 10 lakh}}{\text{100,000 shares}} = \text{Rs. 10}$$

$$\text{Value of share (before project)} = \frac{EPS}{r} = \frac{\text{Rs. 10}}{0.10} = \text{Rs. 100}$$

(ii) What is the value per share after after deciding to accept the new project?

If this year dividend is invested (Rs. 10 lakh invested)



$$\text{Additional dividend each year} = \frac{\text{2.1 lakh}}{\text{100,000 shares}} = \text{Rs. 2.1}$$

$$\text{Present value of all dividends} = \frac{2.1}{0.10} = \text{Rs. 21}$$

$$\text{I spend today (per share)} = \frac{\text{Rs. 10 lakh}}{\text{100,000}} = \text{Rs. 10}$$

But I get (per share) = Rs. 21

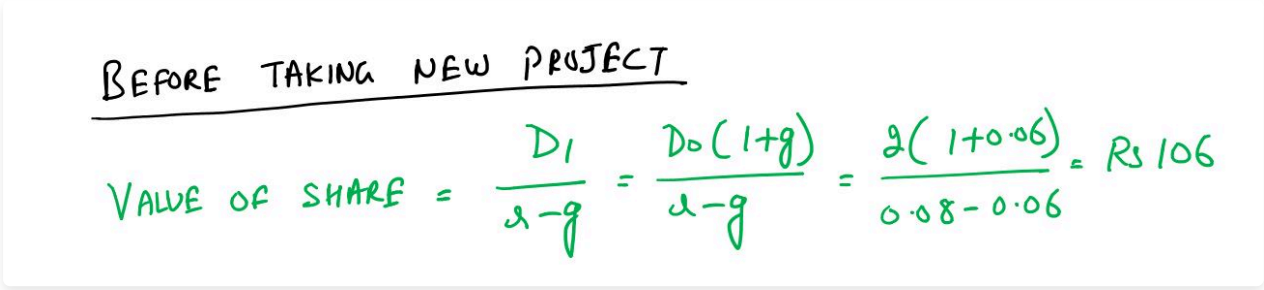
Additional Value = 21 - 10 = 11 Value of Stock = Rs. 100 + 11 = **Rs. 111**

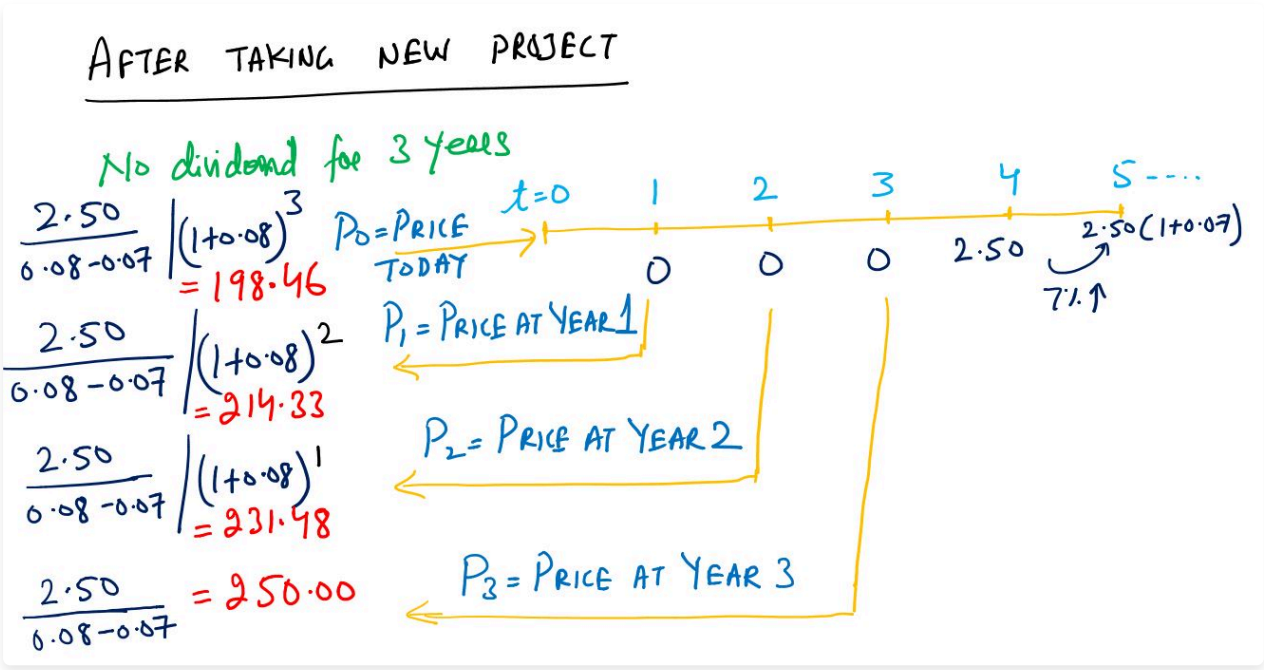
5. Reinvest or Pay Dividends

A firm has just paid a dividend of Rs 2 per share and it is expected to grow @ 6% per annuum. After paying dividend, the Board declared to take up a project by retaining the next three annual dividends. It is expected that this project is of same risk as the existing projects. The results of this project will start coming from the 4th year onward from now. The dividends will then be Rs 2.50 per share and will grow @ 7% per annuum.

Show that the market value of the share is affected by the decision of the Board.

Solution:





---

6. Required Rate of Return

We use Required return of return (r) as the discount rate for valuation of stocks. Let us discuss it more.

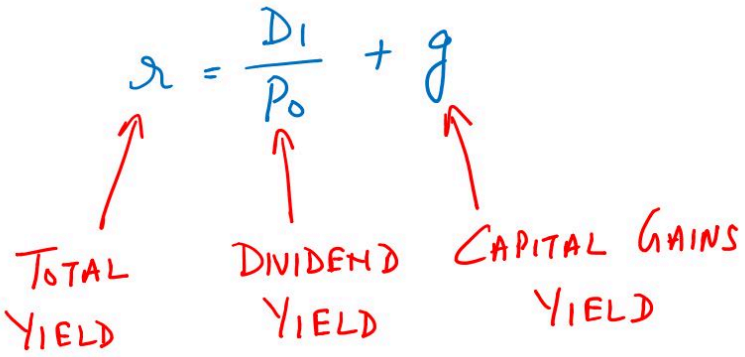
we can rearrange the equation of stock valuation (constant growth) to solve for r:

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

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

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

The rearranged equation tells us that the required return (r), has two components.



The first is called the **dividend yield**. Because this is calculated as the expected cash dividend divided by the current share price, it is conceptually similar to the current yield on a bond.

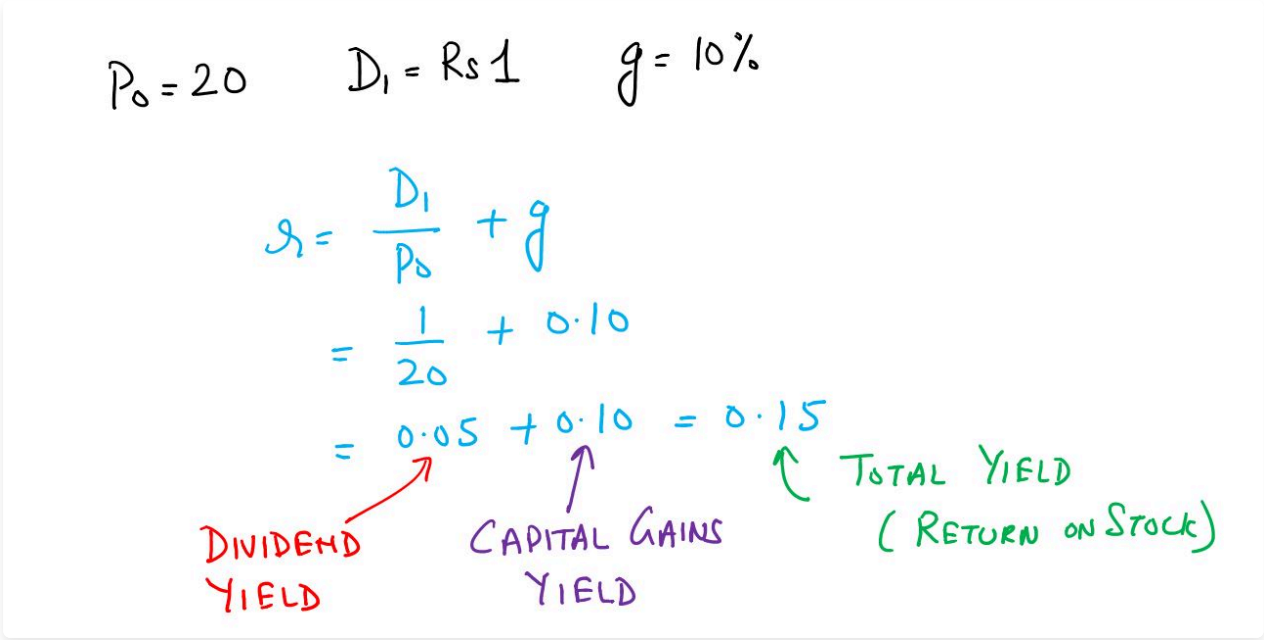
The second part of the total return is the expected growth rate(g). The dividend growth rate is also the stock price's growth rate. Thus, this growth rate can be interpreted as the **capital gains yield**, that is, the rate at which the value of the investment grows.

---

6. Required Rate of Return

We observe a stock selling for Rs 20 per share. The next dividend is expected to be Rs 1 per share. The dividend will grow by 10 percent per year more or less indefinitely. What expected return does this stock offer you? What are the dividend yield and capital gains yield?

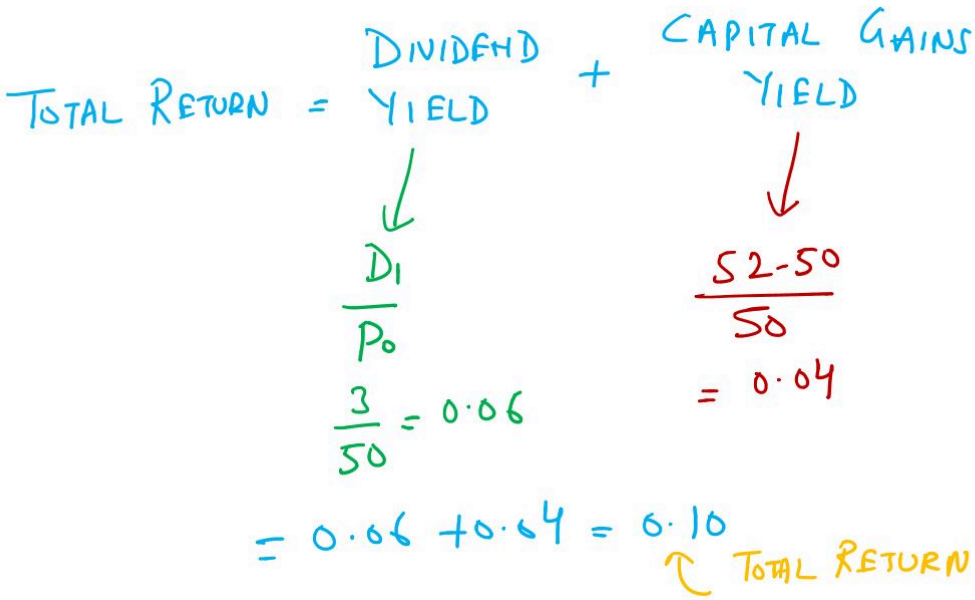
Solution:



6. Required Rate of Return

If the dividend after one year is Rs 3, the price of stock today is Rs 50 and price after 1 year is Rs 52, what are the stock's expected dividend yield, expected capital gains yield, and expected total return for the coming year?

Solution:



6. Required Rate of Return

Haldiram just reported earnings of 20 lakhs. The firm plans to retain 40 percent of its earnings in all years going forward. The historical return on equity (ROE) has been 0.16. The company has 10,00,000 shares of stock outstanding. The stock is selling at Rs 10. What is the required return on the stock?

Solution:

$g = \text{RETENTION RATIO} \times \text{ROE}$

$= 0.40 \times 0.16 = 0.064$

EARNING NEXT YEAR $= 20 \times (1+0.064) =$ Rs 21.28 lakh

RETENTION RATIO $= 0.40$ PAYOUT $= 1 - 0.40 = 0.60$

TOTAL PAYOUT $= 21.28 \times 0.60 =$ 12.768 lakh

DIVIDND PER SHARE $= \frac{12.768 \text{ lakh}}{1,00,00,000} =$ Rs 1.28

RETURN ON STOCK $= \frac{D_1}{P_0} + g$

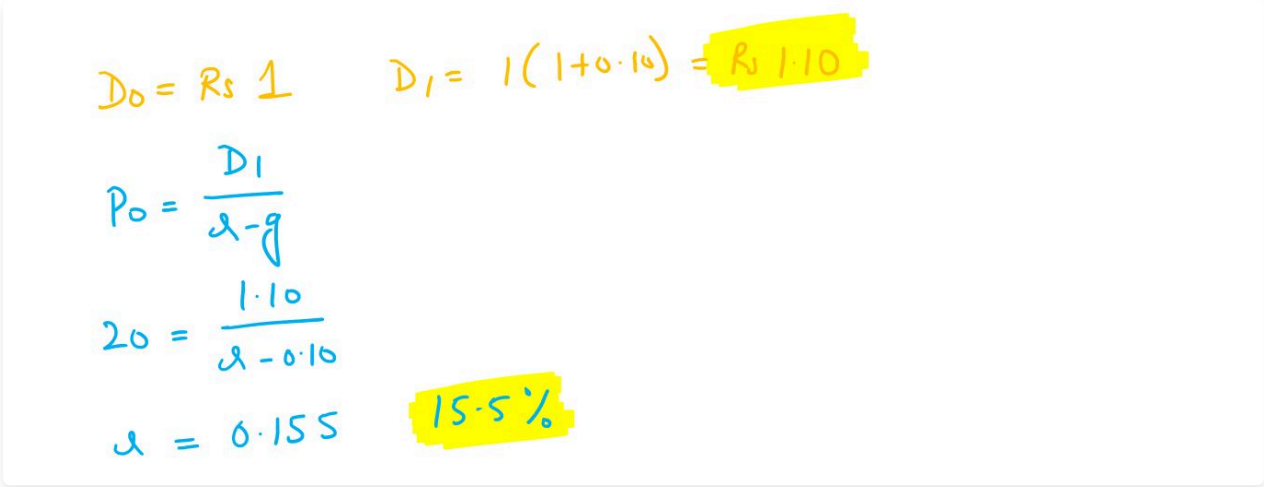
$= \frac{1.28}{10} + 0.064 = 0.192$

19.2%

6. Required Rate of Return

ABC's stock currently sells for Rs. 20 a share. The stock just paid a dividend of Rs. 1.00 a share, and the dividend is expected to grow forever at a constant rate of 10% a year. What stock price is expected 1 year from now? What is the required rate of return on ABC's stock?

Solution:



6. Required Rate of Return

ABC Computer Chips Inc. is experiencing a period of rapid growth. Earnings and dividends are expected to grow at a rate of 15% during the next 2 years, at 13% in the third year, and at a constant rate of 6% thereafter. The last dividend was Rs. 1.15, and the required rate of return on the stock is 12%.

(a) Calculate the value of the stock today.

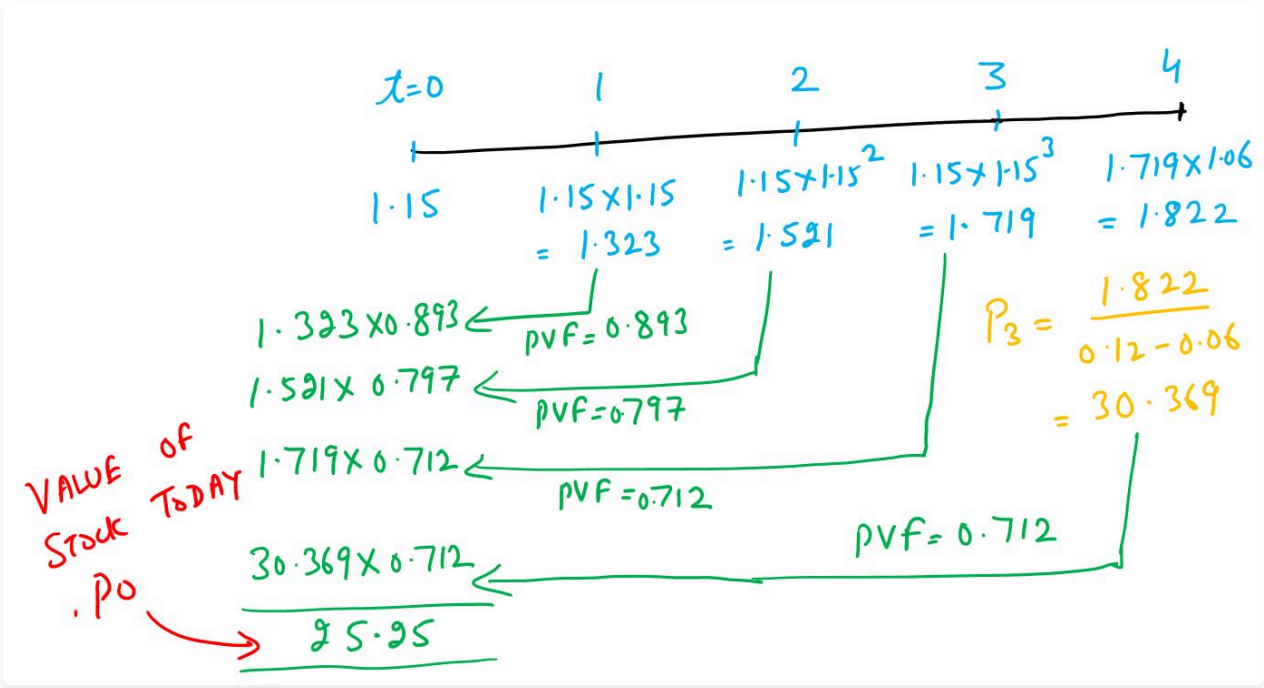
(b) Calculate the price of stock after 1 year and after 2 years.

(c) Calculate the dividend yield and capital gains yield for Years 1, 2, and 3.

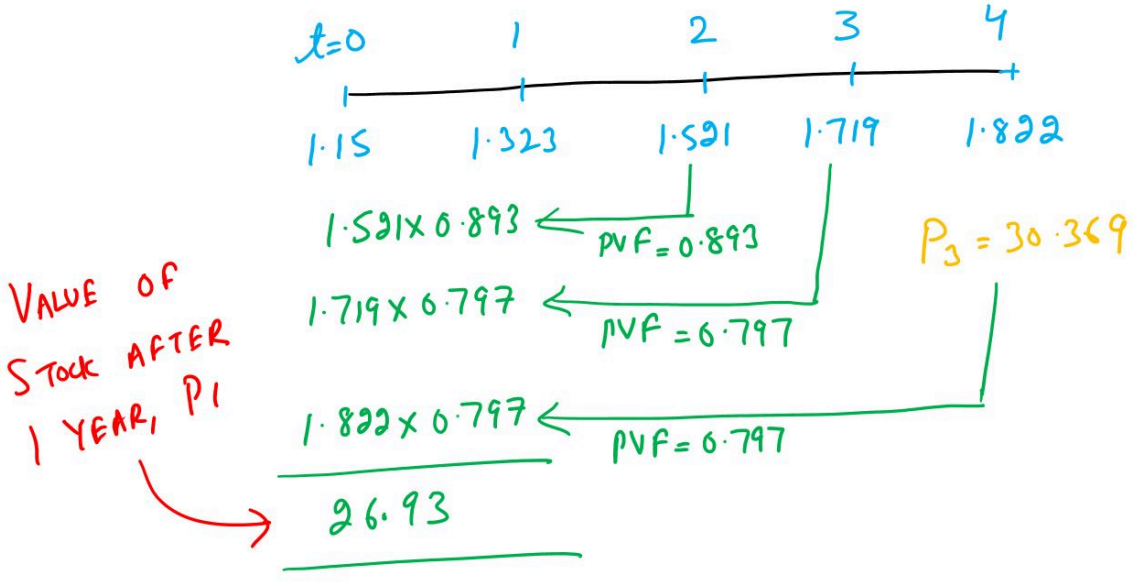
(PVF (12%) for year 1 to 3 are 0.893, 0.797, 0.712)

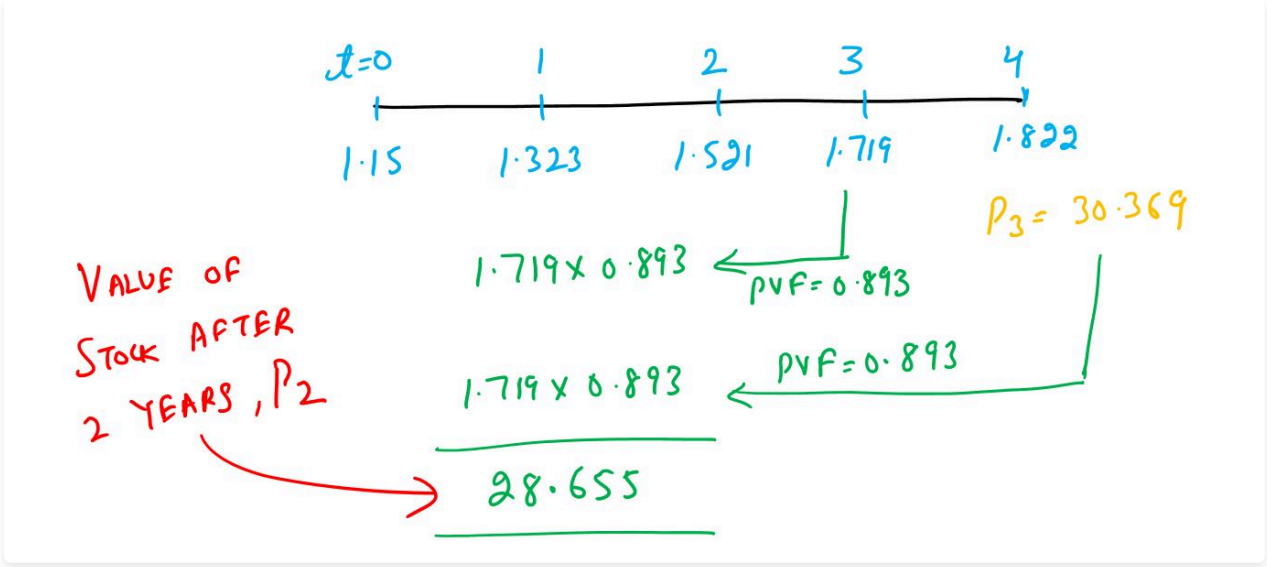
Solution:

(a) Calculate the value of the stock today.

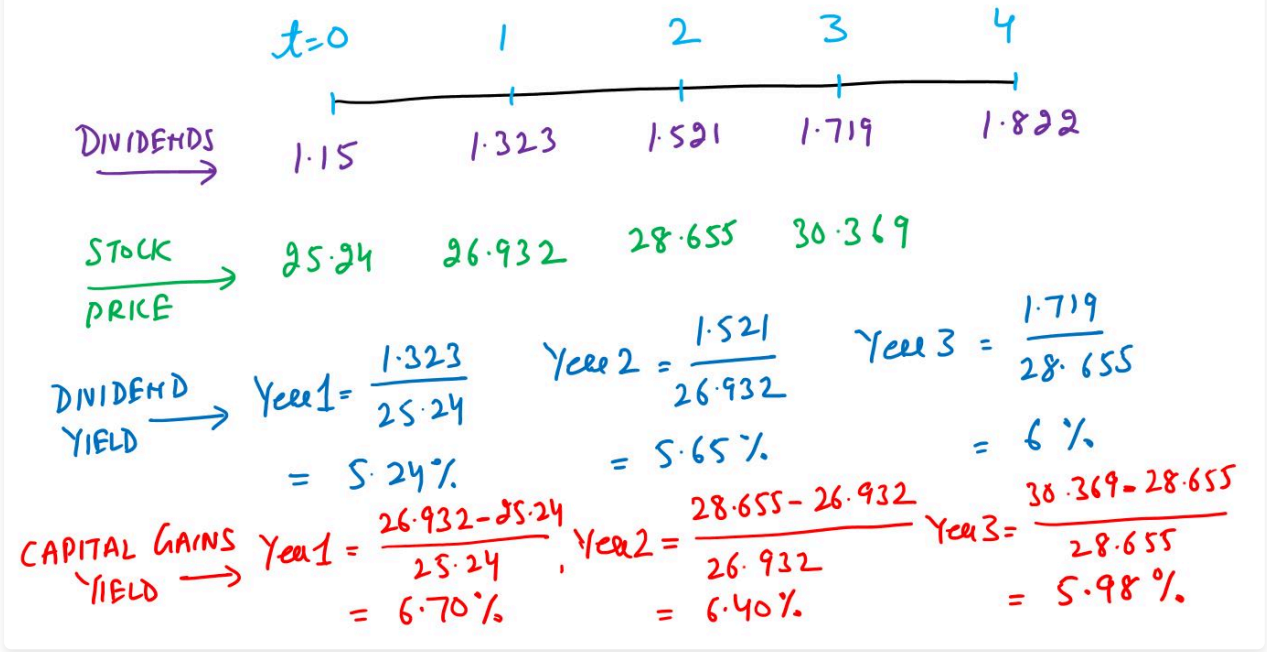


(b) Calculate the price of stock after 1 year and after 2 years.





(c) Calculate the dividend yield and capital gains yield for Years 1, 2, and 3.

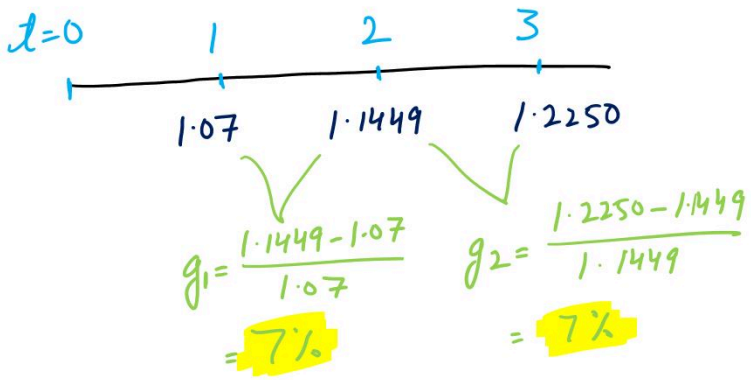


6. Required Rate of Return

You buy a share of The Ludwig Corporation stock for Rs. 21.40. You expect it to pay dividends of Rs. 1.07, Rs. 1.1449, and Rs. 1.2250 in Years 1, 2, and 3, respectively, and you expect to sell it at a price of Rs. 26.22 at the end of 3 years.
(a) Calculate the growth rate in dividends.
(b) Calculate the expected dividend yield.
(c) Assuming that the calculated growth rate is expected to continue, you can add the dividend yield to the expected growth rate to obtain the expected total rate of return. What is this stock's expected total rate of return?

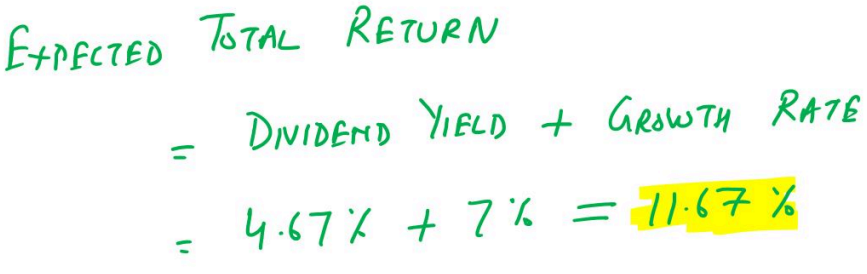
Solution:

(a) Calculate the growth rate in dividends.



(b) Calculate the expected dividend yield.

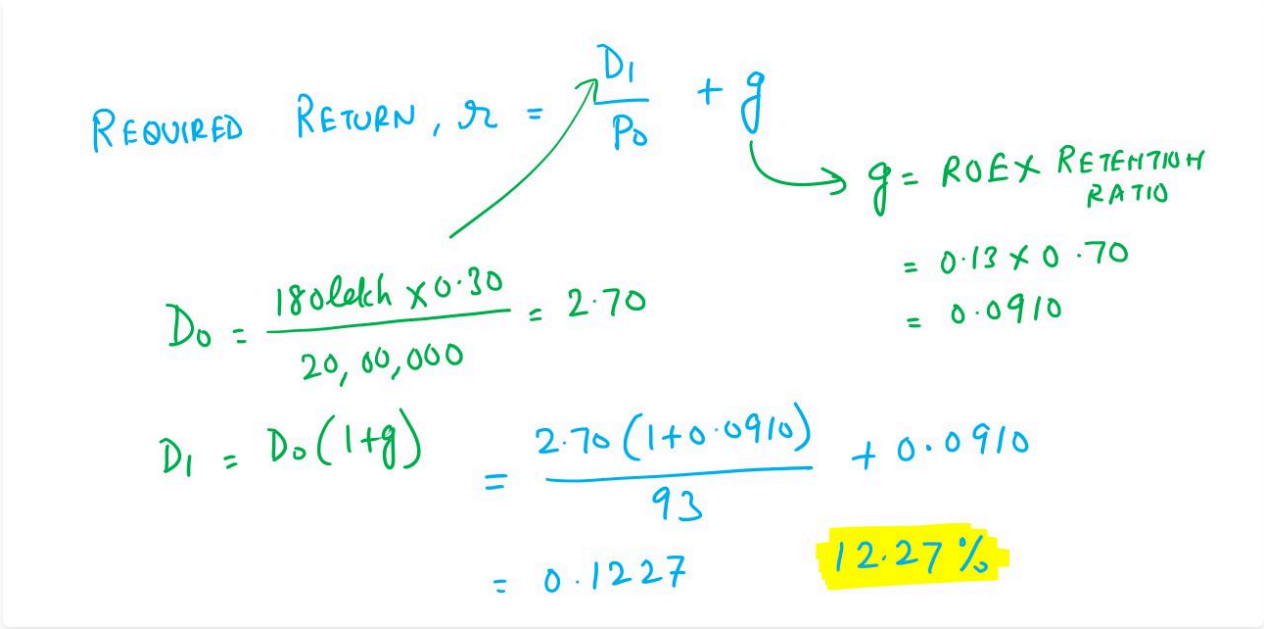
(c) Assuming that the calculated growth rate is expected to continue, you can add the dividend yield to the expected growth rate to obtain the expected total rate of return. What is this stock's expected total rate of return?



6. Required Rate of Return

A firm earned Rs 180 lakh for the fiscal year ending yesterday. The firm also paid out 30% of its earnings as dividends yesterday. The firm will continue to pay out 30% of its earnings as annual, end-of-year dividends. The remaining 70% of earnings is retained by the company for use in projects. The company has 2 million shares of common stock outstanding. The current stock price is Rs 93. The historical return on equity (ROE) of 13 percent is expected to continue in the future. What is the required rate of return on the stock?

Solution:



---

7. Zero Dividend Firms

When a company doesn't pay dividends, investors still buy its stock because they believe its value will increase over time. They hope to sell the stock later at a higher price than what they paid for it. So instead of getting regular dividend payments, they're counting on making money by selling the stock for more than they bought it for.

The value of the stock they expect to sell later, at a higher price, is called the "terminal value." This terminal value depends on what other investors think the stock will be worth at that future time. Ultimately, everyone expects that the company will eventually start paying dividends, or maybe even sell its assets and distribute the money to shareholders. So investors believe they'll eventually get cash returns from their investment.

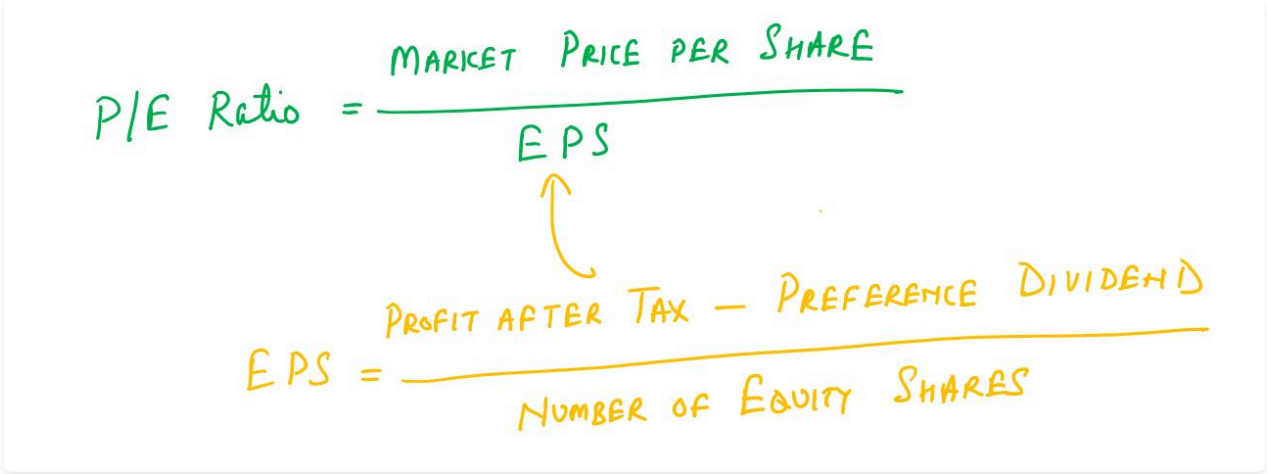
In the meantime, while the company isn't paying dividends, it's using its profits to grow and improve its business. Investors hope that this growth will make the company more valuable in the future, leading to even higher stock prices and eventually, dividends.

So even though a company doesn't pay dividends now, investors are still willing to buy its stock because they expect to sell it later for a profit, and they trust that the company's value will grow over time.

---

8. P/E ratio based Valuation

The Price-to-Earnings (P/E) ratio is also used to assess the valuation of stocks. It is calculated by dividing the current market price of a stock by its earnings per share (EPS). Mathematically, it can be represented as:



The P/E ratio provides a simple way to compare the valuation of a stock relative to its earnings. A higher P/E ratio indicates that investors are willing to pay more for each unit of earnings, suggesting that the stock may be overvalued. Conversely, a lower P/E ratio suggests that the stock may be undervalued.

Investors often compare the P/E ratio of a stock to that of its industry peers or the broader market. This allows them to gauge whether the stock is trading at a premium or discount compared to similar companies. For example, if a company's P/E ratio is lower than its industry average, it may indicate that the stock is relatively cheap compared to its peers.

For example, a stock with a P/E ratio of 20 suggests that investors are willing to pay Rs 20 for every Rs 1 of earnings. If the industry average P/E ratio is 15, the stock may be considered relatively expensive. Conversely, if the industry P/E ratio is 25, the stock may be seen as relatively cheap.

The P/E ratio also reflects market expectations for future earnings growth. A high P/E ratio may indicate that investors expect strong future earnings growth, while a low P/E ratio may suggest subdued growth prospects.

It is also called **Market Multiple Analysis**.

---

8. P/E ratio based Valuation

The three factors that determine a company’s price-earnings ratio are as follows:

1. Future Growth Opportunities

The expected future growth of a company significantly influences its P/E ratio. Investors are willing to pay a higher multiple for companies with strong growth prospects because they anticipate higher earnings in the future. Therefore, companies with promising growth opportunities typically command higher P/E ratios.

2. Level of Risk

Risk is a crucial factor in determining a company's P/E ratio. The perceived risk associated with a company affects the discount rate investors apply to its future earnings. Generally, companies with higher risk profiles, such as those operating in volatile industries or facing financial instability, tend to have lower P/E ratios. Conversely, companies with lower risk, stable cash flows, and strong balance sheets often have higher P/E ratios.

3. Accounting Method Used

The accounting method employed by a company can influence its reported earnings, thereby impacting its P/E ratio. Different accounting methods may lead to variations in reported earnings, affecting investors' perceptions of the company's profitability and growth prospects. For example, companies using aggressive accounting practices might report higher earnings, potentially resulting in inflated P/E ratios.

---

8. P/E ratio based Valuation

Company XYZ operates in the retail sector and has recently announced its financial results for the year. The company's stock is currently trading at Rs 50 per share. The company reported earnings per share (EPS) of Rs 5 for the year. Additionally, the industry average P/E ratio for retail companies is 20.

Calculate the Price-to-Earnings (P/E) ratio for Company XYZ and determine whether the stock is currently overvalued, undervalued, or fairly valued based on the industry average P/E ratio. Provide reasoning for your evaluation.

Solution:

$$\text{P/E for XYZ} = \frac{\text{MARKET PRICE PER SHARE}}{\text{EPS}}$$

$$= \frac{\text{Rs } 50}{\text{Rs } 5} = 10$$

Industry Average P/E Ratio = 20

Company XYZ's calculated P/E ratio of 10 is lower than the industry average P/E ratio of 20. This suggests that investors are paying less for each dollar of earnings for Company XYZ compared to the industry average.

If the stock's P/E ratio is lower than the industry average, it may indicate that the stock is undervalued or has potential for growth. Investors may consider purchasing the stock as it could offer good value for the price.

If the stock's P/E ratio is higher than the industry average, it may indicate that the stock is overvalued or may have already reached its growth potential. Investors may consider selling or avoiding the stock as it could be overpriced relative to its earnings.

Company XYZ's stock may be considered undervalued relative to the industry average P/E ratio. Investors may see this as an opportunity to invest in the stock, expecting potential future growth and higher returns.

---

8. P/E ratio based Valuation

Consider a firm which reported earnings of Rs 9,50,000. Without new projects, the firm will continue to generate earnings of Rs 9,50,000 in perpetuity. Assume that all earnings are paid as dividends and that the firm requires a return of 12 percent.
(i) What is the current P/E ratio?
(ii) The firm has a new project that will generate additional earnings of Rs 1,00,000 each year in perpetuity. Calculate the new P/E ratio of the firm.

Solution:

Since earnings are equal to dividends, and there is no growth, the value of the company's stock today is the present value of a perpetuity.

$$P_0 = \frac{D}{r} = \frac{9,50,000}{0.12} = 79,16,667$$

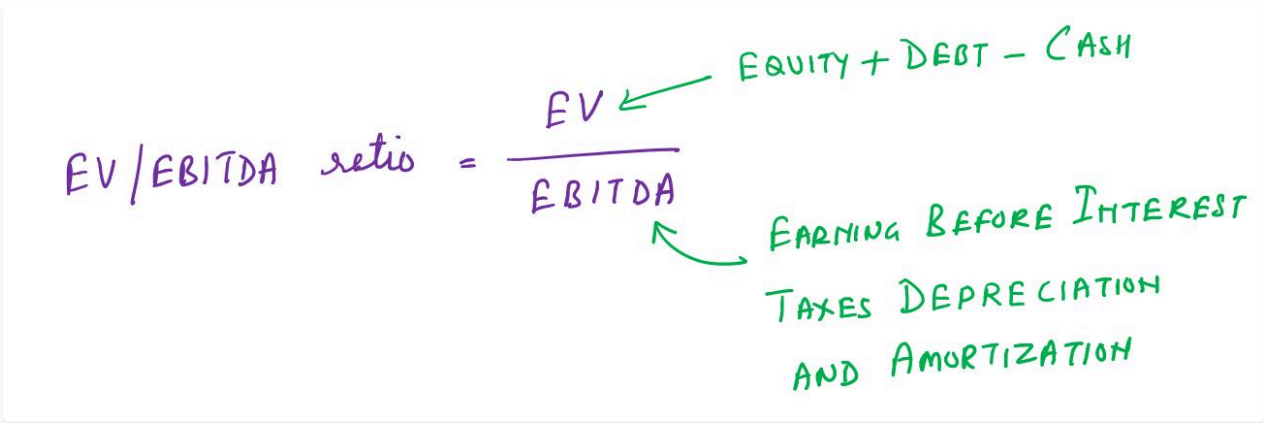
$$P/E = \frac{79,16,667}{9,50,000} = 8.33$$

$$\text{New } P_0 = \frac{9,50,000 + 1,00,000}{0.12} = 87,50,000$$

$$\text{New } P/E = \frac{87,50,000}{9,50,000} = 9.21$$

9. EV/EBITDA ratio

The enterprise value (EV) to EBITDA ratio is another metric used by investors to assess the attractiveness of a company's stock. It provides a comparison between a company's enterprise value (EV) and its EBITDA, which stands for earnings before interest, taxes, depreciation, and amortization.



Enterprise value represents the total value of a company's equity and debt, minus its cash holdings. It gives investors a more comprehensive picture of a company's total value, as it takes into account both its equity and debt components.

EBITDA, on the other hand, is a measure of a company's operating performance before accounting for non-operating expenses like interest, taxes, depreciation, and amortization. It is often used as a proxy for cash flow and profitability.

The EV/EBITDA ratio is calculated by dividing a company's enterprise value by its EBITDA. This ratio helps investors gauge how much they are paying for a company's operating earnings relative to its total value.

For example, if the average EV/EBITDA ratio in an industry is 6 and a company's EBITDA is Rs 50 million, its estimated enterprise value would be Rs 300 million (Rs 50 million multiplied by 6). If the company has Rs 75 million of debt and Rs 25 million of cash, its stock would be valued at Rs 250 million (Rs 300 million - Rs 75 million + Rs 25 million).

Thus, the EV/EBITDA ratio provides investors with insights into a company's valuation and can help them make informed decisions about whether a stock is overvalued, undervalued, or fairly valued relative to its peers in the industry.

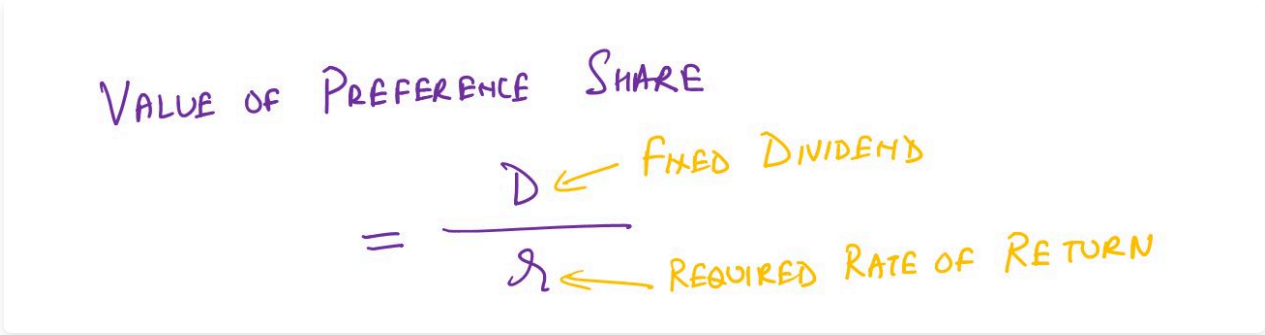
---

10. Value of Preference Shares

Preference shares possess characteristics of both bonds and common stock. They have a par value like bonds, and a fixed dividend must be paid before dividends can be distributed to common stockholders. However, unlike bonds, if the preference dividend is not earned, the company can choose to omit or defer it without facing bankruptcy. This flexibility distinguishes preference shares from bonds, as the failure to make dividend payments does not result in financial insolvency.

The dividends on preference shares are predetermined and fixed. Since these dividends are expected to continue indefinitely, the preference shares represent a perpetuity.

The value of preference shares can be calculated using the following formula:

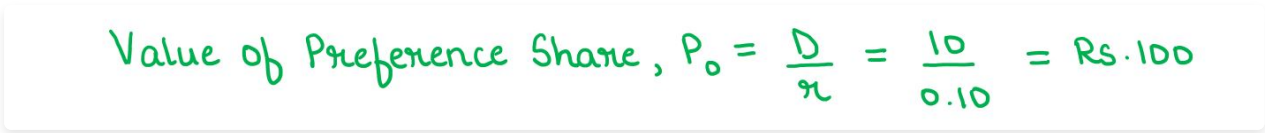


---

10. Value of Preference Shares

ABC has preferred stock outstanding that pays a dividend of Rs. 10 per year. If the required rate of return on this preferred stock is 10%, then calculate its value.

Solution:



---

10. Value of Preference Shares

Atlas Cycle has an issue of preferred stock outstanding that pays a Rs 5.90 dividend every year, in perpetuity. If this issue currently sells for Rs 87 per share, what is the required return?

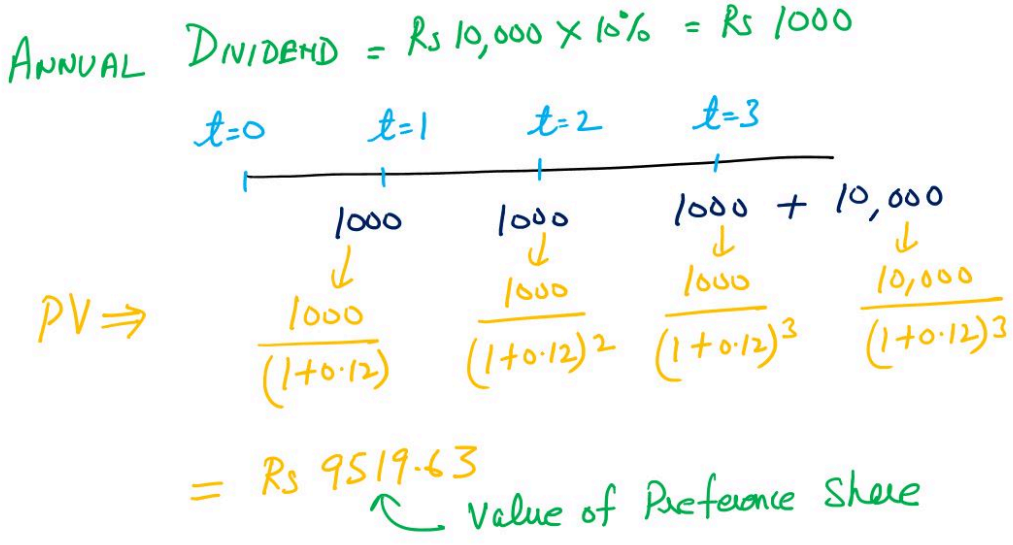
Solution:

---

10. Value of Preference Shares

The face value of the preference share is Rs 10,000 and the stated dividend rate is 10%. The shares are redeemable after 3 years period. Calculate the value of preference shares if the required rate of return is 12%.

Solution:



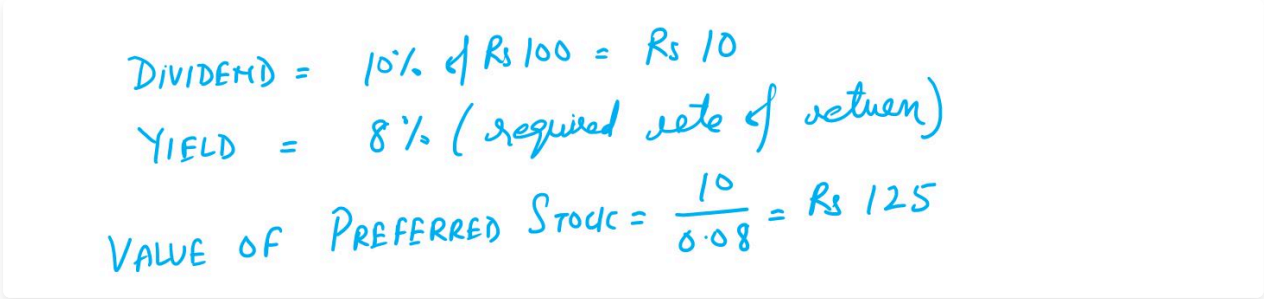
---

10. Value of Preference Shares

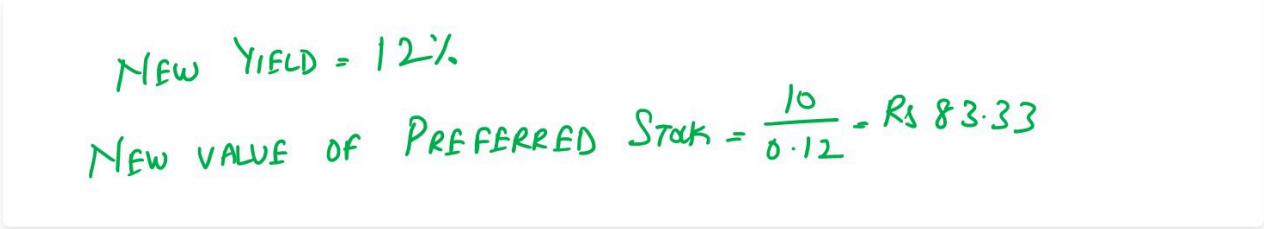
Several years ago, Rolen Riders issued preferred stock with a stated annual dividend of 10% of its Rs. 100 par value. Preferred stock of this type currently yields 8%. Assume dividends are paid annually.
(a) What is the value of Rolen's preferred stock?
(b) Suppose interest rate levels have risen to the point where the preferred stock now yields 12%. What would be the new value of Rolen's preferred stock?

Solution:

(a) What is the value of Rolen's preferred stock?



(b) Suppose interest rate levels have risen to the point where the preferred stock now yields 12%. What would be the new value of Rolen's preferred stock?



---

11. Analysis of Stock Market

Fundamental analysis and technical analysis are two distinct methods used by investors to evaluate securities and forecast future trends in stock prices.

Fundamental analysis focuses on measuring the intrinsic value of a security by examining various factors that can influence its price. This method involves a thorough investigation of both macroeconomic factors, such as industry trends and economic conditions, and microeconomic factors, such as company financial statements and management quality. Analysts aim to determine whether a stock is priced accurately relative to its underlying value.

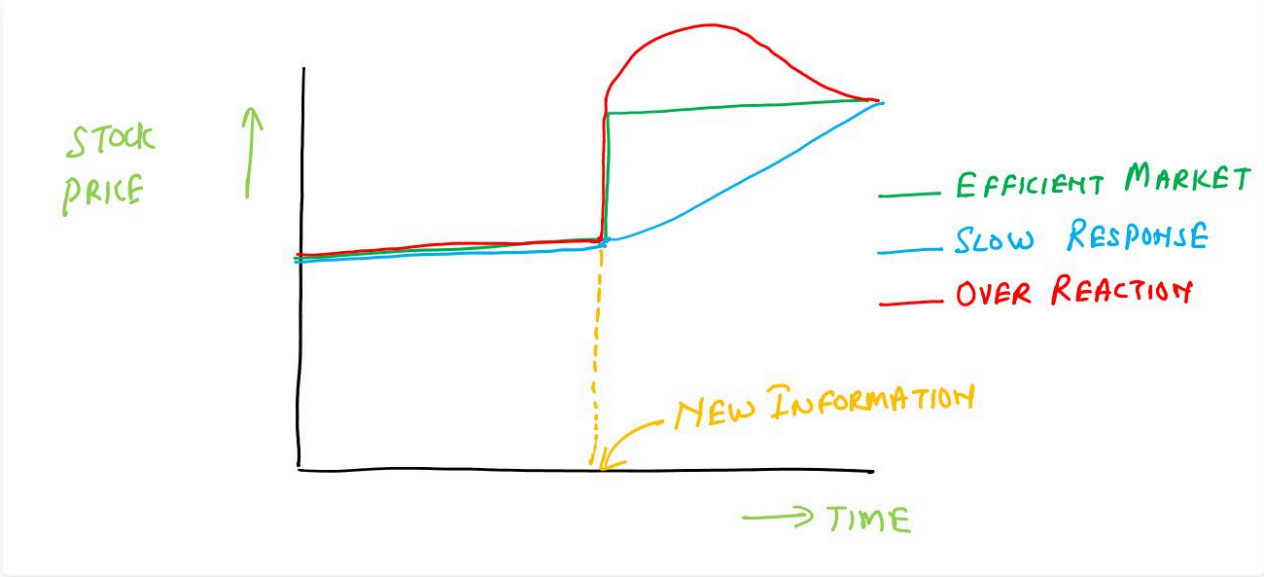
On the other hand, **technical analysis** relies on statistical trends in a stock's price and volume to forecast future price movements. Instead of considering external factors like economic indicators or company fundamentals, technical analysts primarily analyze historical price and volume data of the specific stock. They use charts, patterns, and indicators to identify trends and make predictions about future price movements.

---

12. Efficient Market Hypothesis

The Efficient Market Hypothesis (EMH) theory asserts that financial markets are efficient in processing and reflecting all available information. This means that stock prices already embody and reflect all known information, including both public and private data, making it exceedingly difficult for investors to consistently outperform the market through active trading or by analyzing publicly available information.

For example, let's consider a scenario where a publicly traded company, XYZ Corp, announces better-than-expected quarterly earnings. According to the EMH, as soon as this information becomes publicly available, it will be quickly incorporated into the company's stock price. Consequently, the stock price of XYZ Corp will adjust upward to reflect the positive earnings news.

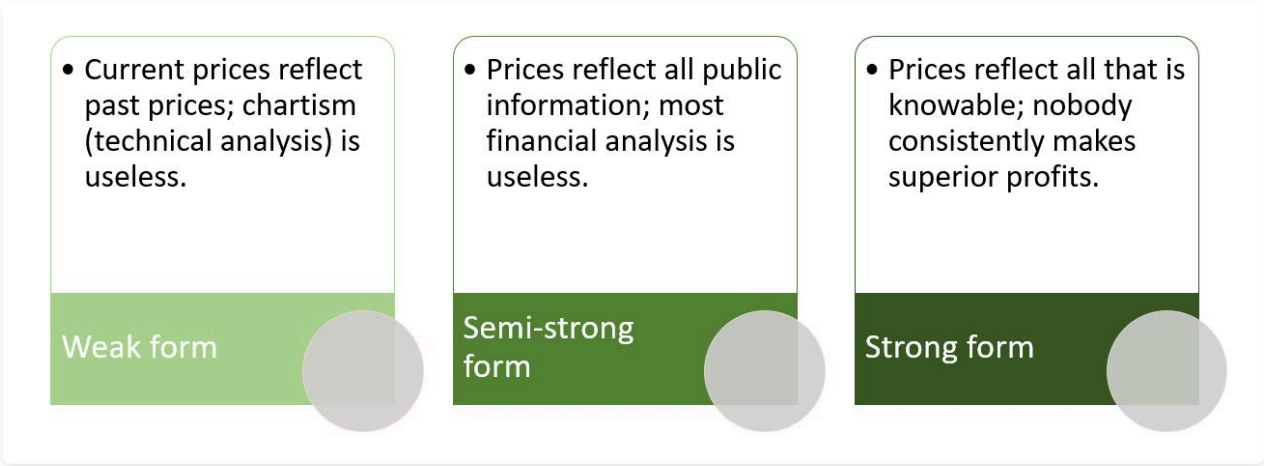


In an efficient market, investors cannot expect to consistently earn higher-than-average returns by trading on this information alone. This is because, by the time the news reaches the broader market, the stock price has already adjusted to reflect the new information. As a result, attempting to profit from this news through active trading would be futile, as the market has efficiently priced in the information.

It may be noted that there are various degrees of market efficiency, and some investors may still believe they can identify opportunities for outperformance in specific market conditions or through alternative investment strategies.

---

12. Efficient Market Hypothesis



The Efficient Market Hypothesis (EMH) is categorized into three main forms:

1. Weak Form Efficiency

This asserts that stock prices already incorporate all past trading information, like historical prices and volumes. Therefore, techniques such as technical analysis, which rely on past price movements, are ineffective in generating consistent abnormal returns. Believers of weak-form efficiency argue that recent trends in stock prices offer no useful clues for selecting stocks.

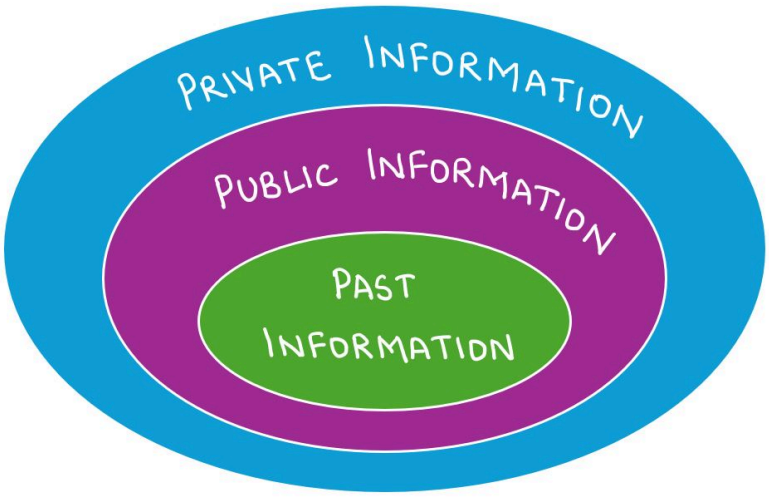
2. Semi-Strong Form Efficiency

This form argues that stock prices reflect all publicly available information, including historical trading data and other public information like earnings reports and economic indicators. Hence, fundamental analysis techniques, which analyze financial statements and economic factors, cannot consistently outperform the market. In this scenario, market prices adjust to any news contained in reports when it's released, making it futile to pore over annual reports.

3. Strong Form Efficiency

This suggests that stock prices reflect all information, whether public or private. Therefore, even insider information doesn't provide investors with an advantage, as the market quickly adjusts to such information. The strong form of EMH states that current market prices incorporate all pertinent information, making it impossible even for insiders to consistently earn abnormal returns in the stock market.

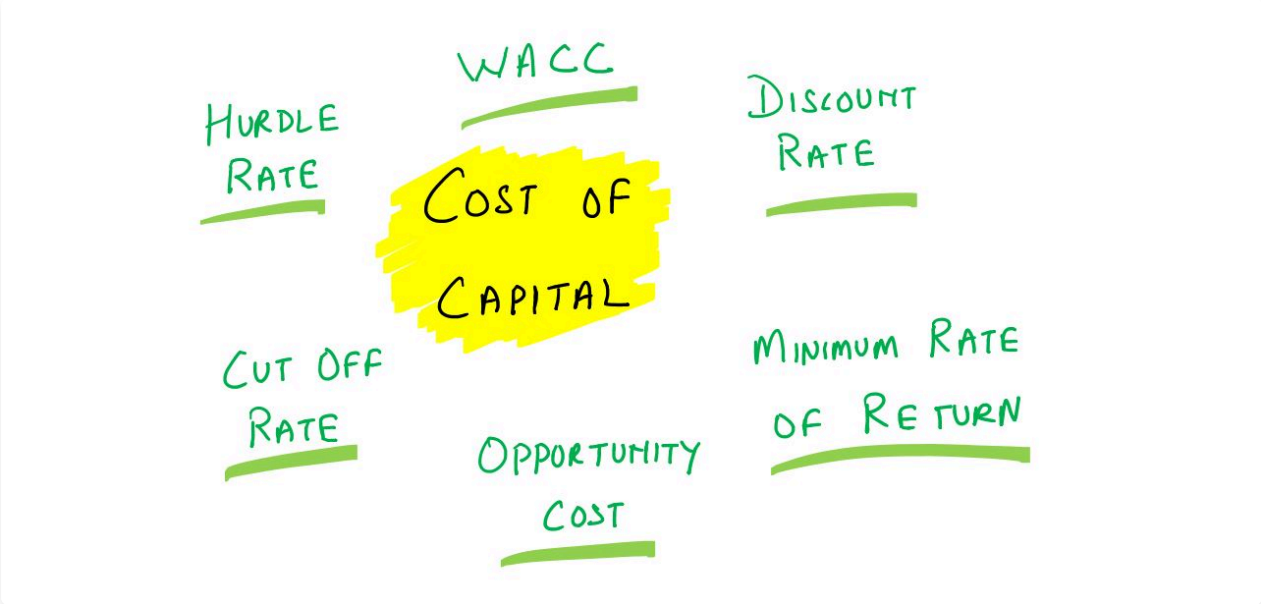
Three Forms of Efficiency



The information set of past prices is a subset of the set of all publicly available information, which in turn is a subset of all information. If today's price reflects only information about past prices, the market is weak form efficient. If today's price reflects all publicly available information, the market is semistrong form efficient. If today's price reflects all information, both public and private, the market is strong form efficient. Semistrong form efficiency implies weak form efficiency, and strong form efficiency implies semistrong form efficiency.

1. Introduction

Cost of capital refers to the cost a company incurs in order to raise funds for its operations and investments.



As we know, the fundamental task of a finance manager is to acquire funds and allocate them effectively to maximize the value of the firm. Now, when it comes to deciding how to raise funds, the finance manager must evaluate various sources of finance and determine their costs.

The Cost of capital represents the rate of return that investors and lenders expect to receive in exchange for providing capital to the company. Essentially, it is the cost associated with obtaining financing from various sources, such as equity (common stock), debt (bonds or loans), and other financial instruments.

It is used to discount or compound future cash flows, helping us determine the value of investments or projects. You might hear it referred to by different names like the **cut-off rate**, **hurdle rate**, or **minimum rate of return**.

Cost of capital is a critical concept in financial management because it helps companies assess the feasibility of investment projects and make decisions about capital structure. By comparing the cost of capital to the expected return on investment, companies can determine whether an investment opportunity is worthwhile and whether it will generate enough profit to cover the cost of financing.

1. Introduction

Here are several reasons why understanding the cost of capital is essential for finance managers:

1. Capital Budgeting Decisions
Cost of capital is used as a benchmark for evaluating the profitability of potential investment projects. Finance managers need to compare the expected return from a project with the cost of capital to determine whether the investment is worthwhile.

2. Capital Structure Decision
Cost of capital helps in determining the optimal mix of debt and equity financing for a company. Finance managers analyze the cost of different sources of capital to minimize the overall cost of funding and maximize shareholder value.

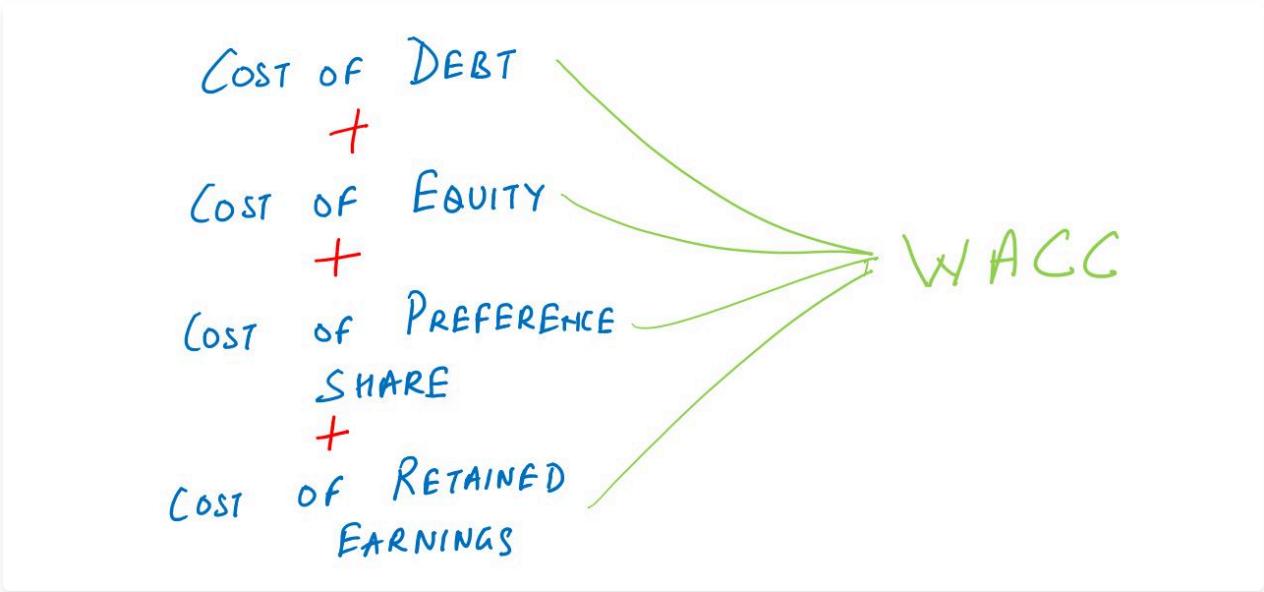
3. Valuation of Securities
Understanding the cost of capital is crucial for valuing financial securities such as stocks and bonds. It provides a basis for estimating the appropriate discount rate for cash flows, which is essential for determining the intrinsic value of these securities.

4. Performance Evaluation
Cost of capital serves as a yardstick for evaluating the financial performance of a company. Finance managers compare the return on investment with the cost of capital to assess whether the company is generating sufficient returns to compensate investors for the risk undertaken.

5. Mergers and Acquisitions
In mergers and acquisitions, the cost of capital is used to assess the financial feasibility of the transaction. Finance managers evaluate whether the expected returns from the acquired company justify the cost of capital of the acquiring company.

---

2. Determination of Cost of Capital



The cost of capital is used by companies to assess the overall cost of financing their operations. It is determined by considering various sources of funding, each with its own associated cost:

1. Cost of Debt
This refers to the interest rate companies pay on borrowed funds, such as loans, debentures, or bonds. The cost of debt is influenced by factors like prevailing interest rates, creditworthiness of the borrower, and terms of the loan.

2. Cost of Equity
Equity represents the ownership stake of shareholders in a company. The cost of equity is the rate of return investors expect to receive on their investment in the company's common stock. It's influenced by factors such as the company's profitability, growth prospects, and market conditions.

3. Cost of Preference Share
Preference shares are a type of hybrid security that combines features of both debt and equity. The cost of preference shares is the dividend rate paid to preference shareholders. It's typically fixed and represents the return required by preference shareholders for providing capital to the company.

4. Cost of Retained Earnings
Retained earnings are profits that are reinvested in the company rather than distributed to shareholders as dividends. The cost of retained earnings is the opportunity cost of using these funds for investment purposes instead of distributing them to shareholders. It's based on the returns shareholders could earn if they received dividends and invested them elsewhere.

Once the individual costs of debt, equity, preference shares, and retained earnings are determined, they are weighted based on their proportion in the company's capital structure. The **weighted average cost of capital (WACC)** is calculated by multiplying each component's cost by its respective weight and summing the results.

WACC serves as a benchmark for evaluating the attractiveness of investment opportunities and making decisions related to capital budgeting, project financing, and strategic planning. It represents the minimum rate of return required by investors to compensate them for the risk associated with investing in the company's operations.

---

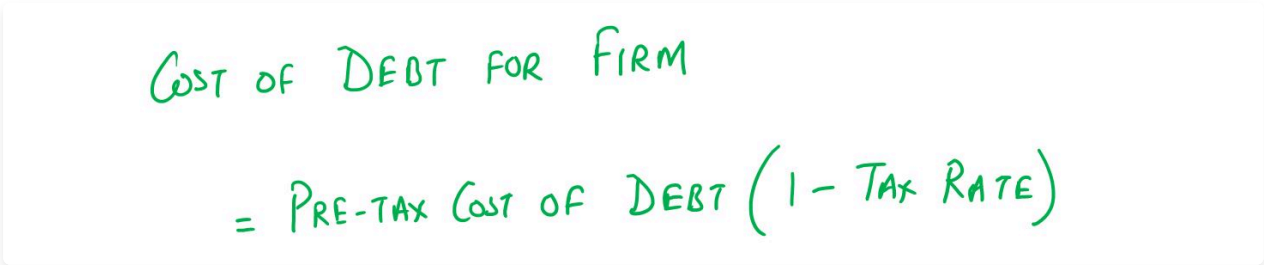
3. Cost of Debt

The cost of debt for a firm is nothing but the expected return of debt holders, such as bondholders or debenture holders.

Usually, the Yield to Maturity (YTM) serves as a good approximation for the cost of debt. YTM represents the total return anticipated on a bond if it is held until maturity, considering both interest payments and any capital gain or loss.

However, it is important to consider the tax implications associated with interest payments. Unlike dividends paid to equity holders, interest payments on debt are tax-deductible expenses for the company. This effectively reduces the cost of debt for the firm.

To factor in the tax benefits of interest payments, we can adjust the cost of debt calculation using the after-tax cost of debt formula:



Pre-Tax Cost of Debt represents the cost of debt before considering any tax effects. As mentioned, it can be approximated by the Yield to Maturity (YTM) of the debt instruments.

Tax Rate is the corporate tax rate applicable to the company.

By multiplying the pre-tax cost of debt by (1 - Tax Rate), we adjust for the tax advantage associated with interest payments. This yields the after-tax cost of debt, which is a more accurate measure of the true cost of debt for the firm, accounting for the tax shield provided by interest payments.

---

4. Tax-deductability of Interest Payments

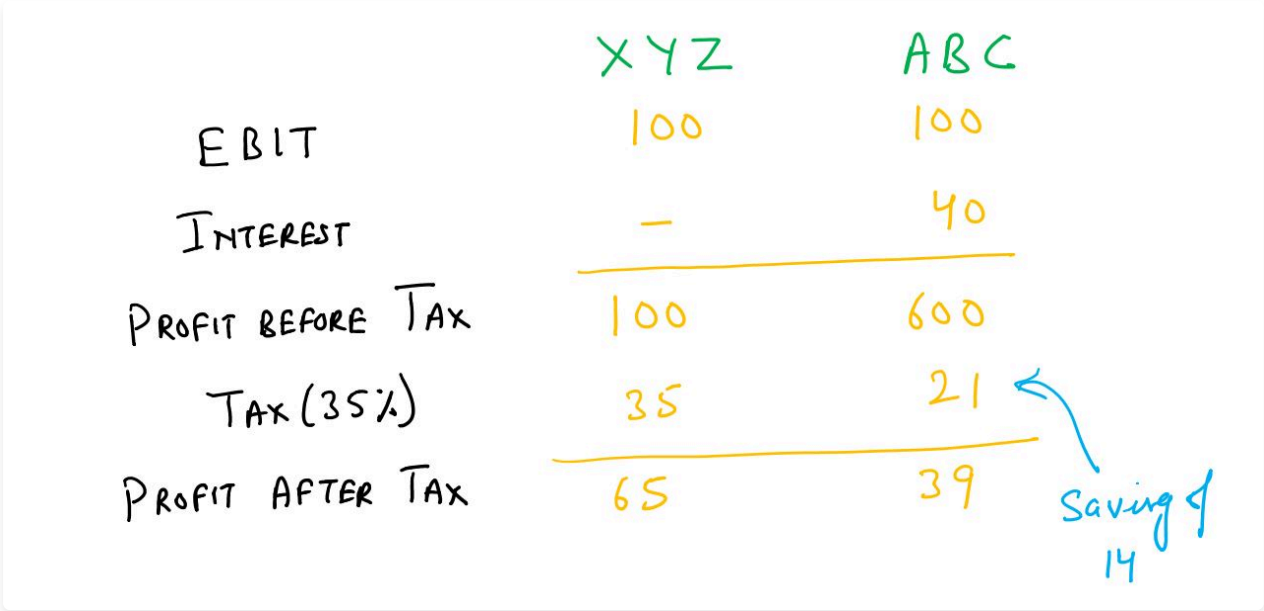
Interest payments on debt are tax-deductible expenses for corporations, meaning that the amount of interest paid on debt can be subtracted from the company's taxable income, resulting in a lower tax liability. This tax advantage reduces the effective cost of debt financing for companies.

To calculate the after-tax cost of debt, we take into account the tax deductibility of interest payments. The formula is:

After-tax cost of debt = Borrowing rate \(\times \) (1 - Tax rate)

By multiplying the borrowing rate by one minus the tax rate, we effectively reduce the cost of debt by the tax savings resulting from the deductibility of interest payments.

There are two companies namely XYZ and ABC. The capital of the XYZ is fully financed by the equity shareholders whereas ABC uses both debt and equity. Given below is the profitability statements of both the companies:



A comparison of the two companies shows that the interest payment is Rs 26 only for ABC, whereas it is Rs 40 for XYZ. An interest payment of Rs 40 by the ABC results in a tax shield (tax saving) of Rs 14 (Rs 40 × 35% tax rate).

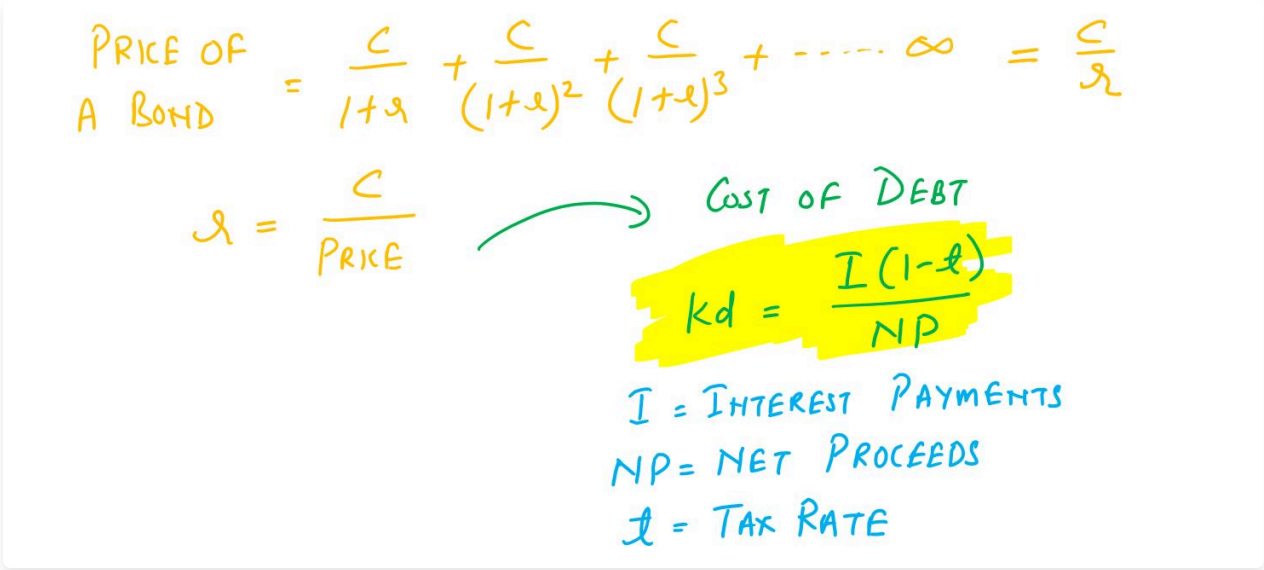
On the other hand, dividends paid to shareholders or preference shares do not offer the same tax benefits. When a company pays dividends to its shareholders, it does so out of its after-tax profits. Shareholders then pay taxes on these dividends at their individual tax rates, resulting in double taxation—once at the corporate level and again at the individual level.

---

5. Cost of Irredeemable Debt

Irredeemable debt, also known as perpetual debt, refers to debt instruments that do not have a maturity date. Unlike traditional bonds, which have a specific maturity date when the principal amount must be repaid, irredeemable debt has no such requirement. Instead, the issuer pays interest indefinitely, usually at fixed intervals, without any obligation to repay the principal.

We can derive the formula for the cost of irredeemable debt from the formula for value of a perpetual bond:



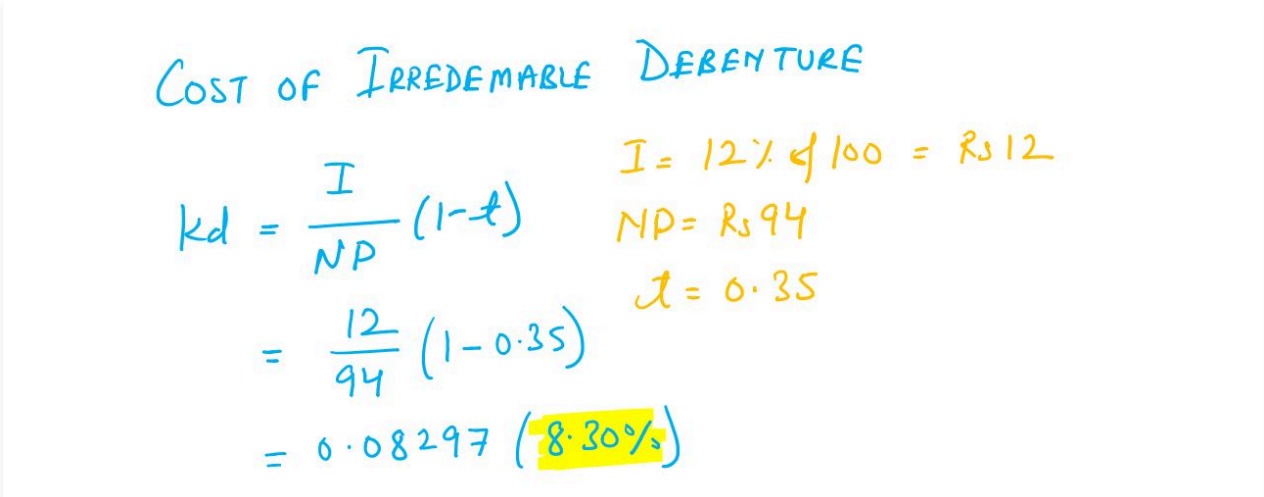
Here, **Net Proceeds** refers to the issue price of the debt minus any issue expenses or flotation costs. Flotation costs include various expenses incurred during the issuance of securities, such as underwriting fees, brokerage fees, legal charges, administrative costs, registration fees, and printing expenses.

---

5. Cost of Irredeemable Debt

Five years ago, XYZ limited issued 12% irredeemable bonds at Rs 103, with Face value of Rs 100. The current market price is Rs 94. If the corporate tax rate is 35%, calculate its cost of debt?

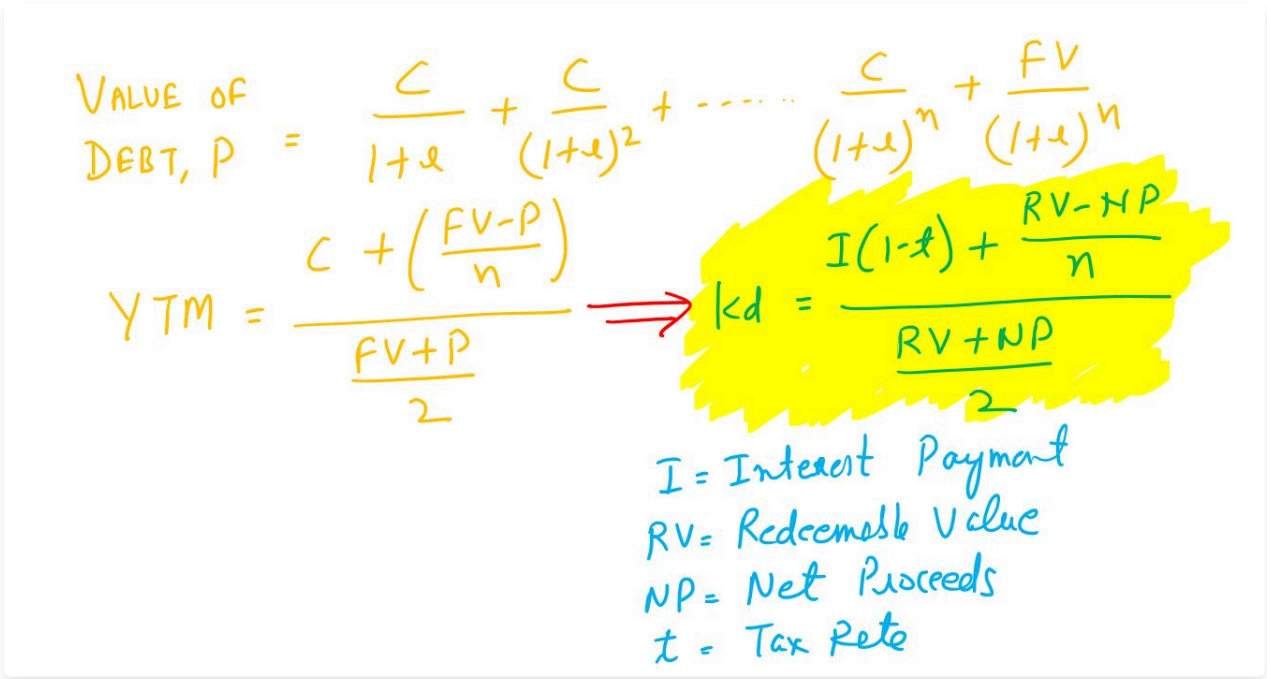
Solution:



---

6. Cost of Redeemable Debt

We can derive the formula for the cost of redeemable debt from the formula for value of a bond with fixed maturity period:

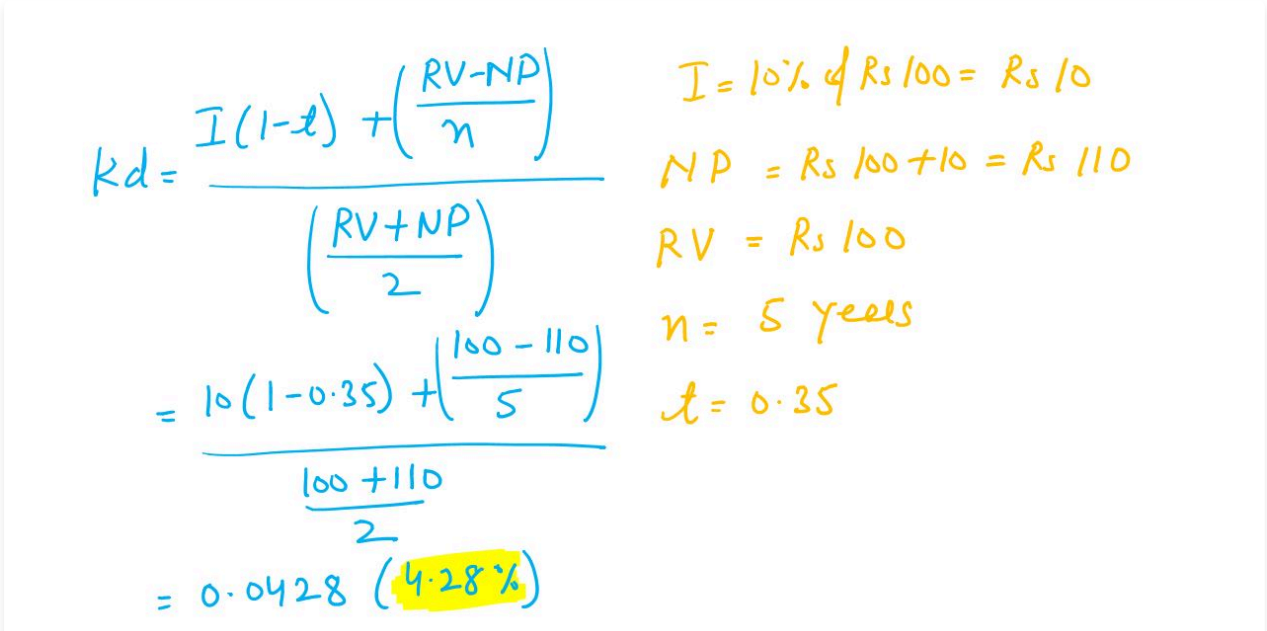


---

6. Cost of Redeemable Debt

ABC issued 10,000 bonds at 10% coupon rate of Rs 100 each at a premium of 10% in 2017. They are to be matured in 2022 and will then be redeemed. Calculate cost of debt at 35% tax rate.

Solution:



---

6. Cost of Redeemable Debt

A company issued 10,000, 10% debentures of Rs 100 each at par in 2019 to be matured on 2029. The company wants to know the cost of its existing debt on 2024 when the market price of the debentures is Rs 80. Calculate the cost of existing debentures assuming 35% tax rate.

Solution:

$$K_d = \frac{I(1-t) + \left(\frac{RV-NP}{n}\right)}{\left(\frac{RV+NP}{2}\right)}$$

$I = 10\% \text{ of } 100 = Rs\ 10$

$NP = Rs\ 80$

$RV = Rs\ 100$

$n = 2029 - 2024 = 5 \text{ years}$

$t = 0.35$

$$= \frac{10(1-0.35) + \left(\frac{100-80}{5}\right)}{\frac{100+80}{2}}$$

$$= 0.1166\ (11.67\%)$$

6. Cost of Redeemable Debt

A 5 year Rs. 100 debenture of a firm can be sold for a net price of Rs. 96.50. The coupon rate of interest is 14% per annum, and the debenture will be redeemed at 5% premium on maturity. The firm's tax rate is 40%. Compute the after tax cost of debenture.

Solution:

$$K_d = \frac{I(1-t) + \frac{RV-NP}{n}}{\frac{RV+NP}{2}}$$

$$= \frac{14(1-0.40) + \frac{105-96.50}{5}}{\frac{105+96.50}{2}}$$

$$= 0.1002 \ (10.02\%)$$

$NP = Rs\ 96.50$

$RV = 100 + 5\%\ Premium$

$= Rs\ 105$

$n = 5\ years$

$t = 0.40$

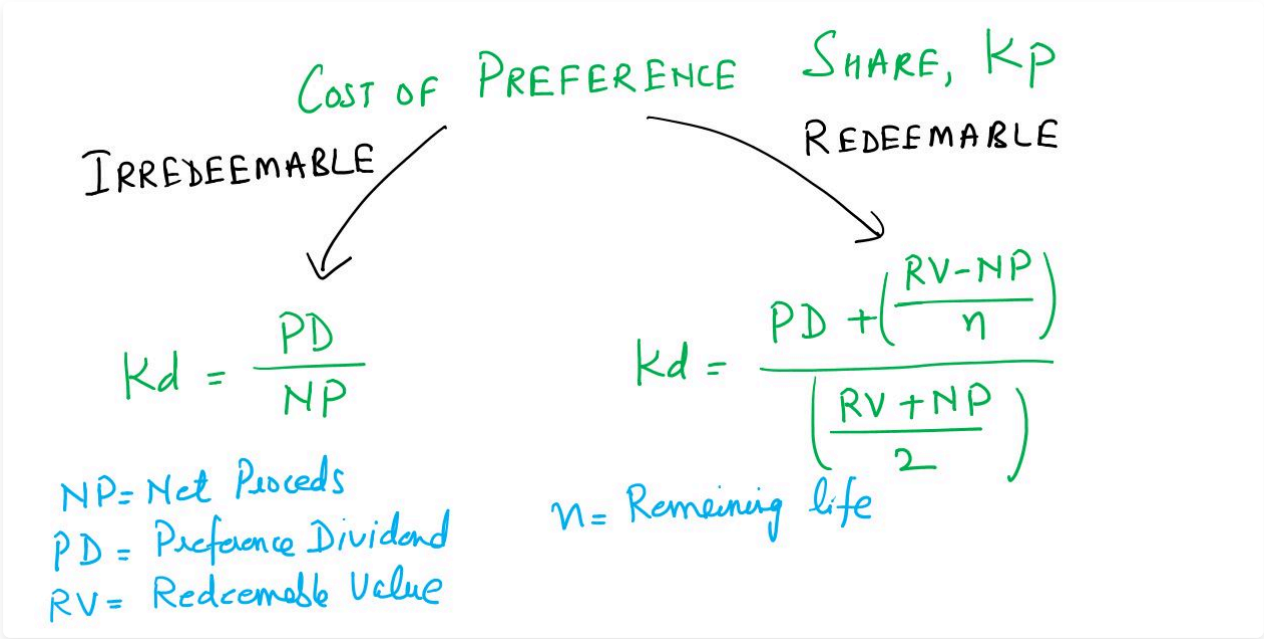
$I = 14\%\ of\ 100 = Rs\ 14$

7. Cost of Preference Capital

Many companies opt to include preference shares in their financing strategy. These shares promise a fixed dividend rate, although the payment of dividends remains at the discretion of the Board of Directors, without any legal obligation. Despite this discretionary nature, preference capital isn't cost-free. The cost of preference capital is determined by the expected dividend demanded by its investors. Typically, there are significant floatation costs associated with raising preference share capital.

In essence, the cost of preference dividends closely resembles the cost of debt. However, unlike interest payments on debt, preference dividends are not tax-deductible, resulting in the company bearing their full cost. Consequently, no adjustment for taxes is made when computing the cost of preference share capital.

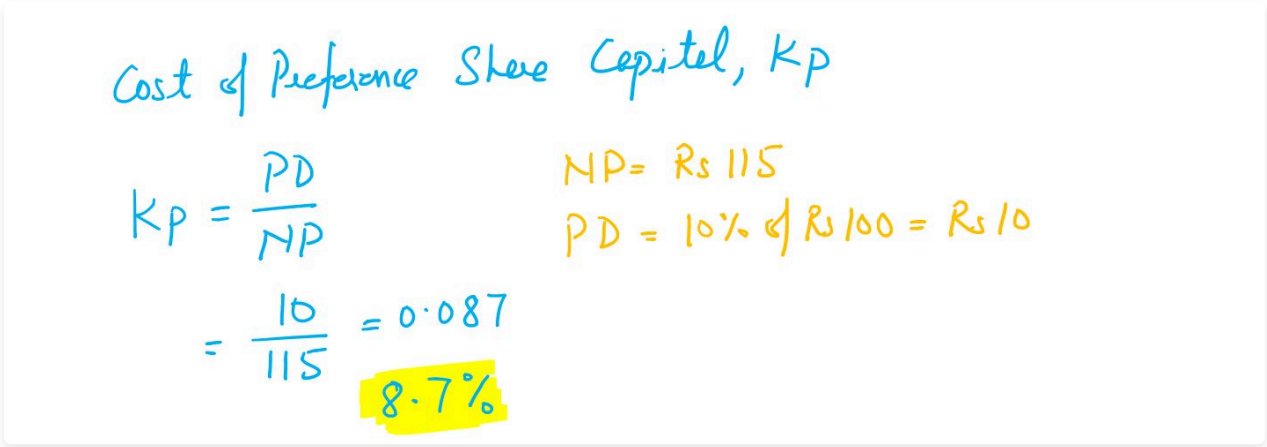
The Cost of Preference Share capital is given by:



7. Cost of Preference Capital

A company issues 10000, 10% preference shares of face value of Rs 100 each. The market price of the share is Rs 115. Calculate cost of capital of this preference share.

Solution:

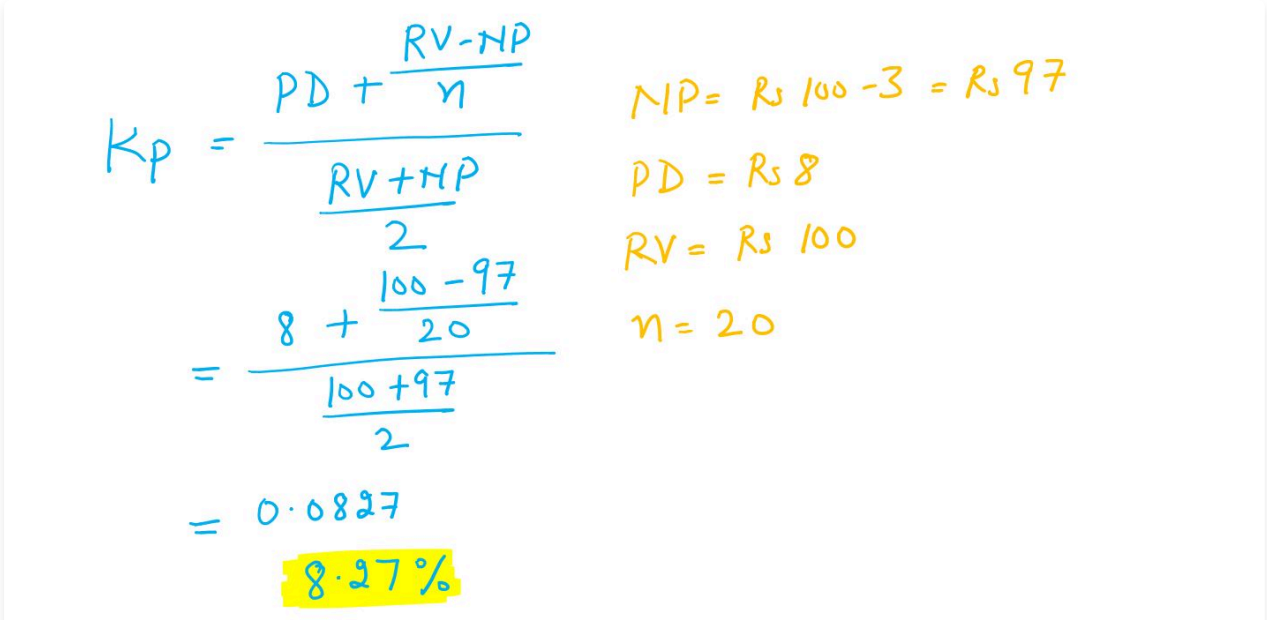


---

7. Cost of Preference Capital

A company has 25000, 8% preference shares of Rs. 100 each, redeemable after 20 years at face value. The floatation costs is Rs 3 per share. Calculate Cost of Capital.

Solution:

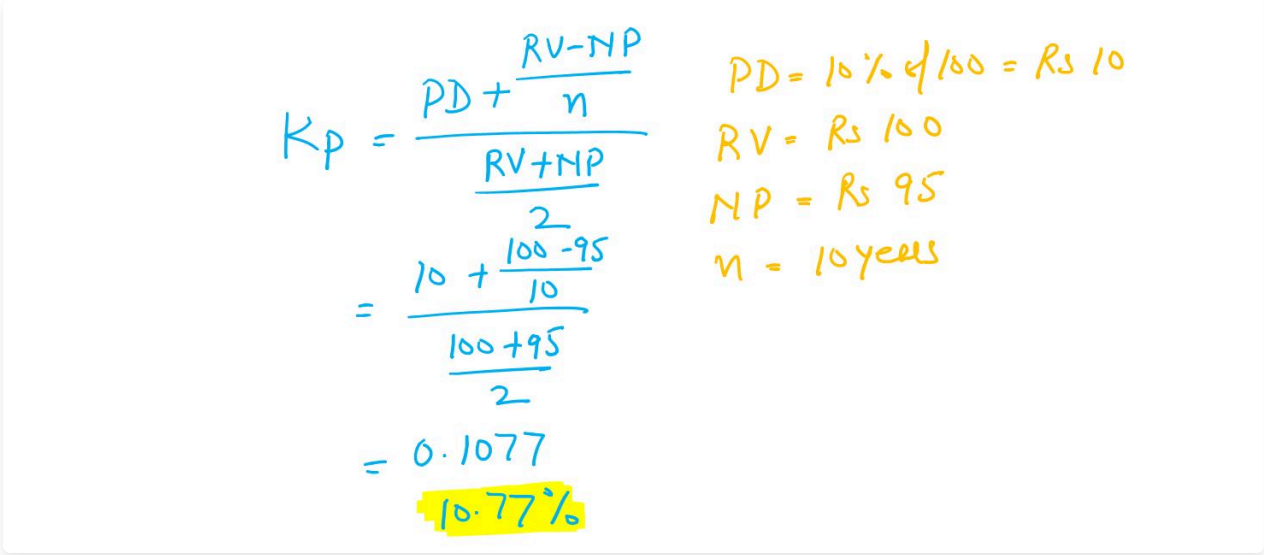


---

7. Cost of Preference Capital

LMN ltd issues 2000, 10% preference shares of Rs 100 each at Rs 95. The company proposes to redeem the preference shares at the end of tenth year from the date of issue. Calculate the cost of preference share capital?

Solution:



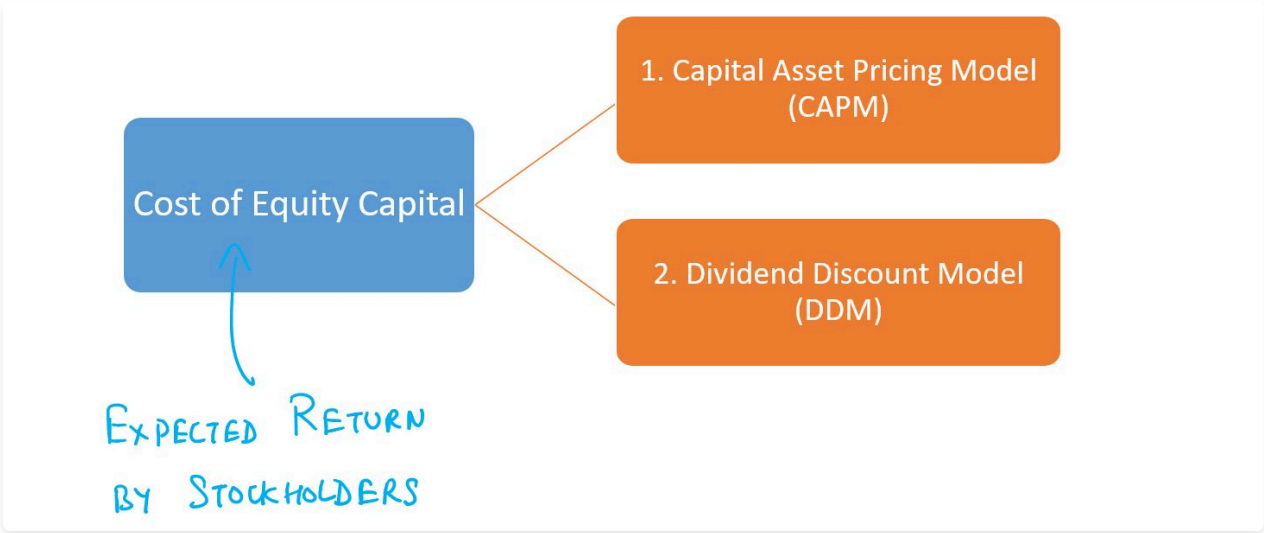
8. Cost of Equity Capital

The cost of equity capital represents the return expected by shareholders on their investment in the company. However, unlike debt where the interest rate is predetermined, determining the cost of equity is more complex because shareholders don't explicitly state their required returns.

Essentially, the cost of equity capital is the anticipated return on investment demanded by shareholders.

When a company issues new shares to raise funds for projects, it's crucial to understand that the returns expected by shareholders and the costs to the company are connected. Shareholders expect returns in the form of dividends and stock price appreciation.

However, these returns represent costs to the company. Dividends directly reduce the company's cash reserves, affecting existing shareholders. Additionally, when new shareholders benefit from stock price increases, existing shareholders' gains are diluted because the overall appreciation is shared among all shareholders. Therefore, issuing new shares impacts both shareholder returns and the company's costs.



The cost of equity capital can be calculated using various models, two of which are commonly employed:

1. **Capital Asset Pricing Model (CAPM)**: This model estimates the cost of equity based on the stock's volatility, the risk-free rate, and the market risk premium. It considers the systematic risk associated with the stock compared to the market as a whole.

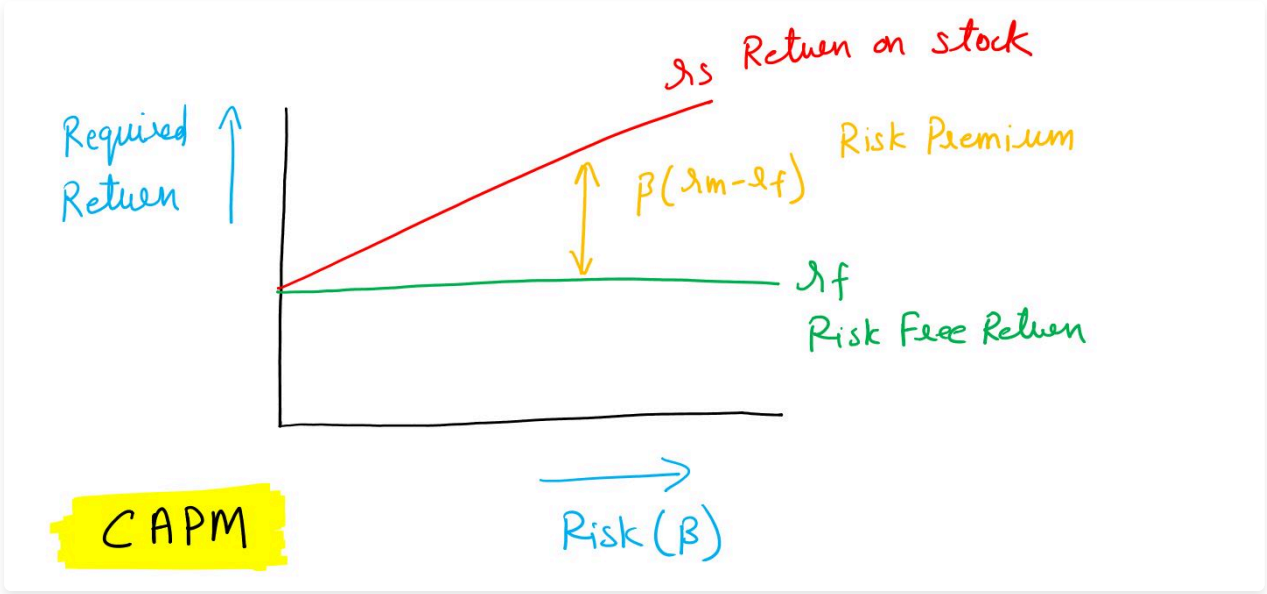
2. **Dividend Discount Model (DDM)**: The DDM calculates the cost of equity by discounting the expected dividends per share over a certain period at an appropriate discount rate. This model is particularly useful for companies that pay regular dividends and have stable growth patterns.

---

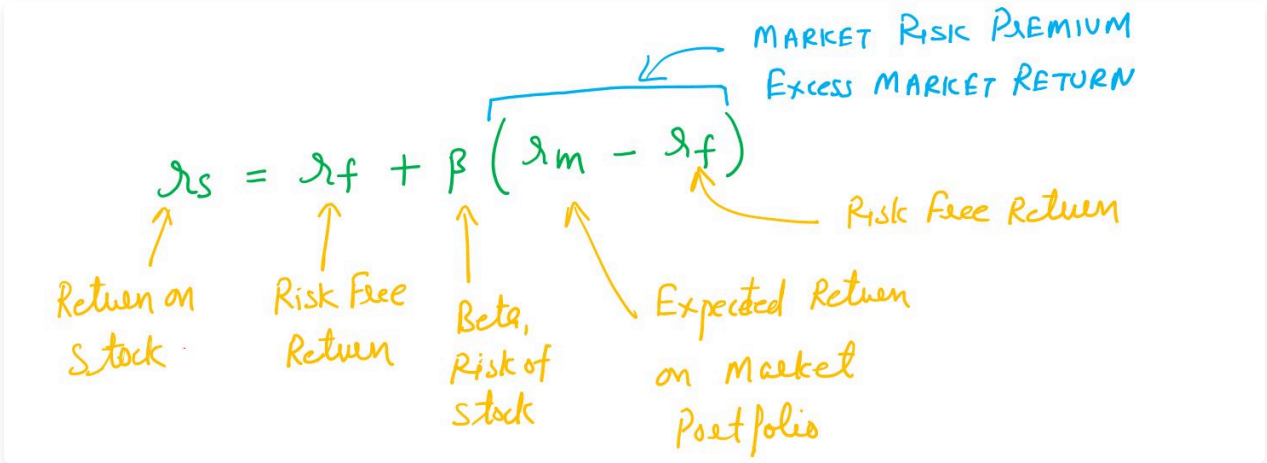
9. CAPM Model

The Capital Asset Pricing Model (CAPM) was developed in mid-1960s by 3 researchers: William Sharpe, John Lintner and Jan Mossin independently. Consequently, the model is often referred to as Sharpe-Lintner-Mossin Capital Asset Pricing Model.

The CAPM is used to determine the expected return on a stock based on its risk. It suggests that the expected return of a stock is determined by the risk-free rate, the asset's beta, \(\beta \) (a measure of its volatility relative to the market), and the market risk premium (the excess return expected from investing in the market over the risk-free rate). CAPM helps investors assess whether an investment is adequately compensating for the level of risk it poses. This expected return can be viewed as the firm's cost of equity capital.



The CAPM can be summarized according to the following formula:



9. CAPM Model

In the Capital Asset Pricing Model (CAPM), the risk-free rate refers to the theoretical return on an investment that is considered to have no risk of financial loss. The risk-free rate serves as a baseline for evaluating the expected return on other investments.

There are a few common methods to determine the risk-free rate in CAPM:

1. **Treasury Securities**: The most common approach is to use the yield on short-term Treasury bills issued by the government, such as the Treasury bills. These securities are considered virtually risk-free because they are backed by the government's creditworthiness.

2. **Government Bonds**: Alternatively, some analysts may use the yield on longer-term government bonds, such as Treasury bonds, as a proxy for the risk-free rate.

3. **Interbank Lending Rate**: In some cases, the interbank lending rate, such as LIBOR (London Interbank Offered Rate), may be used as an approximation of the risk-free rate, especially in international contexts.

4. **Central Bank Rates**: Central bank lending rates, such as the RBI Repos can also be used as an indicator of the risk-free rate.

---

9. CAPM Model

In the Capital Asset Pricing Model (CAPM), the market risk premium represents the excess return that investors expect to receive for holding a risky asset (such as stocks) over the risk-free rate.

The expected market return, also known as the equity risk premium, is an estimation of the average return that investors anticipate earning from investing in the overall stock market. It represents the compensation investors require for bearing the systematic risk associated with holding stocks.

There are several approaches to determine the expected market return:

1. **Historical Data Analysis**: One approach is to analyze historical stock market returns over a significant time period, typically spanning several decades. By examining past returns, trends, and volatility, investors can derive an estimate of the average annual return that the market has provided historically.

2. **Financial Models**: Financial models, such as discounted cash flow (DCF) models or dividend discount models (DDM), can also be used to estimate the expected return on the overall market. These models incorporate factors such as earnings growth, dividends, and macroeconomic variables to forecast future market returns.

3. **Analyst Forecasts**: Financial analysts and economists often provide forecasts for future stock market returns based on their assessments of economic conditions, corporate earnings growth, interest rates, and other relevant factors. These forecasts can serve as valuable inputs for estimating the expected market return.

---

9. CAPM Model

Compute the cost of equity capital of LMN Ltd., whose risk-free rate of return equals 10%. The firm's beta equals 1.75 and the return on the market portfolio equals to 15%.

Solution:

$$r_s = r_f + \beta(r_m - r_f)$$
$$= 0.10 + 1.75(0.15 - 0.10)$$
$$= 0.1875$$
$$18.75\% \leftarrow \text{Cost of Equity Capital}$$

$r_f = 0.10$
$r_m = 0.15$
$\beta = 1.75$

---

9. CAPM Model

Suppose the stock of the Vodafone has a beta (β) of 1.3. The firm is 100% equity financed; that is, it has no debt. Vodafone is considering a number of capital budgeting projects that will double its size. Because these new projects are similar to the firm's existing ones, the average beta on the new projects is assumed to be equal to Vodafone's existing beta. The risk-free rate is 5 percent. What is the appropriate discount rate for these new projects, assuming a market risk premium of 8.4 percent?

Solution:

$$r_s = r_f + \beta(r_m - r_f)$$
$$= 5 + 1.3 \times 8.4$$
$$= 15.92$$

$r_f = 5$
$r_m - r_f = 8.4$
$\beta = 1.3$

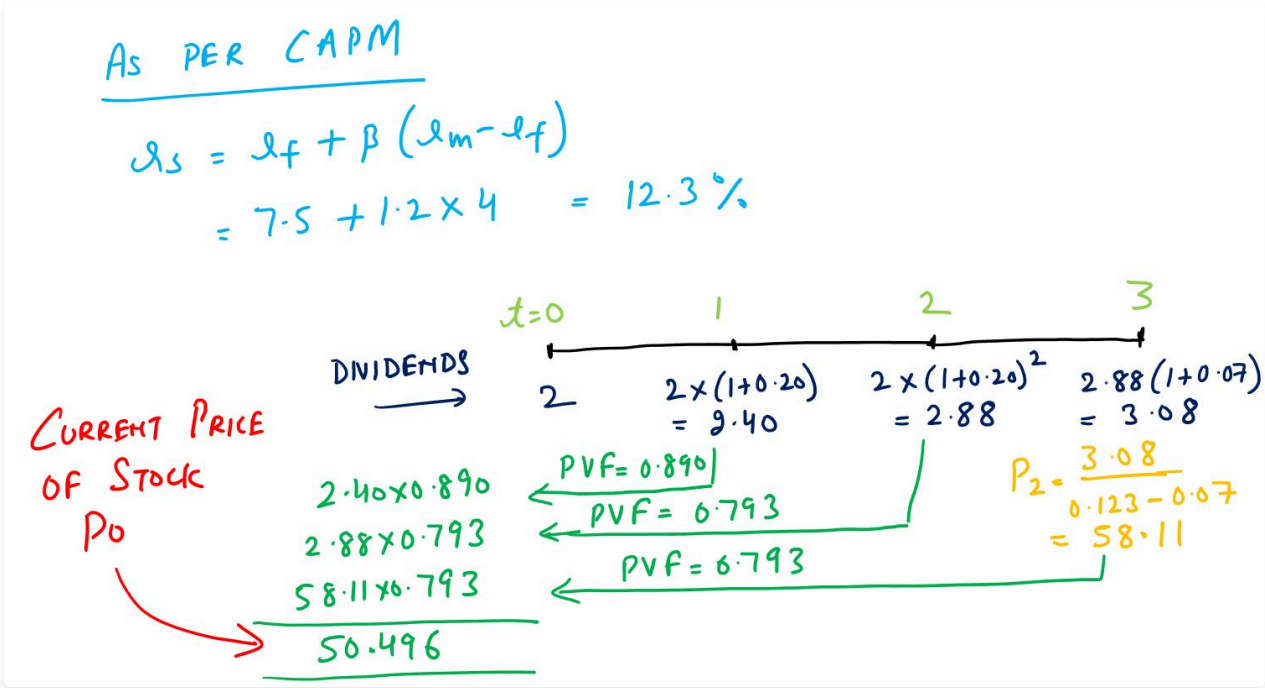
Cash flows of new projects should be discounted at 15.92%

---

9. CAPM Model

A company currently pays a dividend of Rs. 2 per share. It is estimated that the company's dividend will grow at a rate of 20% per year for the next 2 years, then at a constant rate of 7% thereafter. The company's stock has a beta of 1.2, the risk free rate is 7.5%, and the market risk premium is 4%. What is your estimate of the stock's current price? (PVF (12.3%) for year 1 and 2 are 0.890 and 0.793)

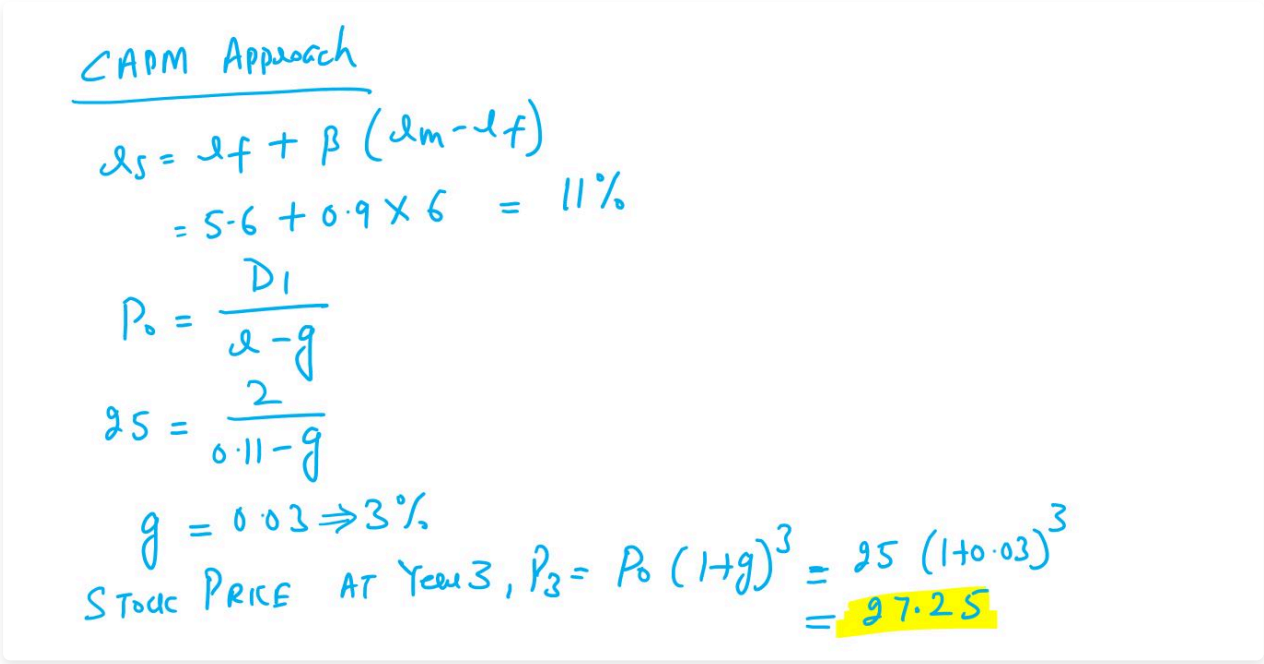
Solution:



9. CAPM Model

You are considering an investment in Mishra's common stock. The stock is expected to pay a dividend of Rs. 2 a share at the end of this year; its beta is 0.9; the risk-free rate is 5.6%; and the market risk premium is 6%. The dividend is expected to grow at some constant rate g, and the stock currently sells for Rs. 25 a share. Assuming the market is in equilibrium, what does the market believe will be the stock's price at the end of 3 years?

Solution:



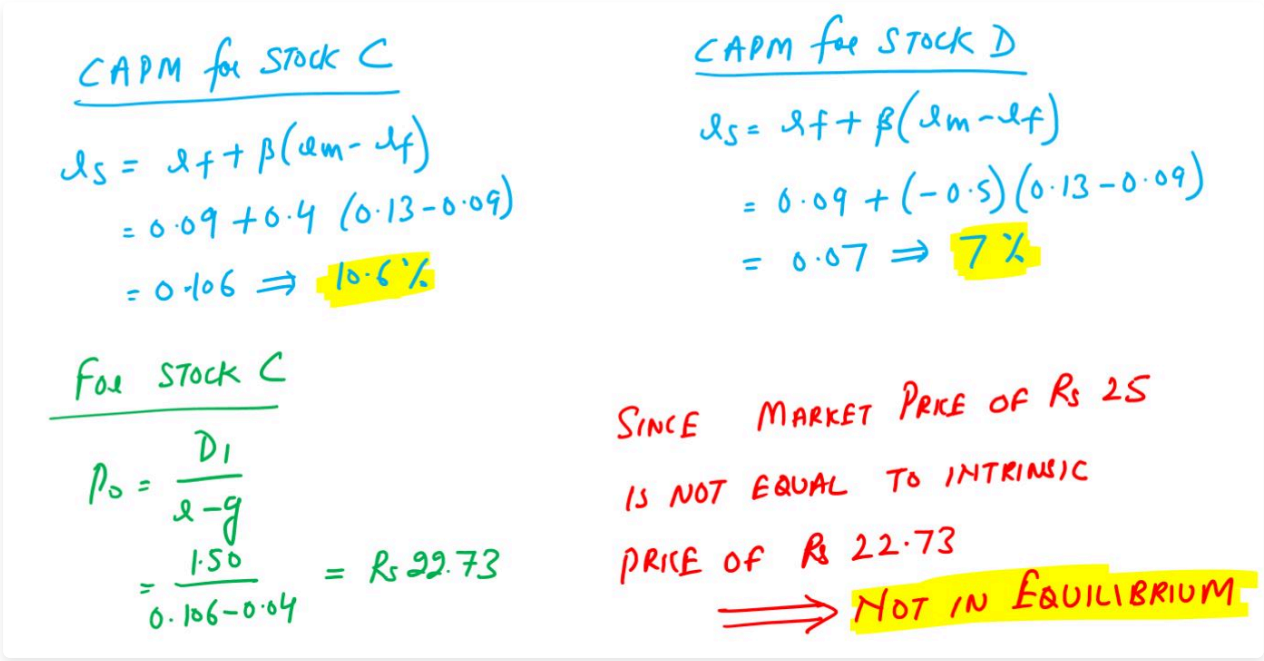
9. CAPM Model

The beta coefficient for Stock C is 0.4 and that for Stock D is −0.5.

(a) If the risk-free rate is 9% and the expected rate of return on an average stock is 13%, what are the required rates of return on Stocks C and D?

(b) For Stock C, suppose the current price is Rs. 25; the next expected dividend is Rs. 1.50; and the stock's expected constant growth rate is 4%. Is the stock in equilibrium?

Solution:



9. CAPM Model

The risk-free rate of return is 11%; the required rate of return on the market is 14%; and Sigma Company's stock has a beta coefficient of 1.5.
(a) If the dividend expected during the coming year is Rs. 2.25, and if g is a constant 5%, then at what price should Sigma's stock sell?
(b) Now suppose that the RBI increases the money supply, causing a fall in the risk-free rate to 9% and in expected return of market to 12%. How would this affect the price of the stock?
(c) In addition to the change in part b, suppose investors' risk aversion declines; this fact, combined with the decline in risk free rate of return, causes expected return of market to fall to 11%. At what price would Sigma's stock now sell?
(d) Suppose Sigma has a change in management. The new group institutes policies that increase the expected constant growth rate to 6%. Also, the new management stabilizes sales and profits and thus causes the beta coefficient to decline from 1.5 to 1.3. Assume that risk free rate of return and expected return of market are equal to the values in part c. After all these changes, what is Sigma's new equilibrium price? (Note: D_1 goes to Rs. 2.27)

Solution:

(a) If the dividend expected during the coming year is Rs. 2.25, and if g is a constant 5%, then at what price should Sigma's stock sell?

$$r_s = r_f + \beta (r_m - r_f)$$
$$= 0.11 + 1.5 \times (0.14 - 0.11)$$
$$= 0.155 \Rightarrow 15.5\%$$
$$P_0 = \frac{D_1}{r - g} = \frac{2.25}{0.155 - 0.05} = \text{Rs } 21.43$$

(b) Now suppose that the RBI increases the money supply, causing a fall in the risk-free rate to 9% and in expected return of market to 12%. How would this affect the price of the stock?

$$r_s = r_f + \beta (r_m - r_f)$$
$$= 0.09 + 1.5 \times (0.12 - 0.09)$$
$$= 0.135 \Rightarrow 13.5\%$$
$$P_0 = \frac{D_1}{r - g} = \frac{2.25}{0.135 - 0.05} = \text{Rs } 26.47$$

(c) In addition to the change in part b, suppose investors' risk aversion declines; this fact, combined with the decline in risk free rate of return, causes expected return of market to fall to 11%. At what price would Sigma's stock now sell?

$$r_s = r_f + \beta (r_m - r_f)$$
$$= 0.09 + 1.5 (0.11 - 0.09)$$
$$= 0.12 \Rightarrow 12\%$$
$$P_0 = \frac{D_1}{r - g} = \frac{2.25}{0.12 - 0.05} = \text{Rs } 32.14$$

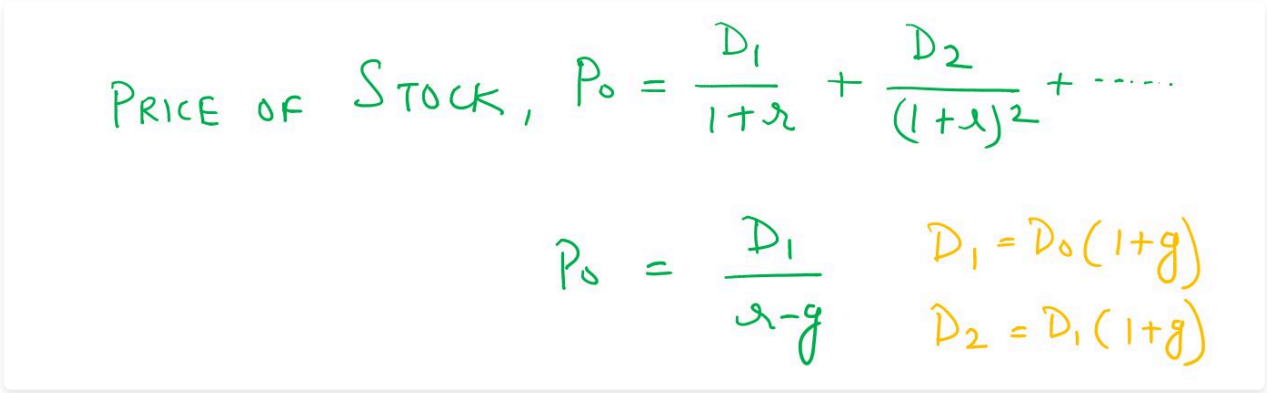
(d) Suppose Sigma has a change in management. The new group institutes policies that increase the expected constant growth rate to 6%. Also, the new management stabilizes sales and profits and thus causes the beta coefficient to decline from 1.5 to 1.3. Assume that risk free rate of return and expected return of market are equal to the values in part c. After all these changes, what is Sigma's new equilibrium price? (Note: D_1 goes to Rs. 2.27)

$$r_s = r_f + \beta (r_m - r_f)$$
$$= 0.09 + 1.3 (0.11 - 0.09)$$
$$= 0.116 \Rightarrow 11.6\%$$
$$P_0 = \frac{D_1}{r - g} = \frac{2.25}{0.116 - 0.06} = \text{Rs } 40.54$$

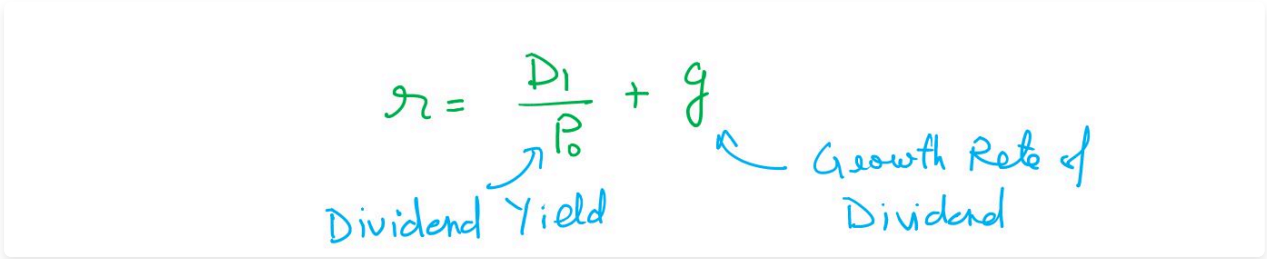
10. Dividend Discount Model

The dividend discount model (DDM) also offers a method for estimating the expected return on an individual stock. This model can be used to compute the cost of equity capital.

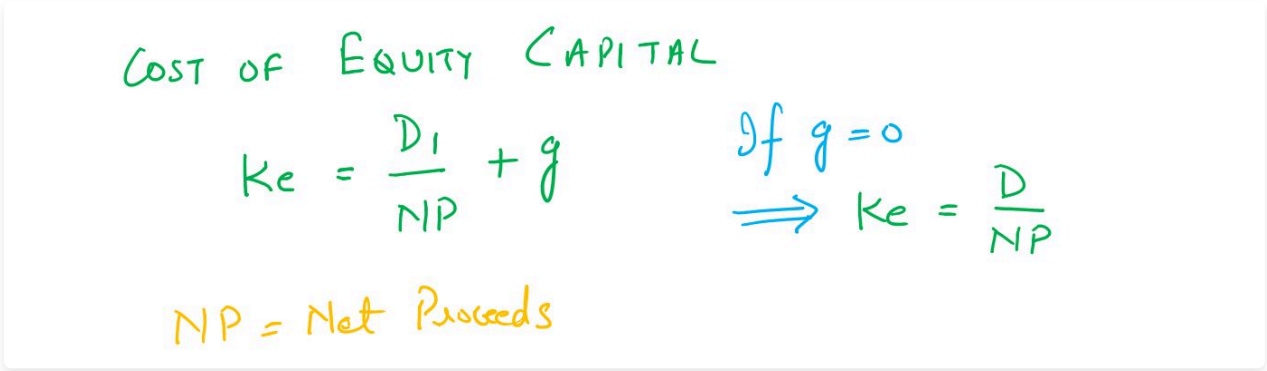
As per dividend discount model, the price of Stock is given by:



Rewriting the above equation, we get expected return on equity capital:



Thus the cost of equity capital is given by:



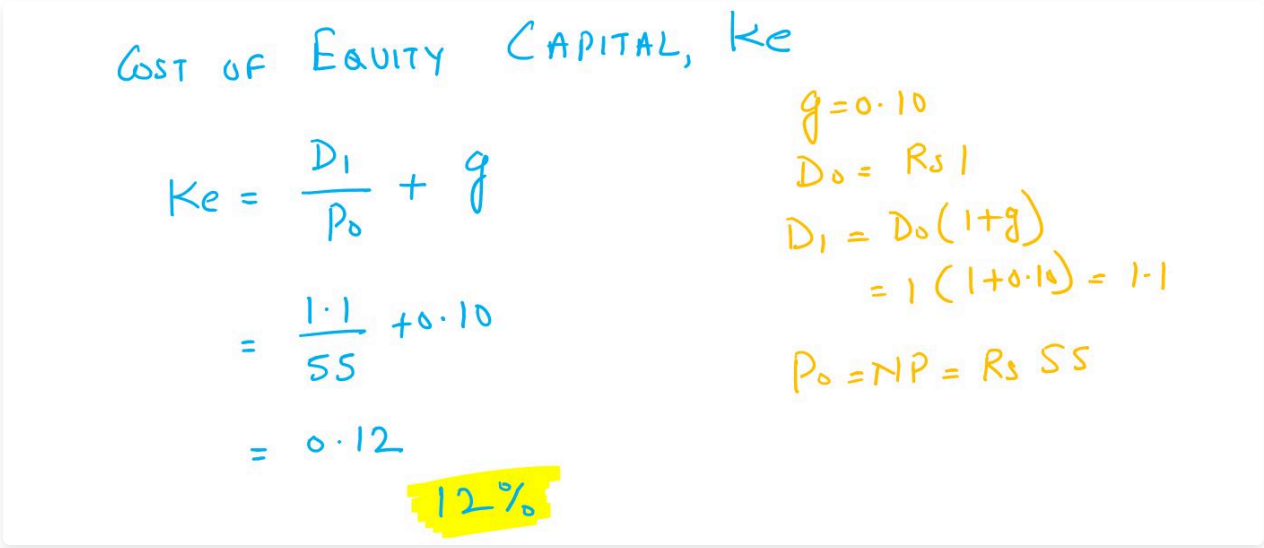
The cost of equity capital will be that rate of expected dividend which will maintain the present market price of equity shares.

---

10. Dividend Discount Model

Atlas cycles has paid dividend of Rs 1 per share for face value of Rs 10. It is expected to grow at rate of 10%. Calculate the cost of equity of the market price of the share is Rs 55?

Solution:

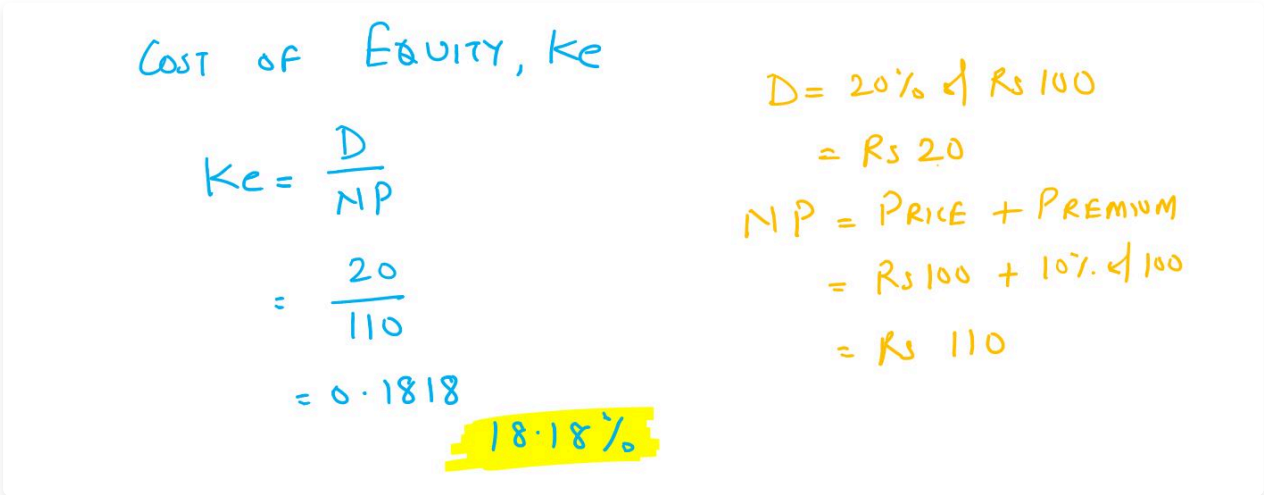


---

10. Dividend Discount Model

A company issues 50000, equity shares of Rs. 100 each at a premium of 10%. The company has been paying 20% dividend to equity shareholders for the past 10 years and expects to do the same in the future. Calculate Cost of equity.

Solution:

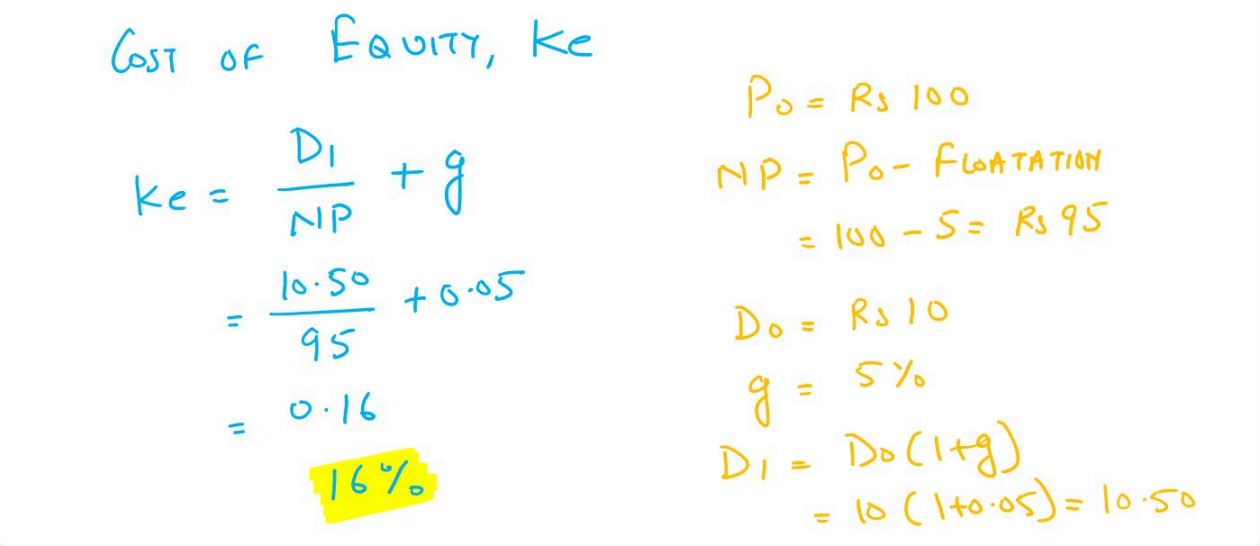


---

10. Dividend Discount Model

A company issues 4000 new equity shares of Rs. 100 each at par. The floatation costs are expected to be 5% of the share price. The company pays a dividend of Rs. 10 per share initially and growth in dividend is expected to be 5%. Compute cost of equity.

Solution:



---

11. Comparing DDM and CAPM

Comparing the Dividend Discount Model (DDM) with the Capital Asset Pricing Model (CAPM) for estimating the cost of equity capital reveals distinct advantages and limitations for each.

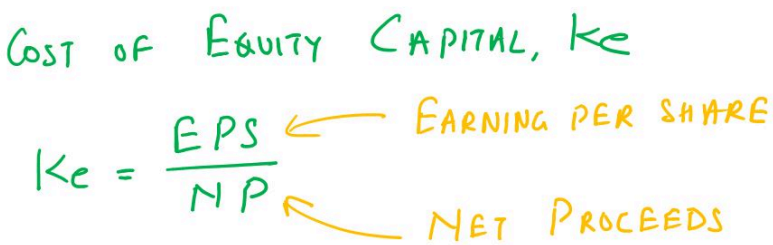
The CAPM provides two notable benefits. **Firstly**, it explicitly adjusts for risk, which is essential for evaluating the expected return on an investment. **Secondly**, it remains applicable to companies that either don't pay dividends or have uncertain dividend growth projections.

Conversely, the DDM boasts simplicity as its primary advantage. However, it's limited to firms that maintain steady dividend payments; it becomes ineffective when companies don't pay dividends at all. Additionally, the DDM lacks explicit consideration of risk, which can be a significant drawback in certain contexts.

---

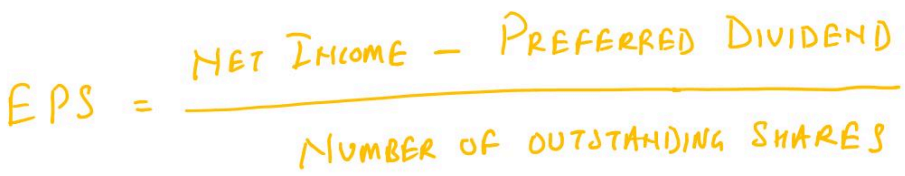
12. EPS approach

We have seen that that the dividend discount model (DDM) is used to estimate the cost of equity capital. However, if a firm's earnings are robust but it doesn't pay dividends, we can not use DDM.



An alternative approach is to use the earnings per share (EPS) method. In this method, the cost of equity capital is calculated by dividing the earnings per share by the price of the stock. This allows for an estimation of the return expected by shareholders based on the earnings generated by the firm, even if no dividends are paid out.

Earning Per Share (EPS) is the portion of a company's profit allocated to each outstanding share of common stock. Earning per share serves as an indicator of a company's profitability.



---

13. Realised Yield Approach

The Realised Yield Approach is another method used to compute the cost of equity for a company's shares. This approach acknowledges the limitations of other methods, such as those based on dividends capitalisation and earnings capitalisation, which rely on uncertain future dividends and earnings projections.

The Realised Yield Approach suggests that instead of estimating future dividends and earnings, the actual average rate of returns realised in the past few years should be used to compute the cost of equity. This includes considering the dividends received in the past few years as well as any gains realised at the time of sale of shares.

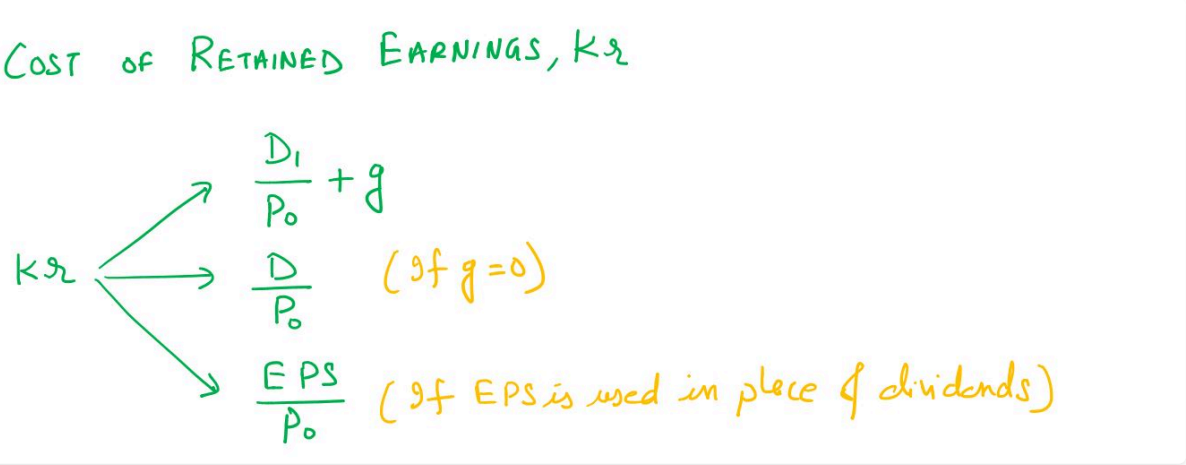
The rationale behind this approach is that investors expect to receive in the future at least what they have received in the past. Therefore, by using the actual average rate of returns realised in the past, the Realised Yield Approach attempts to provide a more realistic estimate of the cost of equity.

However, it's important to note that the Realised Yield Approach is based on several assumptions, including that the firm's risk remains constant over the period, past realised yield is the basis for shareholders' expectations, there is no opportunity cost to investors, and the market price of equity shares does not change significantly.

---

14. Cost of Retained Earnings

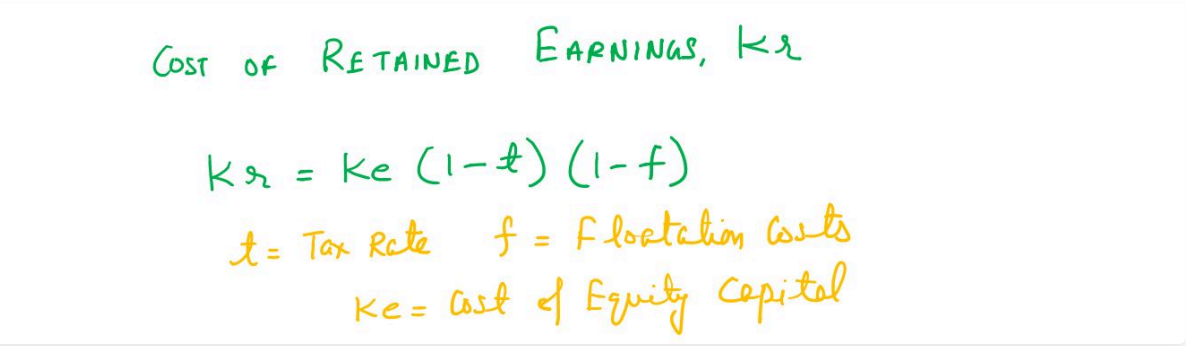
The cost of retained earnings refers to the opportunity cost associated with using internally generated funds for investment purposes rather than distributing them as dividends to shareholders. It represents the return that shareholders could have earned if the funds were paid out as dividends and invested elsewhere.



The calculation method for the cost of retained earnings is similar to that of the cost of equity capital, as both represent the return expected by shareholders.

However, since retained earnings are already owned by the shareholders and not acquired from external investors, the cost is generally considered to be lower. This is because there are no additional costs incurred in raising funds from shareholders, such as underwriting fees or issuing new shares at a discount. There are zero floation costs.

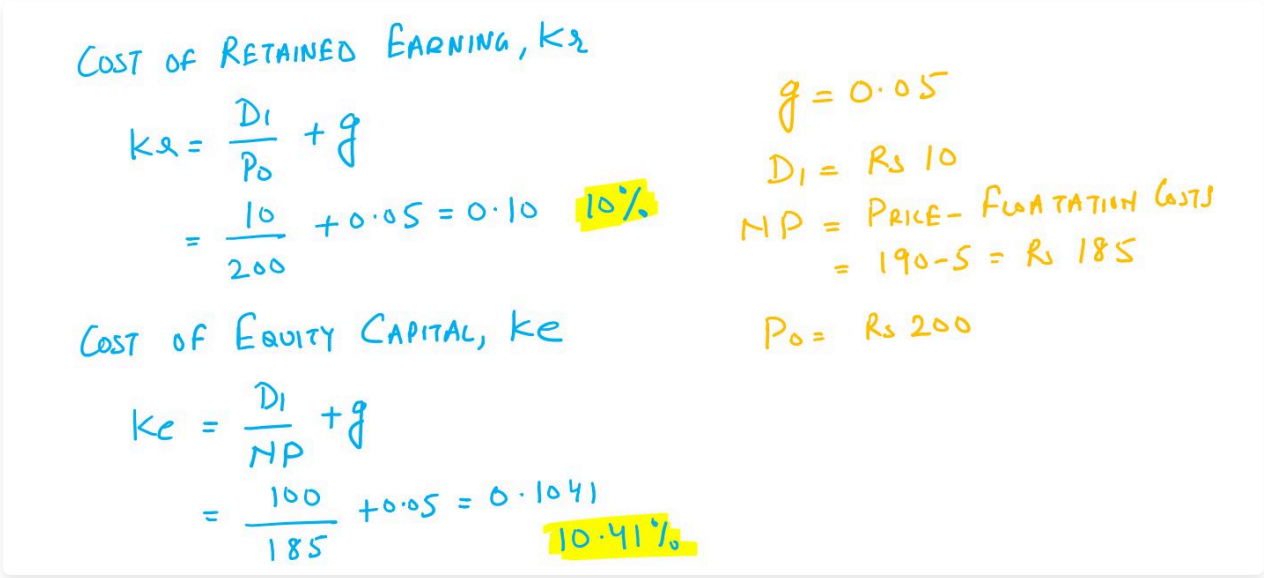
To calculate the cost of retained earnings from the cost of equity capital, we consider the impact of personal tax rates and flotation costs. The formula for the cost of retained earnings, (k_r) is derived by adjusting the cost of equity capital (k_e).



14. Cost of Retained Earnings

The face value of equity shares of a company is Rs 10, while current market price is Rs 200 per share. Company is going to start a new project, and is planning to finance it partially by new issue and partially by retained earnings. You are required to calculate the cost of equity shares as well as cost of retained earnings if issue price will be Rs 190 per share and floatation cost will be Rs 5 per share. Dividend at the end of first year is expected to be Rs 10 and growth rate will be 5%.

Solution:

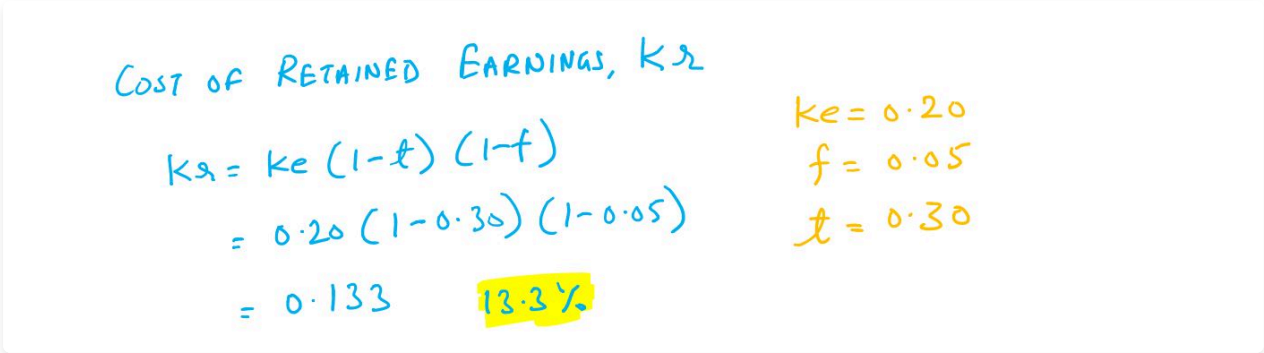


---

14. Cost of Retained Earnings

Cost of equity of a company is 20%. Rate of floatation cost is 5%. Rate of personal income tax is 30%. Calculate cost of retained earnings.

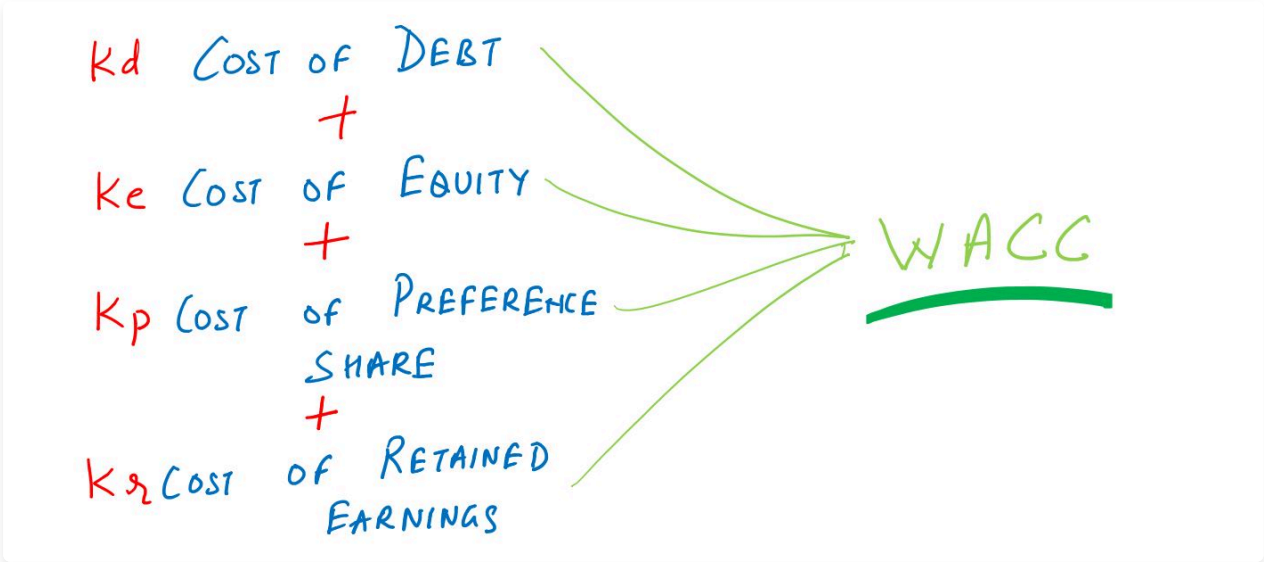
Solution:



---

15. WACC

The Weighted Average Cost of Capital (WACC) is used to evaluate the overall cost of capital for a company. It represents the blended cost of all the different sources of capital employed by a firm, taking into account their relative weightage in the capital structure.



WACC serves as the discount rate used to evaluate the feasibility of projects by comparing their expected returns against this benchmark. For a project to be deemed acceptable, its anticipated returns must surpass the WACC.

It is also known as Overall Cost of Capital or Composite Cost of Capital.

The components involved in calculating WACC, are:

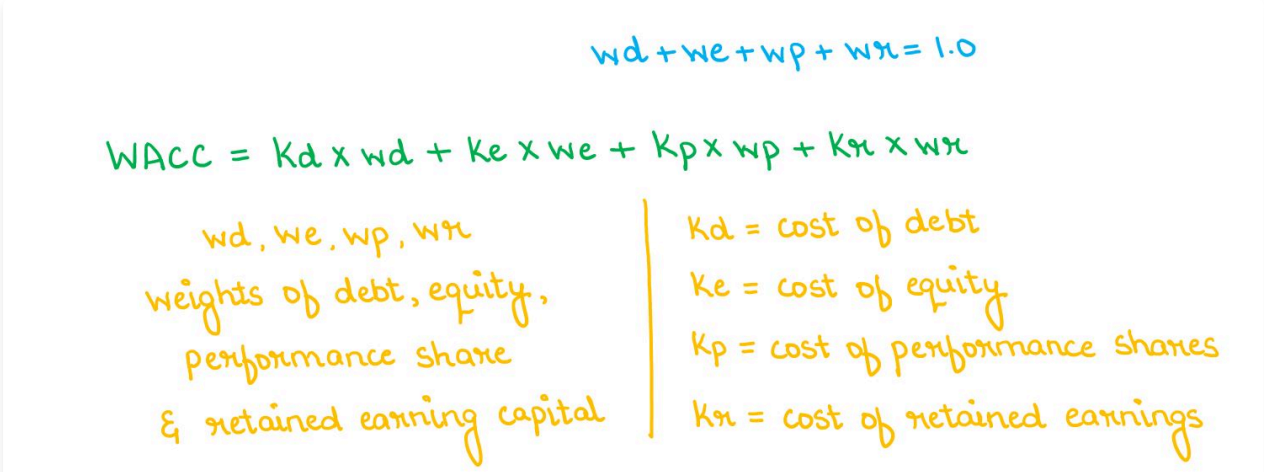
1. **Cost of Debt**: This refers to the interest rate the company pays on its debt, such as bonds or loans. It is essential to consider both the current interest rates and any associated fees or expenses or floation costs.

2. **Cost of Equity**: This represents the return required by the company's shareholders for investing in the firm's equity. It's often calculated using models like the Capital Asset Pricing Model (CAPM) or the Dividend Discount Model (DDM).

3. **Cost of Preferred Equity**: If the company has preferred stock, the cost of preferred equity is included.

4. **Cost of Retained Earnings**: This is the opportunity cost associated with reinvesting earnings into the business instead of distributing them as dividends. It is usually considered the same as the cost of equity, but without flotation costs.

To calculate WACC, we first determine the weight of each capital component by dividing its market value by the total market value of the firm's capital structure. Then, we multiply each component's cost by its respective weight and sum up the results. Mathematically, it can be represented as:



By calculating WACC, a company can determine the minimum rate of return it needs to generate from its investments to satisfy both equity and debt holders. It is an essential tool for decision-making processes such as evaluating investment projects, setting hurdle rates, and making capital structure decisions.

---

16. Weights of capital sources

When calculating the Weighted Average Cost of Capital (WACC), determining the weights of different capital sources is crucial. Two common methods used to ascertain these weights are Book Value Weights and Market Value Weights.

1. Book Value Weights

This approach involves utilizing the book value of each capital component to determine its proportion in the WACC calculation. The book value refers to the historical cost of an asset as recorded on a company's balance sheet. For equity capital, the book value typically represents the total value of shareholders' equity, including common stock, preferred stock, and retained earnings. For debt capital, the book value usually denotes the principal amount of outstanding debt.

2. Market Value Weights

Unlike book value weights, market value weights utilize the current market values of capital components to determine their proportions in the WACC calculation. Market value represents the current price at which an asset can be bought or sold in the market. For equity capital, market value includes the market price of common stock and preferred stock. For debt capital, it reflects the market price of outstanding bonds or loans.

---

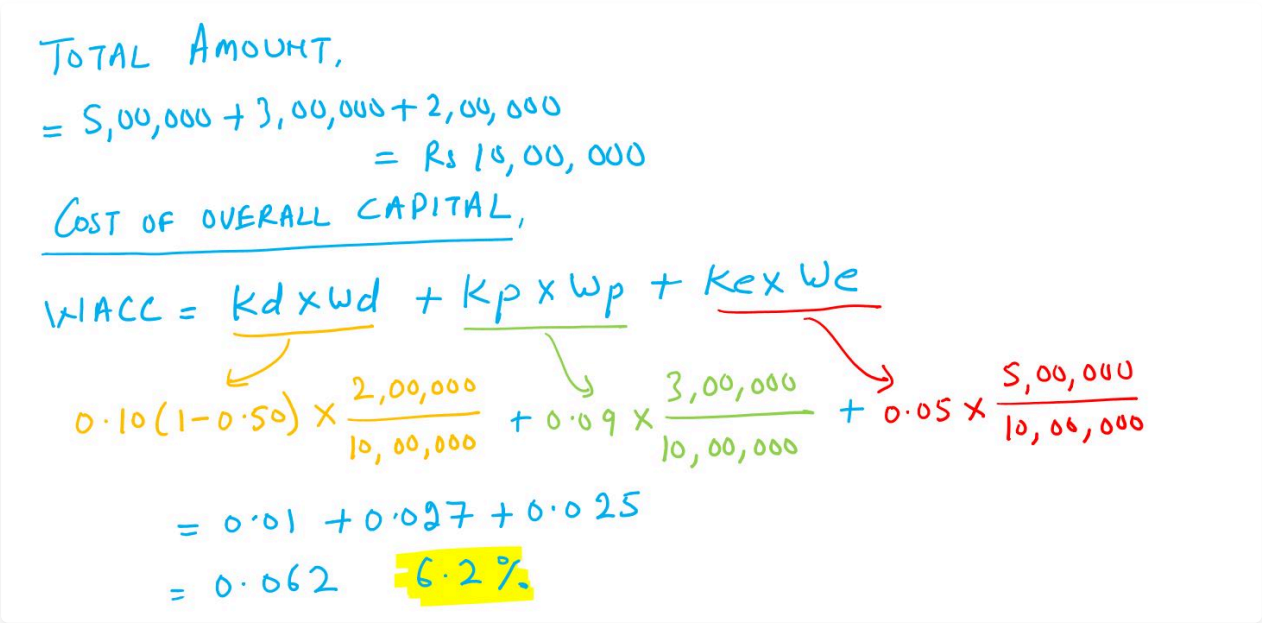
16. Weights of capital sources

It is given that a firm has following capital structure:

Type of finance	Amount (in Rs)	Cost of raising capital
Equity shares	500000	5%
Preference shares	300000	9%
Debt	200000	10%

Assume rate of tax is 50%. Calculate Cost of overall capital.

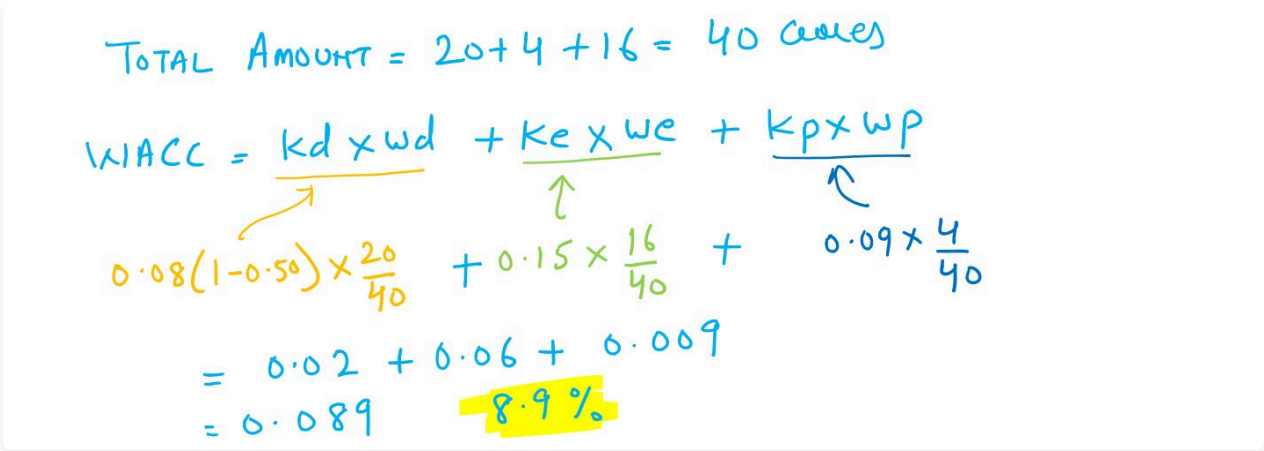
Solution:



16. Weights of capital sources

What is the overall (weighted average) cost of capital when the firm has Rs 20 crore in long-term debt, 4 crore in preferred stock, and Rs 16 crore in equity shares. The before-tax cost for debt, preferred stock, and equity capital are 8%, 9%, and 15%, respectively. Assume a 50% tax rate.

Solution:

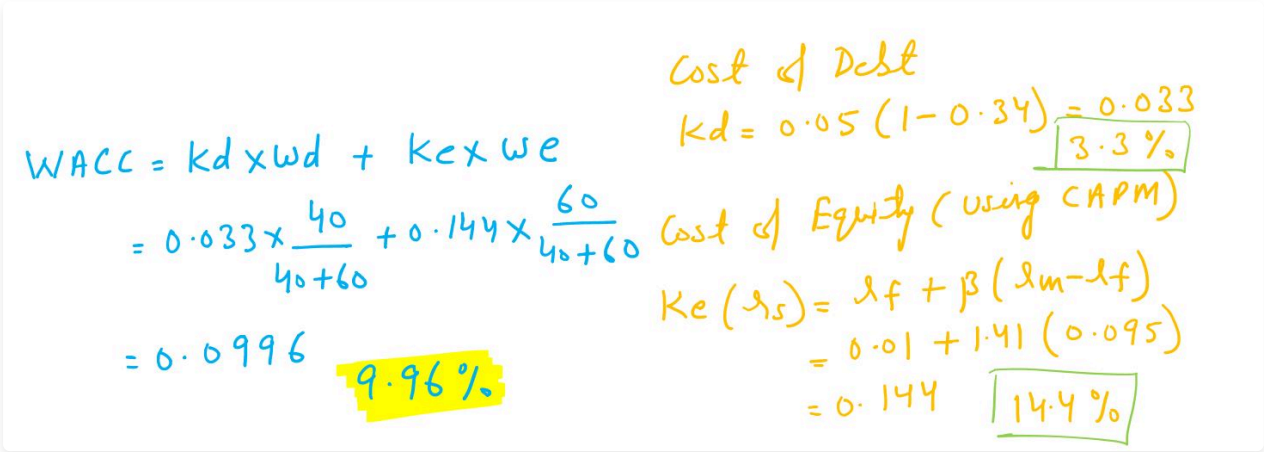


---

16. Weights of capital sources

Consider a firm whose debt has a market value of Rs 40 million and whose stock has a market value of Rs 60 million (3 million outstanding shares of stock, each selling for Rs 20 per share). The firm pays a 5 percent rate of interest on its new debt and has a beta of 1.41. The corporate tax rate is 34 percent. The risk premium on the market is 9.5 %, and that the current Treasury bill rate is 1 percent. What is this firm's WACC ?

Solution:



---

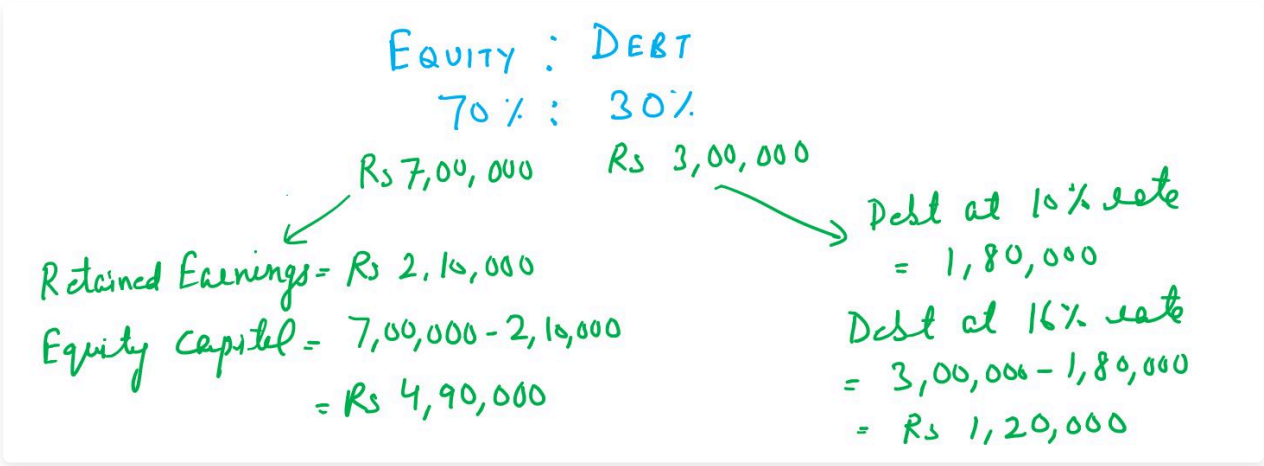
16. Weights of capital sources

A firm wishes to raise additional finance of Rs 10 lakhs for meeting its investment plans. It has Rs 2,10,000 in the form of retained earnings available for investment purposes.
Debt:Equity ratio of 3:7
Cost of debt is 10% upto Rs 1,80,000 and 16% beyond Rs 1,80,000
Earnings per share is Rs 4
Dividend pay out is 50% of earnings
Expected growth rate of dividend is 10%
Current market price per share is Rs 44
Tax Rate is 50%.

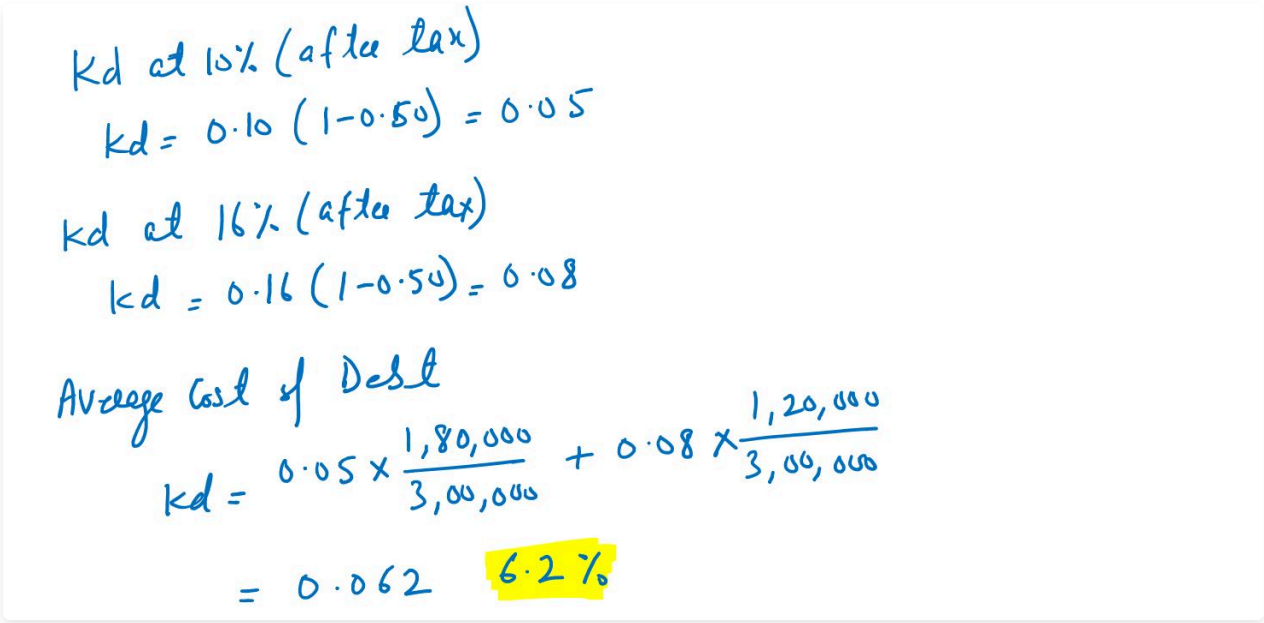
Compute the followings:
(i) Pattern for raising the additional finance.
(ii) Post-tax average cost of additional debt.
(iii) Cost of retained earnings and cost of equity.
(iv) Overall weighted average after tax cost of additional finance.

Solution:

(i) Pattern for raising the additional finance.



(ii) Post-tax average cost of additional debt.



(iii) Cost of retained earnings and cost of equity.

Ke or kr

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

$= \frac{2(1+0.10)}{44} + 0.10 = 0.15$

15%

D_0 = 50% of EPS

$= \frac{50}{100} \times 4 =$ Rs 2

$g = 0.10$

P_0 = Rs 44

(iv) Overall weighted average after tax cost of additional finance.

Includes both equity & retained earnings

WACC = Ke x We + Kd x Wd

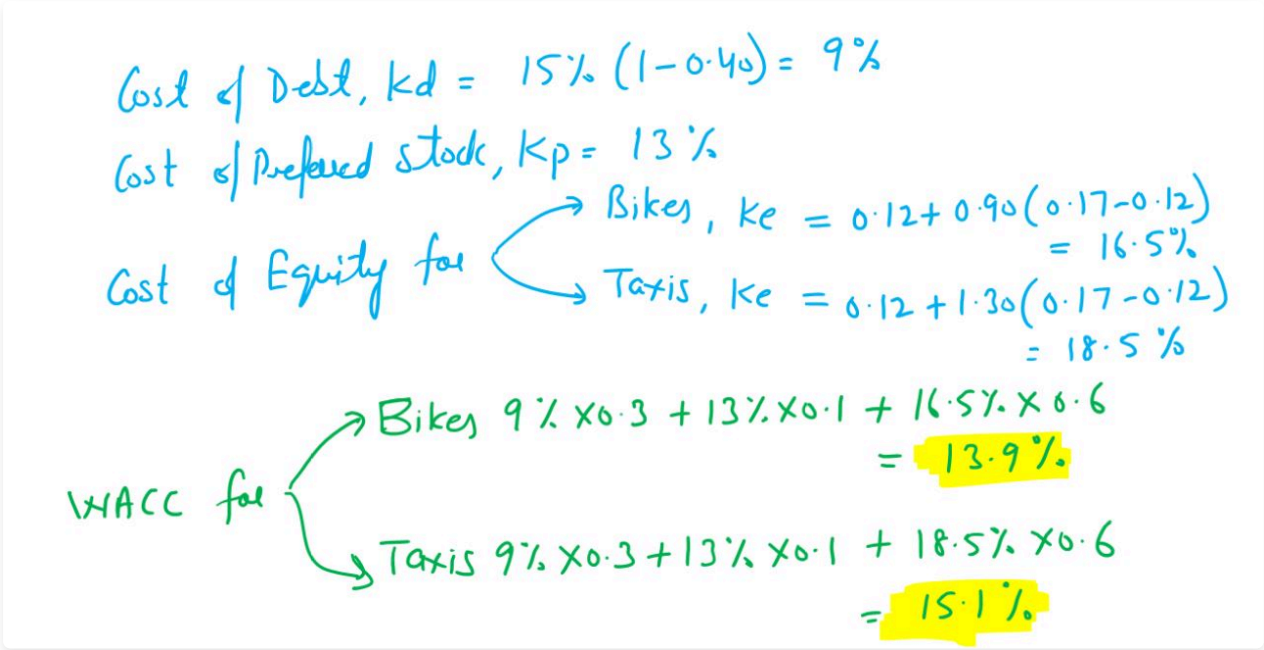
$= 0.15 \times \frac{7,00,000}{10,00,000} + 0.062 \times \frac{3,00,000}{10,00,000}$

$= 0.1236$ 12.36%

16. Weights of capital sources

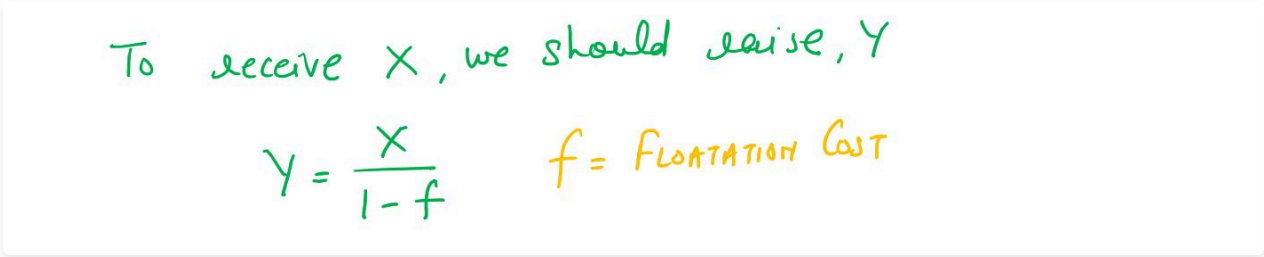
The Ola cabs Company has two divisions: bikes and taxis. Each division employs debt equal to 30% and preferred stock equal to 10% of its
total requirements, with equity capital used for the remainder. The current borrowing rate is 15%, and the company's tax rate is 40%. At present, preferred stock can be sold yielding 13%. The company wishes to establish a minimum return standard for each division based on the risk of that division. This standard then would serve as the transfer price of capital to the division. The company has thought about using the CAPM in this regard. It has identified two samples of companies, with modal value betas of 0.90 for bikes and 1.30 for taxis. The risk-free rate is currently 12% and the expected return on the market portfolio 17%. Using the CAPM approach, what weighted average required returns on investment would you recommend for these two divisions?

Solution:



17. Flotation cost

Flotation cost refers to the expenses incurred by a company when it issues new debt or equity securities in the market. These costs include various fees and charges associated with the issuance process, such as brokerage fees, legal fees, administrative expenses, registration fees, and underwriting fees.



When a company raises capital by issuing new securities, it does not receive the entire amount raised from investors due to these flotation costs. For example, if a company intends to raise Rs 100 from the market but incurs a flotation cost of 10%, it means that 10% of the total amount raised will be deducted as expenses, leaving the company with only 90% of the intended capital.

To account for these flotation costs and ensure that the company receives the desired amount of capital, the total amount needed to be raised must be adjusted accordingly. In the given example, to ultimately receive Rs 100 after deducting 10% flotation costs, the company would need to raise Rs 111 initially 100/(1-0.10) = 111.11. This adjustment ensures that after deducting the flotation costs, the company still receives the desired amount of capital.

Considering flotation costs is essential when calculating the weighted average cost of capital (WACC) because it affects the actual amount of capital the company receives and, consequently, its overall cost of capital.

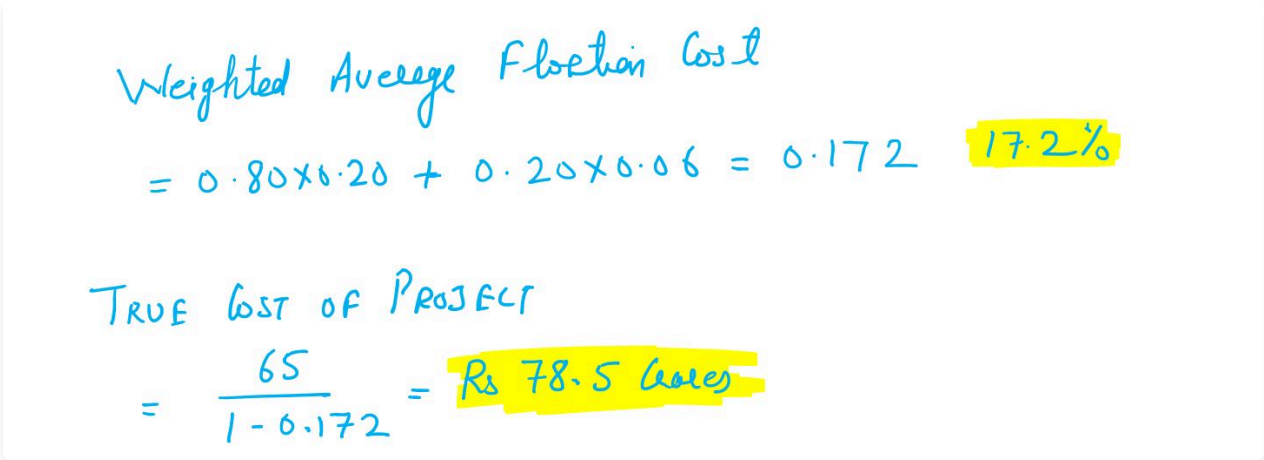
When considering multiple sources of capital, such as debt and equity, each with its respective flotation cost, the overall or **weighted average flotation cost** can be calculated. This is done by multiplying the flotation cost for equity by the percentage of equity and the flotation cost for debt by the percentage of debt, and then adding the two together.

---

17. Flotation cost

The IOCL has a target capital structure of 80 percent equity and 20 percent debt. The flotation costs for equity issues are 20 percent of the amount raised; the flotation costs for debt issues are 6 percent. If IOCL needs Rs 65 Crores for a new refinery facility, what is the true cost of the new project?

Solution:



17. Flotation cost

Hindalco Company is currently at its target debt–equity ratio of 100 percent. It is considering building a new Rs 5,00,000 plant in Ranchi. This new plant is expected to generate after tax cash flows of Rs 73,150 per year forever. The tax rate is 34 percent. There are two financing options:
1. A Rs 5,00,000 new issue of common stock: The issuance costs of the new common stock would be about 10 percent of the amount raised. The required return on the company's new equity is 20 percent.
2. A Rs 5,00,000 issue of 30-year bonds: The issuance costs of the new debt would be 2 percent of the proceeds. The company can raise new debt at 10 percent.
What is the NPV of the new plant in both cases? What is impact of flotation costs?

Solution:

$$WACC = 0.50 \times 0.20 + 0.50 \times 0.10 (1 - 0.34)$$
$$= 0.133$$

$$PV \text{ of cashflows} = \frac{73150}{0.133} = Rs\ 5,50,000$$

NPV w/o FLOATATION COSTS = 5,50,000 − 5,00,000 = **Rs 50,000**

$$\text{OVERALL FLOATATION COST} = 0.50 \times 0.10 + 0.50 \times 0.02$$
$$= 0.06$$

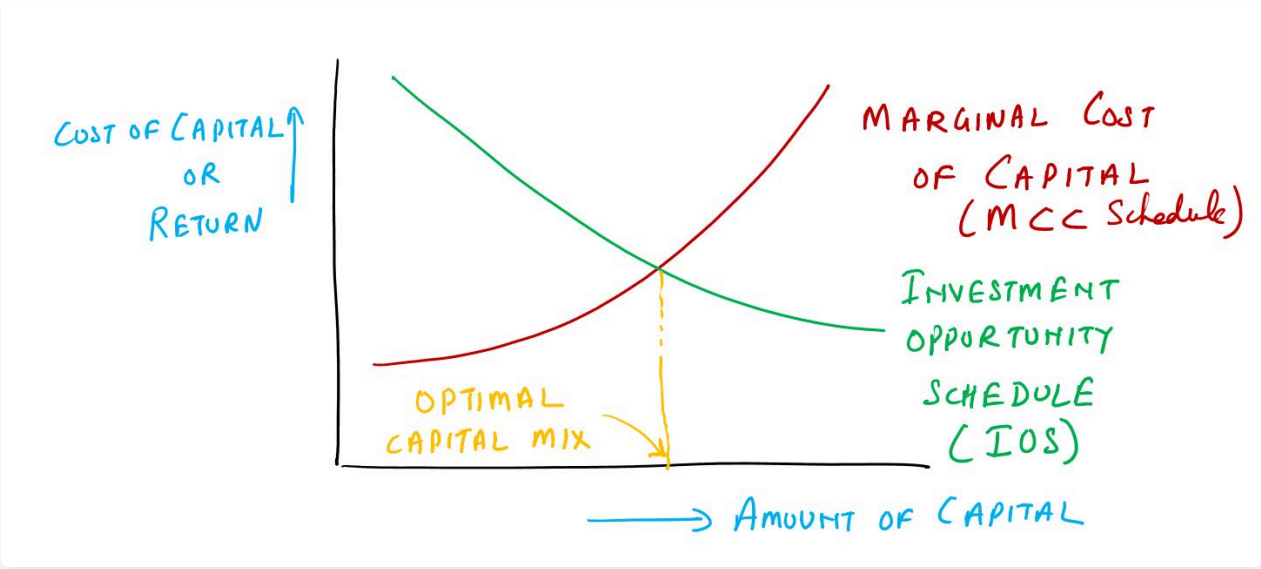
$$\text{AMOUNT TO BE RAISED} = \frac{5,00,000}{1 - 0.06} = Rs\ 5,31,915$$

NPV with FLOATATION COSTS = 5,50,000 − 5,31,915 = **Rs 18,085**

NPV reduced, when we considered floatation costs.

18. Marginal cost of capital

The marginal cost of capital (MCC) represents the cost a company incurs when raising an additional unit of capital, such as through debt or equity issuance.



The **MCC schedule** is a graphical representation of this concept, plotting the new funds raised against the cost of capital. As a company raises more capital, the costs associated with different sources of capital may change, leading to fluctuations in the weighted average cost of capital (WACC). **Breakpoints** occur at points where the cost of one source of capital changes, affecting the overall MCC schedule.

As a company raises additional capital, its MCC may increase due to factors such as higher financing costs or dilution of shareholder value. Conversely, returns on investment opportunities tend to decrease as more investments are made, reflecting diminishing marginal returns.

The **investment opportunity schedule (IOS)** illustrates a company's available investment opportunities ranked by expected return.

The **optimal capital budget** for the company is determined by the intersection of the IOS with the MCC schedule. This intersection identifies the point where the company's cost of capital aligns with the expected returns on its investment opportunities, allowing for efficient allocation of capital.

---

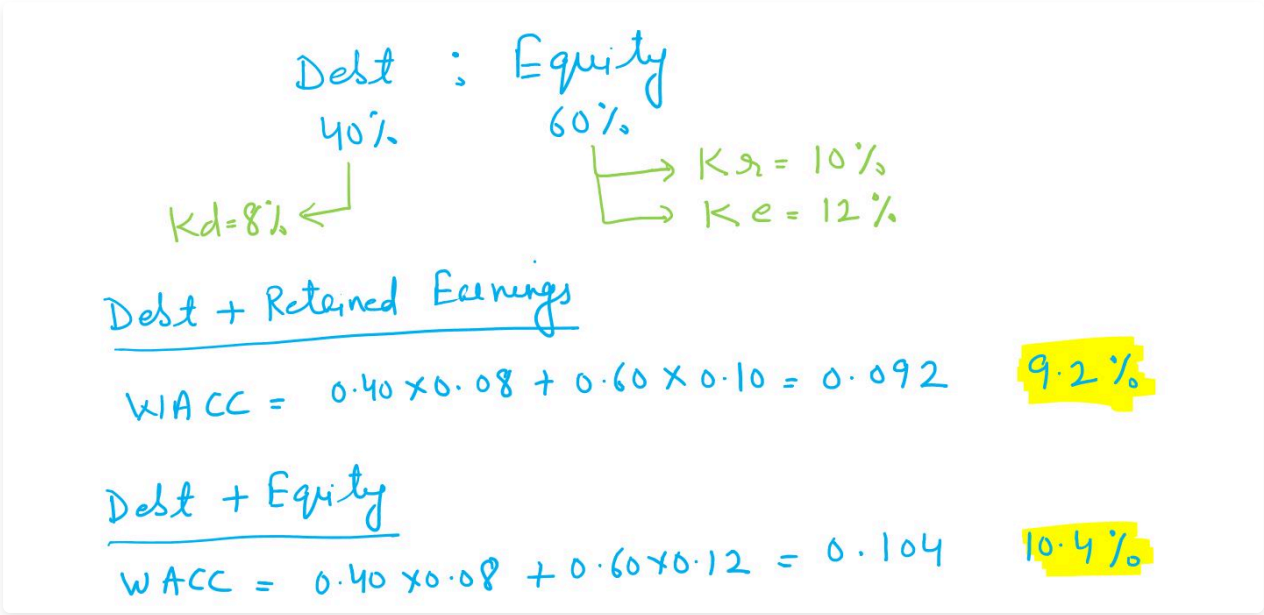
18. Marginal cost of capital

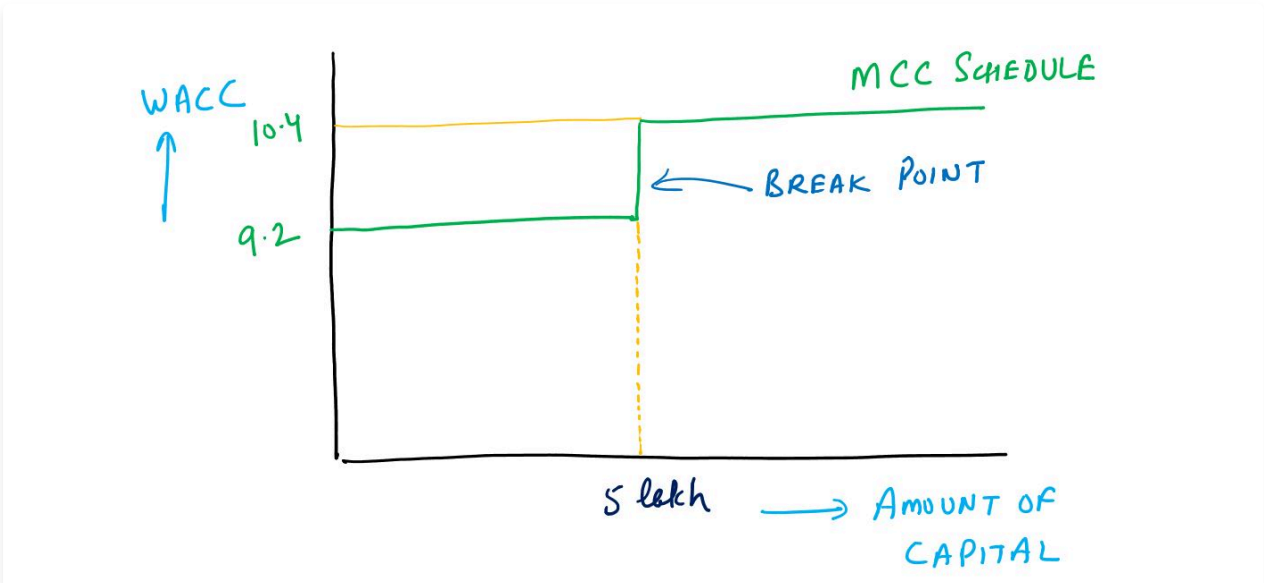
A company aims to maintain a debt-equity ratio of 40:60. The cost of raising debt is 8%, and the cost of common equity is 12%. The cost of retained earnings is 10%. The company holds Rs 3 lakh in retained earnings.

Additionally, four investment projects are available:
Project A: Requires an investment of Rs 2 lakh with an Internal Rate of Return (IRR) of 10%
Project B: Requires an investment of Rs 2 lakh with an IRR of 12%
Project C: Requires an investment of Rs 1 lakh with an IRR of 14%
Project D: Requires an investment of Rs 2 lakh with an IRR of 8%

Construct a schedule of the Marginal Cost of Capital (MCC) and the Investment Opportunity Schedule. Based on these schedules, determine which project should be undertaken.

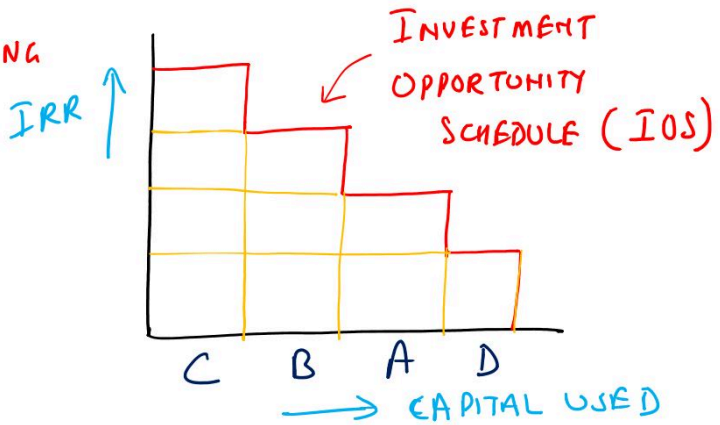
Solution:

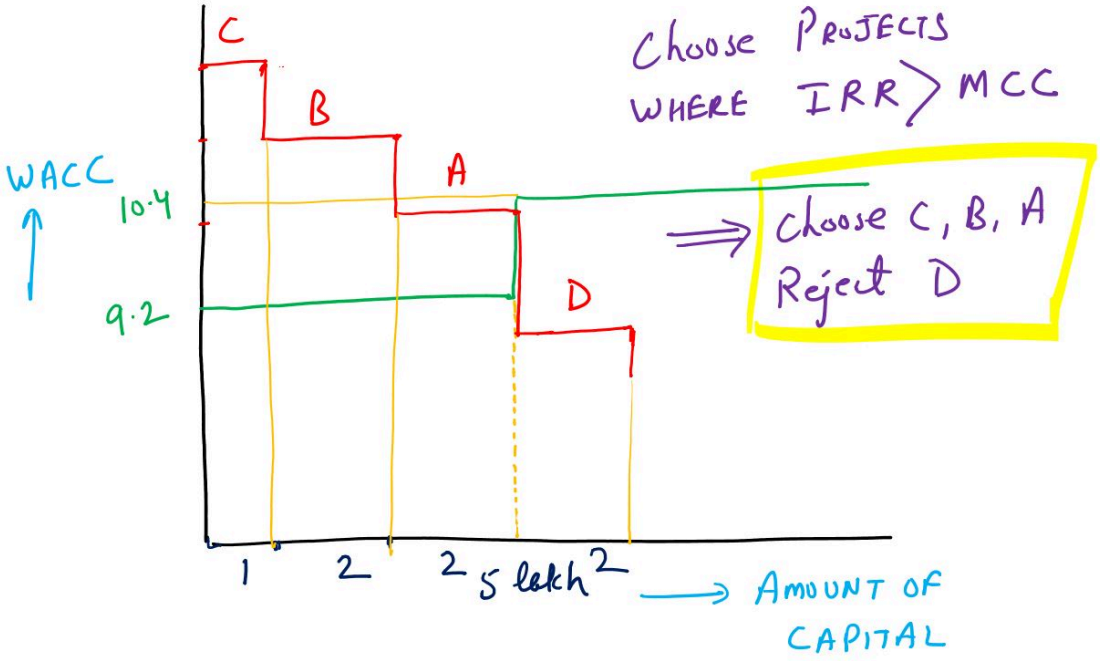




PROJECTS IN DESCENDING ORDER of IRR

C → 14 %
B → 12 %
A → 10 %
D → 8 %

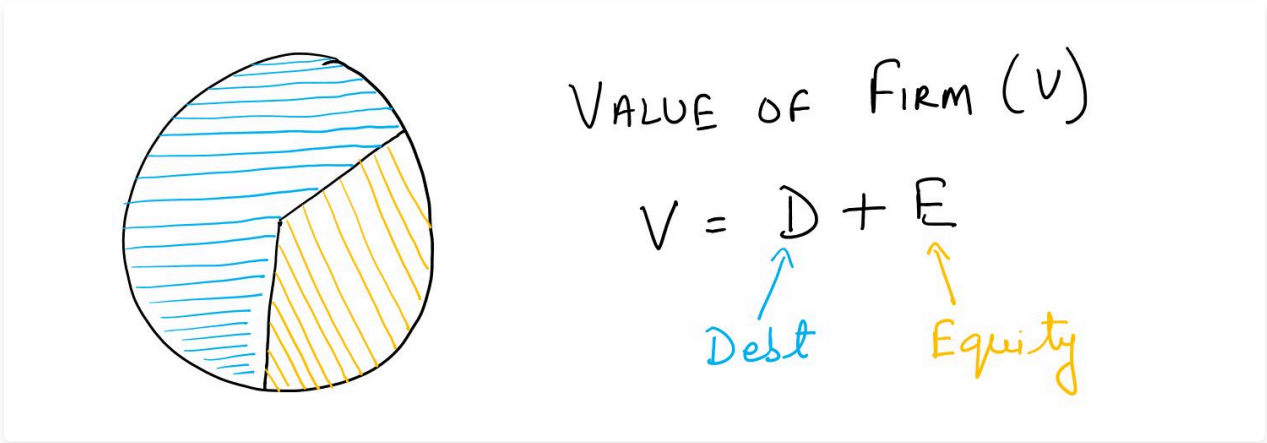




1. Introduction

Capital structure refers to the combination of debt, equity, and retained earnings that a company utilizes to finance its operations and investments. It represents how a firm chooses to raise funds to support its activities and expansion plans.

Managers are tasked with selecting the most appropriate capital structure for the company, aiming to optimize the firm's overall value. The capital structure that generates the highest firm value is the one that optimizes shareholder wealth.

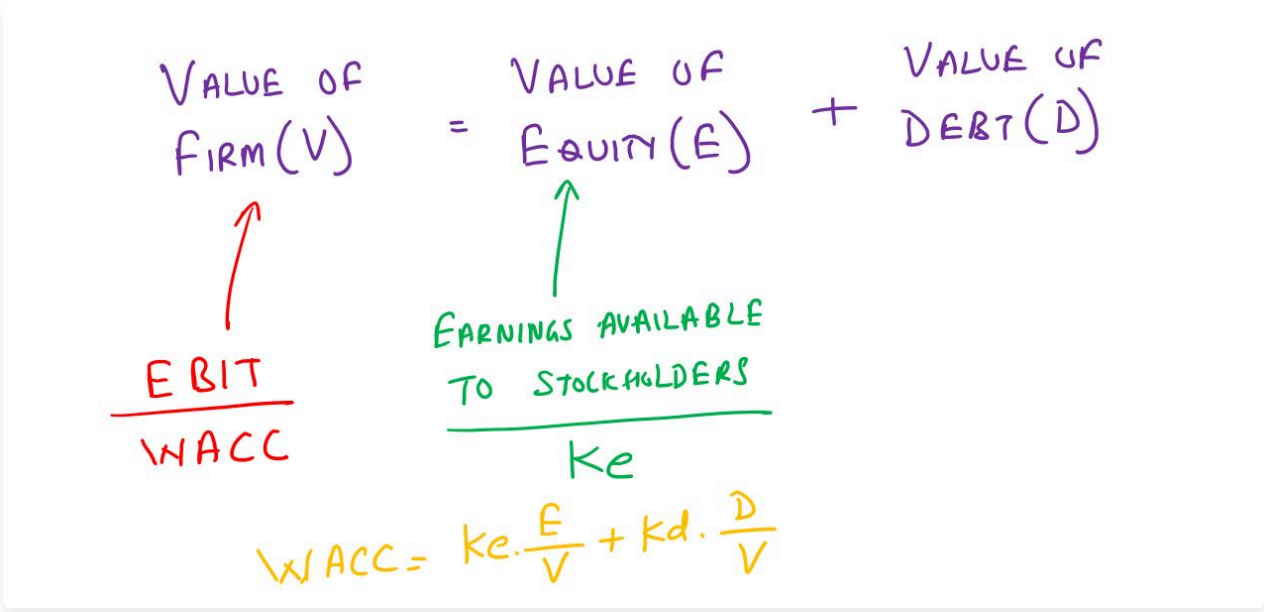


The value of the firm, denoted as V, represents the aggregate worth of the company as perceived by investors and the market. The value of the firm is calculated by summing the market value of its debt (D) and the market value of its equity (E).

---

2. Value of Firm

The value of a firm is the sum of its debt and equity components, representing the financial claims held by creditors and shareholders, respectively.



Determining the value of equity involves assessing the earnings attributable to equity holders. These earnings are calculated as the firm's Earnings Before Interest and Taxes (EBIT) minus taxes and interest payments, reflecting the residual profits available to shareholders after meeting financial obligations. By dividing the earnings available to equity holders by the cost of equity capital, we derive an estimate of the value of equity.

Concurrently, the value of debt is determined by assessing the present value of the firm's future cash flows obligated to debt holders. This valuation incorporates factors such as interest payments and the repayment of principal.

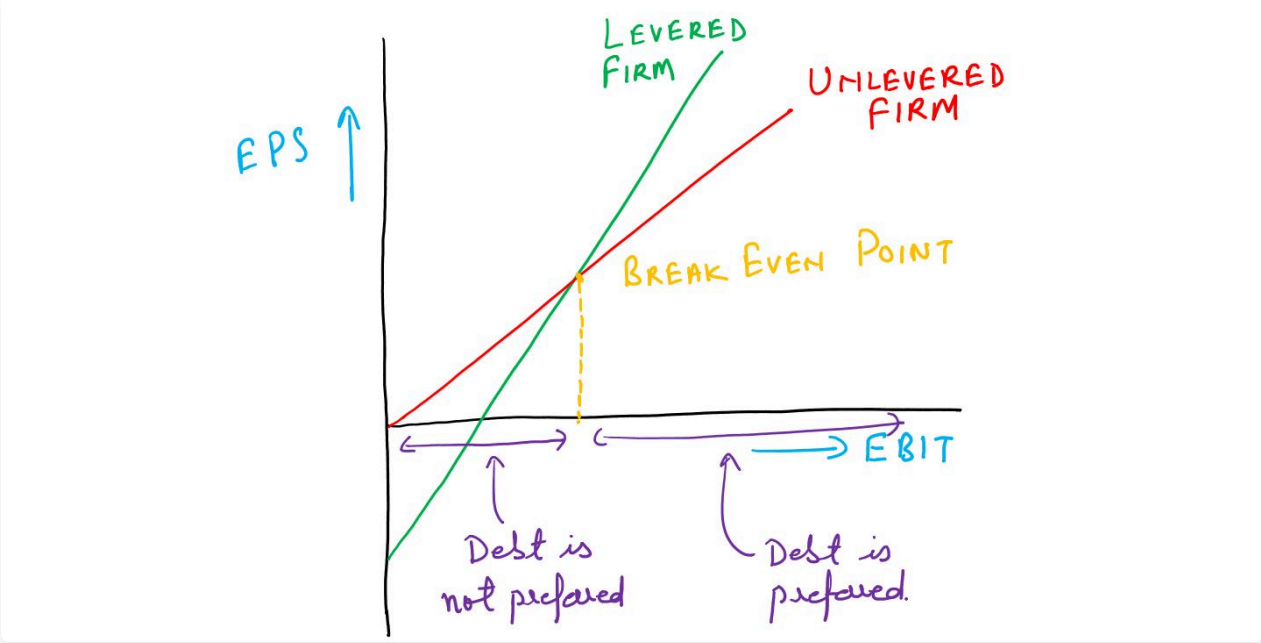
The total value of the firm is then obtained by summing the value of equity and debt, encapsulating the entirety of the firm's financial worth.

---

3. EBIT-EPS analysis

Let us understand how earnings per share (EPS) changes with fluctuations in earnings before interest and taxes (EBIT), with change in capital structure.

We shall examine two scenarios: one for a non-levered firm and the other for a levered firm. Also known as an **unlevered firm**, a non-levered firm operates without any debt in its capital structure. Therefore, it doesn't have any fixed interest payments to make. Conversely, a **levered firm** includes debt in its capital structure, leading to fixed interest payments.



On x-Axis, we represent Earnings Before Interest and Taxes (EBIT) and on y-Axis, we depicts Earnings Per Share (EPS).

$$EPS = \frac{EBIT - INTEREST}{SHARES\ OUTSTANDING}$$

Non-Levered Firm

The line for a non-levered firm starts from the origin, indicating that if EBIT is zero, EPS is also zero. As EBIT increases, EPS rises proportionally.

Levered Firm

In contrast, the line representing a levered firm starts from the negative y-axis. This signifies that if EBIT is zero, EPS will be negative due to fixed interest expenses. Even with no earnings, the firm must still pay interest on its debt.

Slope of two lines

The slope of the line for the levered firm is higher than that of the non-levered firm. This is because the levered firm has fewer shares outstanding, as some earnings are allocated to servicing debt rather than being distributed among shareholders. Thus, any increase in EBIT results in a more substantial rise in EPS for the levered firm compared to the non-levered firm.

Break-Even Point

The lines representing levered and unlevered firms intersect at a certain point, known as the break-even point. At this juncture, the levered firm's EPS equals that of the unlevered firm. This is also called indifference point.

Above the break-even point, the levered firm will have a higher EPS since leverage amplifies earnings. Conversely, below this point, the non-levered firm will have a higher EPS.

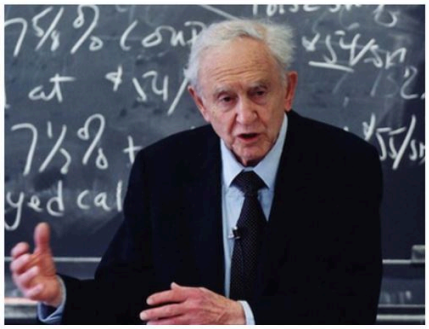
Higher Risk for Levered Firm

The wider range of earnings per share (EPS) for the levered firm indicates higher risk for its stockholders. Levered stockholders

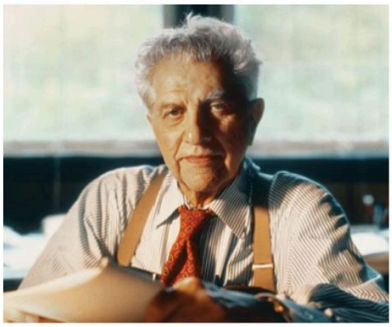
experience greater fluctuations in returns compared to unlevered stockholders. In favorable economic conditions, levered stockholders enjoy higher returns due to the magnified effect of leverage on earnings. However, in adverse situations, such as economic downturns or poor company performance, levered stockholders face more significant losses compared to their unlevered counterparts. This heightened variability in returns signifies the increased risk associated with holding levered equity.

---

4. Modigliani and Miller approaches



Franco Modigliani



Merton Miller

Franco Modigliani and Merton Miller, Nobel Prize-winning economists, proposed four approaches to capital structure. They wrote in 1958, "Cost of Capital, Corporation Finance and the Theory of Investment".

1. MM I - No taxes
2. MM II - No taxes
3. MM I - With taxes
4. MM II - With taxes

Their propositions are based on assumptions including:

1. There are no brokerage costs.
2. There are no taxes.
3. There are no bankruptcy costs.
4. Investors can borrow at the same rate as corporations.
5. All investors have the same information as management about the firm's future investment opportunities.
6. EBIT is not affected by the use of debt.

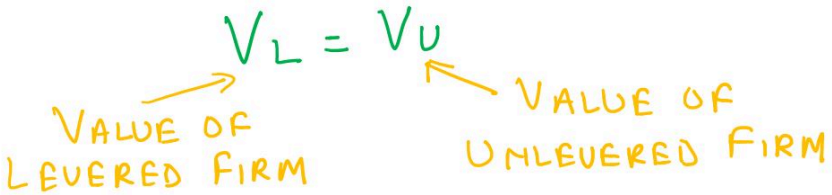
Let us understand these propositions one by one.

---

5. MM I - No Taxes

Modigliani and Miller's Proposition I (MM I) challenges the notion that altering a firm's capital structure affects its overall value. They argue that regardless of how a firm finances its operations—whether through debt, equity, or a combination of both—the total value of its securities remains constant. This proposition implies that no capital structure is inherently superior or inferior for the firm's shareholders.

Under Proposition MM I, the value of a leveraged firm, which includes debt in its capital structure, is equivalent to that of an unlevered firm with no debt. This implies that adding debt to a firm's capital mix doesn't inherently increase or decrease its overall value.



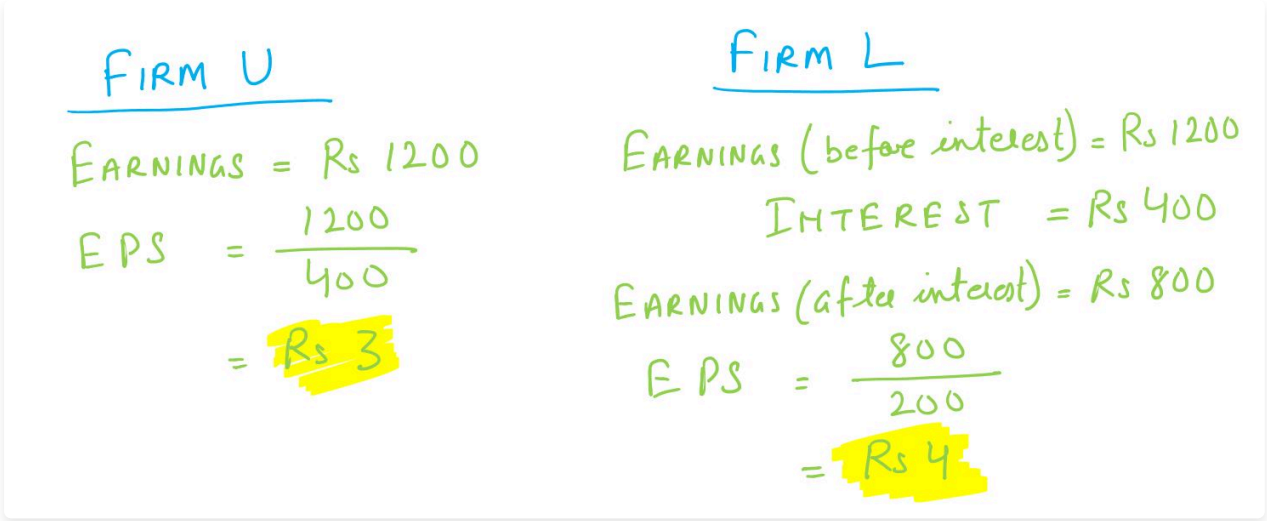
The rationale behind this proposition lies in the concept of **homemade leverage**, where investors can mimic the effects of corporate leverage by adjusting their personal borrowing and investing activities. If leveraged firms are perceived as overvalued, rational investors can borrow at personal rates to invest in unlevered firms, thereby replicating the benefits of leverage without actually holding leveraged securities.

Let us understand this with an example.

	Firm U- Unlevered Firm	Firm L- Levered Firm
Assets	8000	8000
Debt	0	4000
Equity	8000	4000
Interest Rate	10%	10%
Share Price	20	20
Shares Outstanding	400	200

Let us examine two firms with total assets valued at Rs 8000. Firm U (Unlevered) operates solely with equity, while Firm L (Levered) maintains a 50:50 debt-to-equity ratio, resulting in Rs 4000 in equity and Rs 4000 in debt. Firm U has 400 shares outstanding, while Firm L has 200 shares outstanding. Both firms have a share price of Rs 20, and the interest rate is 10%.

Suppose the Return on assets (ROA) is 15%. Earnings will be Rs 1200 (15% of 8000). Then the EPS for Firm U will be Rs 3 and EPS for Firm L will be Rs 4.



Let us consider Strategy 1 and Strategy 2.

Strategy 1
The investor purchases 100 shares of Firm L (Levered) for Rs 2000. With an EPS of Rs 4, they receive Rs 400 for their investment.

Strategy 2
The investor invests the same Rs 2000 in buying 100 shares of Firm U (Unlevered), yielding an EPS of Rs 3, resulting in a return of Rs 300. Additionally, the investor borrows Rs 2000 from a bank at a 10% interest rate. With this loan, they purchase an additional 100 shares of Firm U, generating another Rs 300. However, they must pay Rs 200 in interest to the bank. Ultimately, the investor ends up with Rs 400, which matches the return from investing in Firm L. This showcases the concept of homemade leverage.

Both strategies yield the same cost and payoff, illustrating that investors can achieve the same results as corporate leverage through homemade leverage.

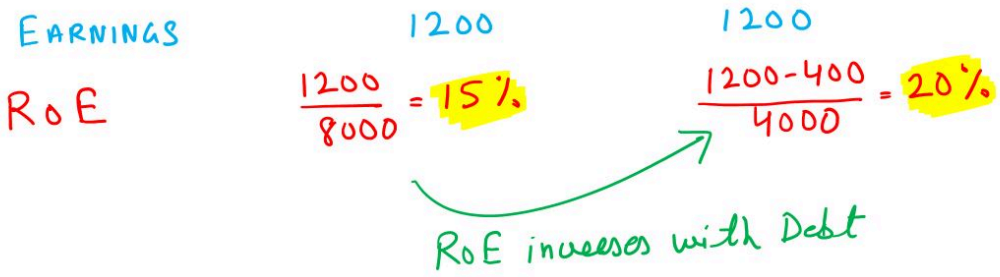
However, the feasibility of **homemade leverage depends on the assumption** that individuals have access to borrowing and lending terms equivalent to those available to corporations. If this assumption holds, then homemade leverage allows investors to achieve similar outcomes to corporate leverage, thereby validating MM Proposition I.

---

6. MM II - No Taxes

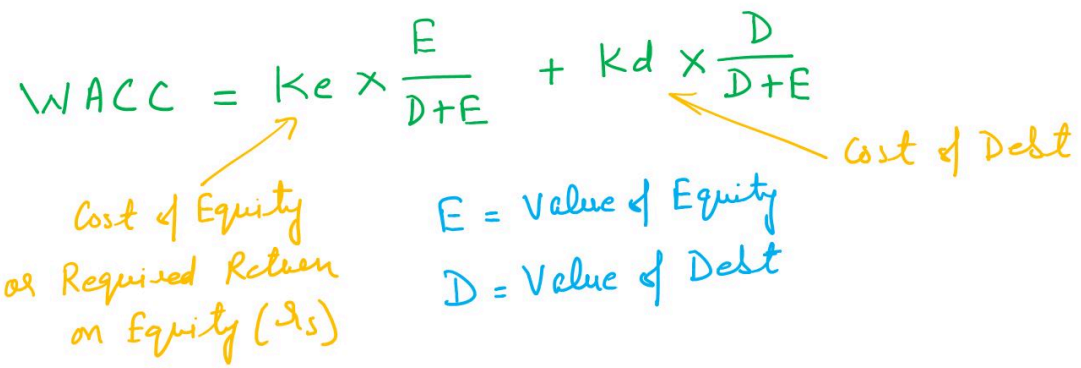
Let us continue with our example of Unlevered Firm U and Levered Firm L.

	Firm U- Unlevered Firm	Firm L- Levered Firm
Assets	8000	8000
Debt	0	4000
Equity	8000	4000
Interest Rate	10%	10%
Share Price	20	20
Shares Outstanding	400	200

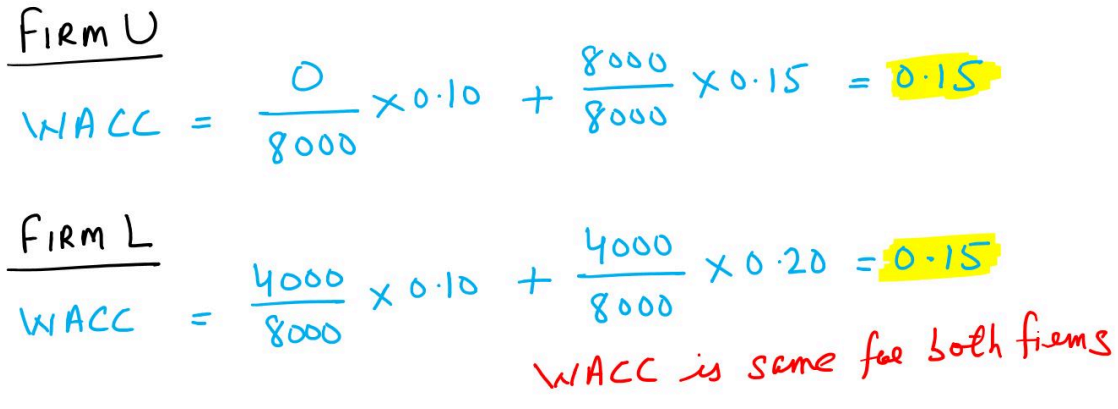


Suppose the Return on assets (ROA) is 15%. Earnings will be Rs 1200 (15% of 8000). **Return on Equity (RoE) is 15% for Unlevered Firm but increases to 20% for Levered Firm.** This is MM II proposition with no taxes. Let us understand basis of this result.

We know that the firm's weighted average cost of capital (WACC), is given by:



But from MM I (no taxes), we can conclude that the WACC is constant for a given firm, regardless of the capital structure. The WACC for Firm U and Firm L are calculated below.



Let K_0 is the Cost of Capital for Firm U (all equity and no debt). Naturally K_0 will be equal to WACC for Firm U.

$$K_o = WACC$$

$$K_o = K_e \times \frac{E}{D+E} + K_d \times \frac{D}{D+E}$$

Rewriting the above equation, we can get following equation:

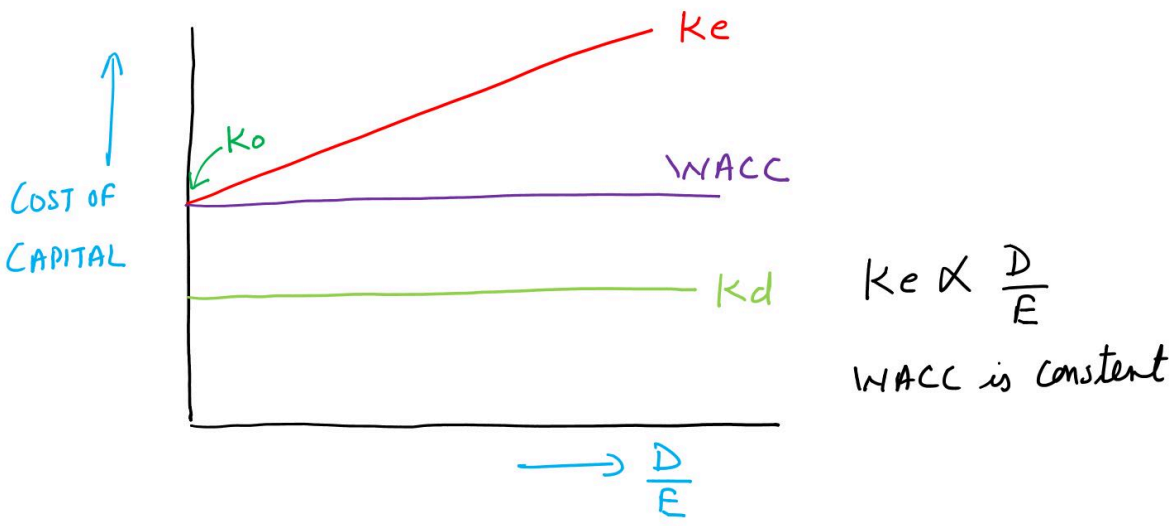
$$K_e = K_o + \frac{D}{E}(K_o - K_d)$$

$$K_e \propto \frac{D}{E}$$

$y = c + x.m$

$y \propto x$

Above equation implies that the required return on equity (Cost of equity capital, K_e) is a linear function of the firm's debt–equity ratio ($\frac{D}{E}$). As the firm raises the debt–equity ratio, each dollar of equity is levered with additional debt. This raises the risk of equity and therefore the required return on the equity (r_s). This is MM II (no taxes) proposition.

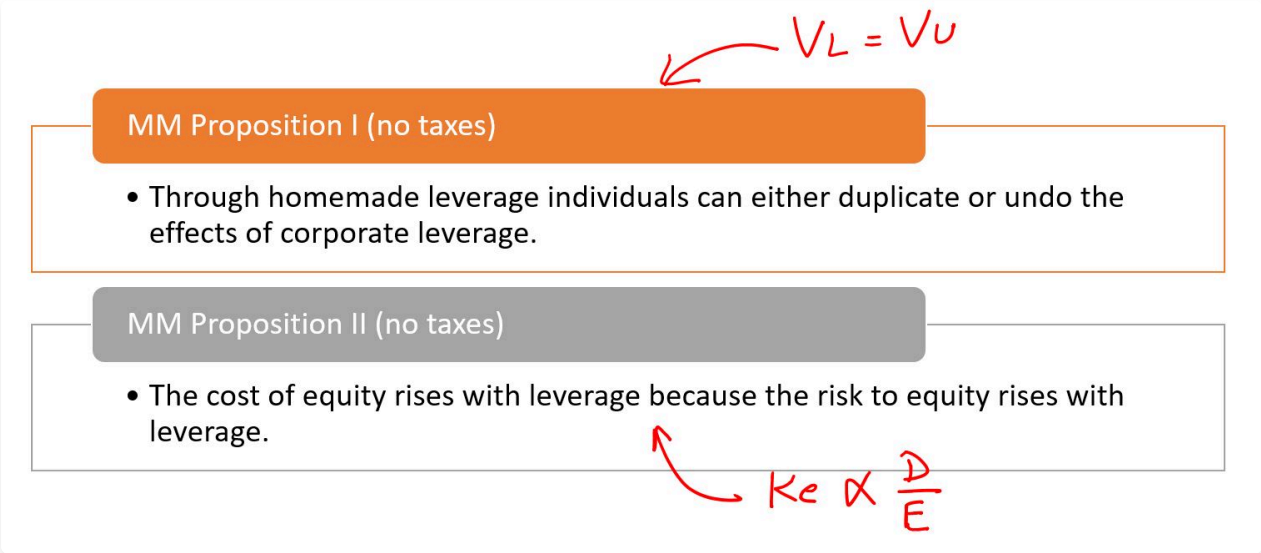


The figure also shows that WACC is unaffected by the change in $\frac{D}{E}$ ratio (change in capital structure). It may be noted in the figure that K_0 (cost of capital for an all-equity firm), is represented by a single dot on the graph. By contrast, WACC is an entire line, parallel to x axis.

---

7. Summary- MM I and MM II - No Taxes

Modigliani and Miller (MM) argue that although debt may seem cheaper than equity due to its lower cost, substituting debt for equity does not reduce the firm's overall cost of capital. This is because as the firm increases its debt, the riskiness of the remaining equity also increases. This rise in risk leads to an increase in the cost of equity capital. Consequently, the higher cost of equity offsets the benefit of financing with low-cost debt.



MM demonstrate that these two effects perfectly balance each other out, resulting in the firm's value and overall cost of capital remaining unchanged regardless of leverage. In essence, the perceived advantage of cheaper debt is neutralized by the corresponding increase in the cost of equity, maintaining the equilibrium of the firm's financial structure.

8. Taxes and Firm Value

To understand the effect of the taxes on the value of the firm, let us consider our example of Firm U (unlevered) and Firm L (levered). The corporate tax rate is 35%.

	Firm U- Unlevered Firm	Firm L- Levered Firm
EBIT	1000	1000
Interest	− 0	− 400
EBT (EAI)	1000	600
Tax @ 35%	− 350	− 210
EAT	650	390

650

400 + 390 = 790

In case of the Firm U, the cash flow to the owners of the firm is 650 (stockholders got all 650). In the case of the Firm L, the cash flow to the owners of the firm is 790 (stockholders got 390 and the bondholders got 400).

This difference (790-650 = Rs 140) occurs because the way the Government treats interest is different from the way it treats earnings going to stockholders. Interest payments are completely exempt from corporate taxation.

This disparity in cash flows between the two firms (Rs 140 = 790 - 650), is termed the **Tax Shield**. It represents the additional cash flow enjoyed by the owners of a Levered Firm due to the tax benefits associated with interest payments.

The Tax Shield can be calculated using the formula (it is annual amount):

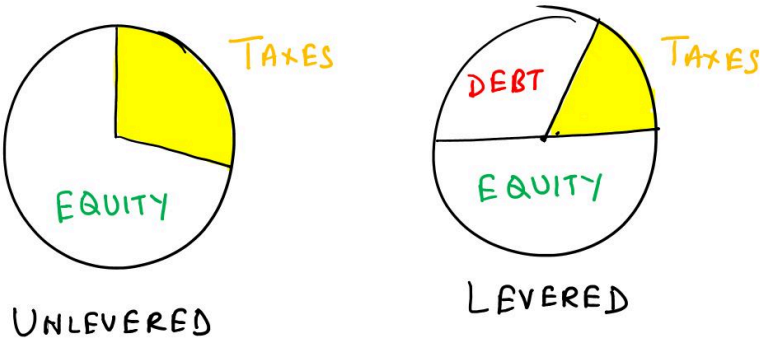
TAX SHIELD = INTEREST PAYMENT X TAX RATE

→ Debt Amount X Rate of Interest

Assuming that the cash flows are perpetual, the present value of the tax shield will be (discounting at the cost of debt):

PRESENT VALUE OF TAX SHIELD = DEBT AMOUNT X TAX RATE

To summarize, the levered firm pays less in taxes than does the all-equity firm. Thus the sum of the debt plus the equity of the levered firm is greater than the equity of the unlevered firm.

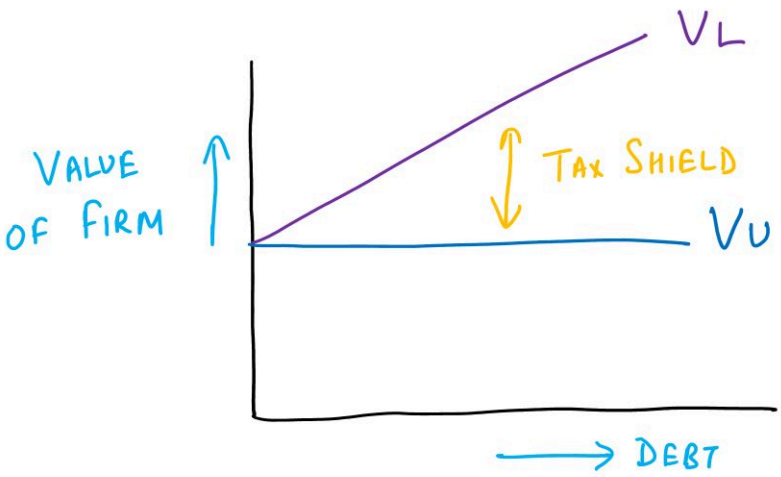


We can note that the stockholders actually receive more from Firm U (Rs 650) than from Firm L (Rs 390). It may seem to imply that stockholders are better off without leverage. However, it may be noted that there are more shares outstanding in Firm U than in Firm L. Earnings per share (EPS) will be higher with leverage (for Firm L).

---

9. MM I - with taxes

We have observed that owners of a leveraged firm benefit from additional cash flows through Tax Shield, unlike owners of unleveraged firms. The additional cash flows arise from the tax advantages linked to interest payments.



The value of an unleveraged firm (with taxes) is computed as follows:

$$V_U = \frac{EBIT(1-t)}{K_o}$$

K_o = Cost of capital for all equity firm

t = Corporate Taxes

Leverage increases the value of the Levered firm by the tax shield. Thus we can add the value of tax shield to the value of the unlevered firm to get the value of the levered firm.

$$V_L = V_U + \text{TAX SHIELD}$$

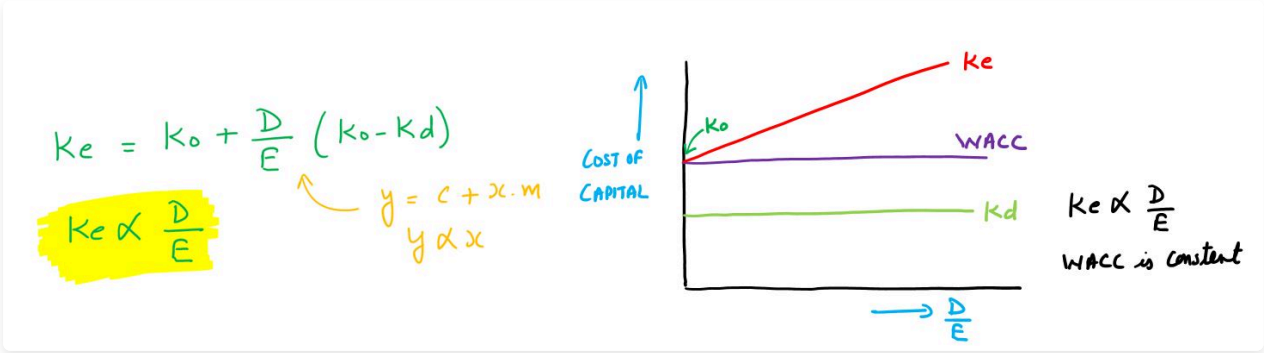
$$= \frac{EBIT(1-t)}{K_o} + \text{DEBT AMOUNT} \times \text{TAX RATE}$$

This is **MM Proposition I under corporate taxes**, which suggests that because interest payments on debt are tax-deductible, firms can increase their cash flow and thus value by substituting debt for equity. This is because the tax shield associated with debt increases as the amount of debt rises in the capital structure.

---

10. MM II - with taxes

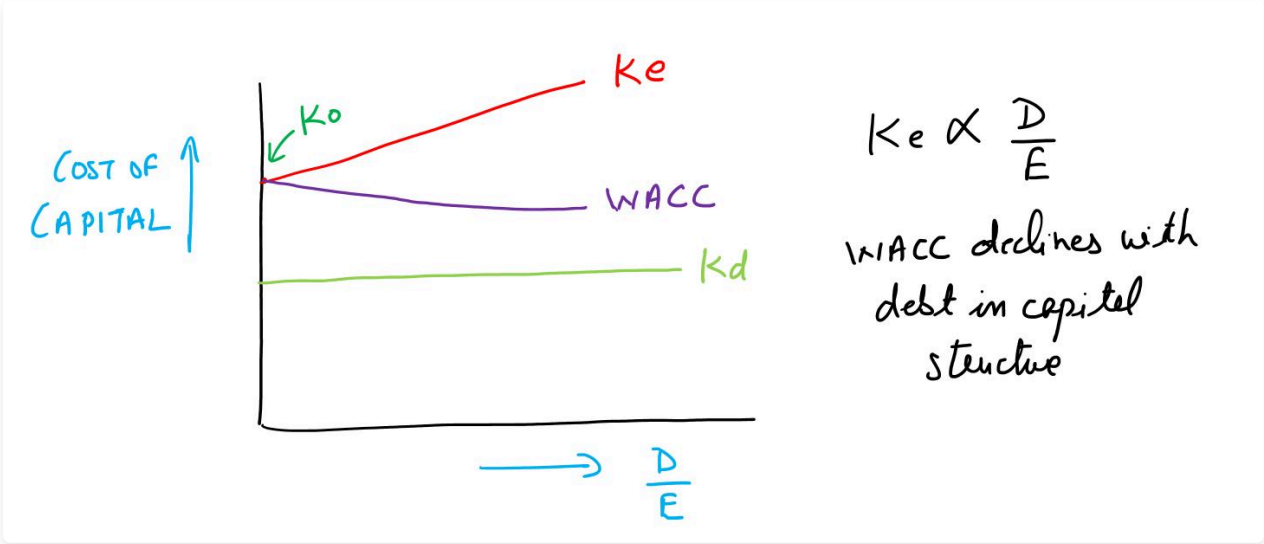
In the MM II (no taxes) proposition, we have seen that that the cost of equity capital (or the required return on equity) is directly related to the firm's debt-to-equity ratio in a linear manner. As the firm increases its debt-to-equity ratio, each unit of equity becomes increasingly leveraged with additional debt. Consequently, this amplifies the risk associated with equity, thereby elevating the required return on equity. This principle encapsulates the essence of the MM II (no taxes) proposition.



The same intuition also holds in a world of corporate taxes (MM II with taxes) proposition. The exact formula in a world of corporate taxes is given below:

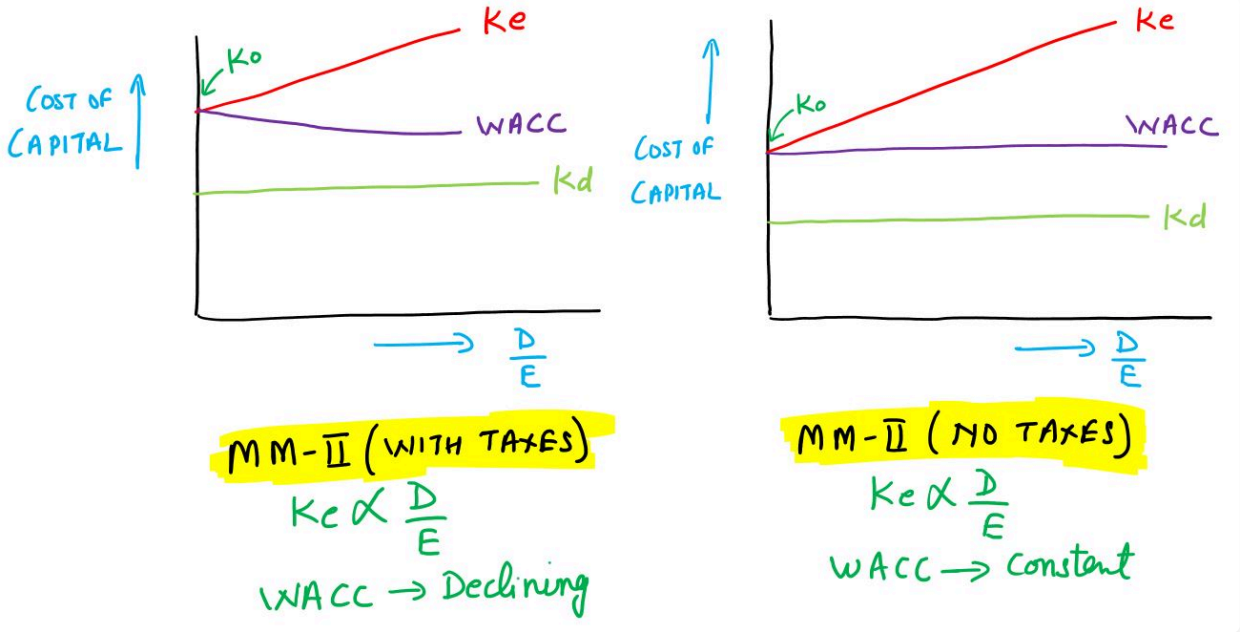
$$K_e = K_0 + \frac{D}{E}(K_0 - K_d)(1 - t)$$

As we can see in the figure, whenever $K_0 > K_d$, Ke increases with leverage, a result that we also found in the no-tax case. It may be noted that K_0 should always exceed K_d. That is, because equity (even unlevered equity) is risky, it should have an expected return greater than that on the less risky debt.



Financial leverage (adding debt to capital structure) adds risk to the firm's equity. As compensation, the cost of equity rises with the firm's risk. Note that K_0 is a single point whereas K_e, K_d, and WACC are all entire lines.

Comparison of MM II (with taxes) and MM II (no taxes) is shown in below figure.

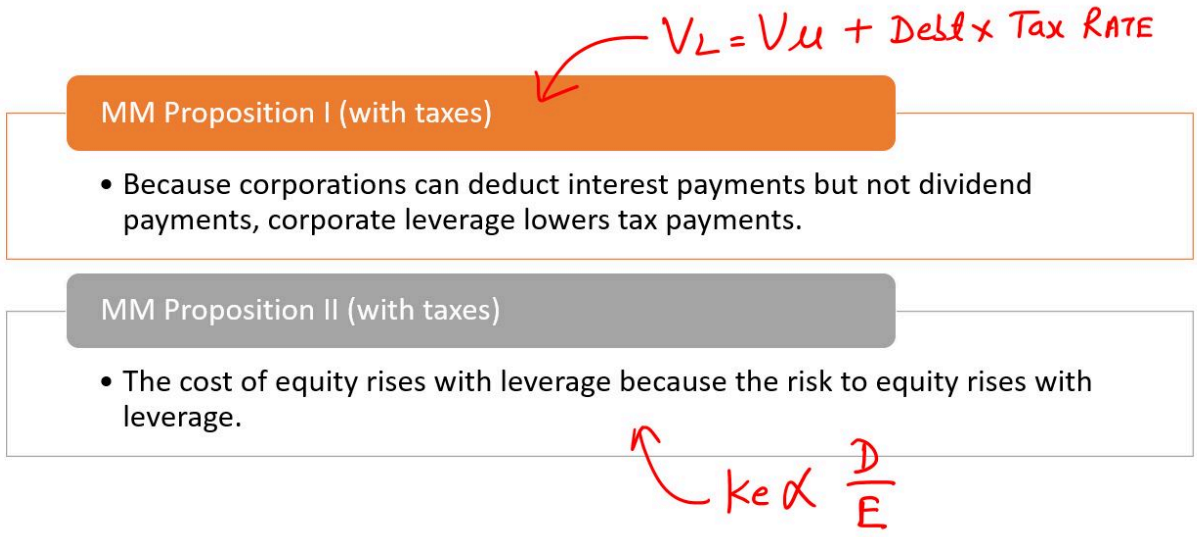


We can in the figure that in both MM II (with taxes) and MM II (no taxes), the cost of equity capital (K_e) increases as leverage rises. However, in MM II (no taxes), this increase occurs at a faster rate compared to MM II (with taxes). This is due to the absence of tax advantages associated with debt financing in MM II (no taxes), causing equity to become more sensitive to changes in leverage, thereby accelerating the rise in the cost of equity capital (K_e).

In the presence of corporate taxes, the cost of debt capital is reduced by the factor (1-t) because interest payments are tax-deductible. Conversely, the cost of equity remains unaffected as dividends are not tax-deductible. Consequently, in a tax-free environment, changes in leverage do not alter the Weighted Average Cost of Capital (WACC). However, due to the tax advantage of debt over equity, WACC decreases with increasing leverage in a taxed setting.

---

11. Summary- MM I and MM II - With Taxes



---

12. Bankruptcy costs

We have learnt from the Modigliani-Miller propositions that, in a world of corporate taxes, leveraging a firm increases its overall value. It suggests that firms will benefit from maximizing debt.

However, should financial managers aim to reach a debt-to-value ratio close to 100 percent? **NO**, due to the presence of bankruptcy costs.

The rationale behind this NO lies in the substantial costs associated with bankruptcy. As a firm's debt levels escalate, so do the potential bankruptcy costs, which have the effect of mitigating the advantages gained from leveraging due to tax deductions.

so, what are bankruptcy costs?

Debt creates a burden on a company because it comes with obligations to make regular interest and principal payments. If the company fails to meet these obligations, it faces the risk of bankruptcy, where control of the company's assets shifts from shareholders to bondholders. Unlike shareholders, who hope for dividends but aren not legally guaranteed them, bondholders have a legal right to receive interest and principal payments.

We see that the Leverage (more debt in capital structure) increases the likelihood of bankruptcy. However, bankruptcy does not, by itself, lower the cash flows to investors. Rather, it is the costs associated with bankruptcy that lower cash flows.

The term "Financial Distress Costs" is sometimes used interchangeably with "Bankruptcy Costs" because these costs have the potential to diminish the firm's value, even if formal bankruptcy proceedings are avoided. So Financial Distress Costs is a better word to understand effect of leverage.

---

12. Bankruptcy costs

The Costs of Financial Distress can be divided into two types, direct and indrect costs.

Direct Costs of Financial Distress

1. Legal and Administrative Costs of Liquidation or Reorganization

- Legal and administrative fees encompass expenses associated with hiring professionals such as lawyers, accountants, and other experts to navigate the bankruptcy process.
- Court fees are the charges linked with filing for bankruptcy and other legal proceedings.
- Professional fees include costs related to consulting financial advisors and restructuring specialists.
- Loss of assets occurs due to the liquidation of assets to repay creditors, potentially resulting in a loss of value compared to their original worth.
- Severance payments are compensation provided to employees who lose their jobs as a consequence of bankruptcy.

Indirect Costs of Financial Distress

1. Impaired Ability to Conduct Business

- Loss of trust among customers and suppliers.
- Decreased employee morale and productivity.
- Loss of market share.
- Difficulty in accessing credit.

2. Incentive to Take on Risky Projects

- Conflicts of interest arise between stockholders and bondholders due to the presence of debt.
- Stockholders may pursue selfish strategies, believing they are utilizing someone else's money, thus imposing agency costs on the firm.

3. Not Investing in Good Projects

- The belief that new assets will be acquired in bankruptcy may lead to a lack of investment in potentially beneficial projects.

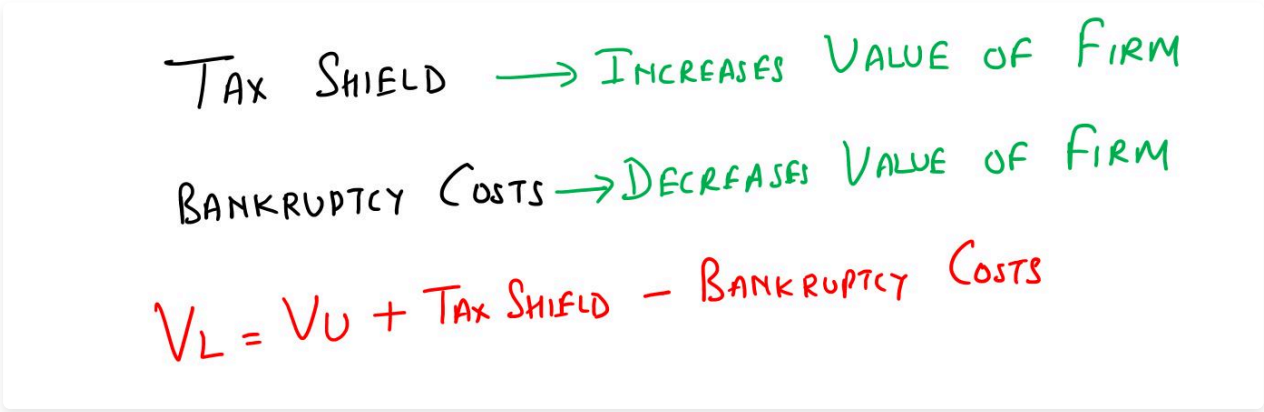
4. Milking the Property

- Paying extra dividends to stockholders before bankruptcy, potentially depleting resources that could be used for debt repayment or reorganization.

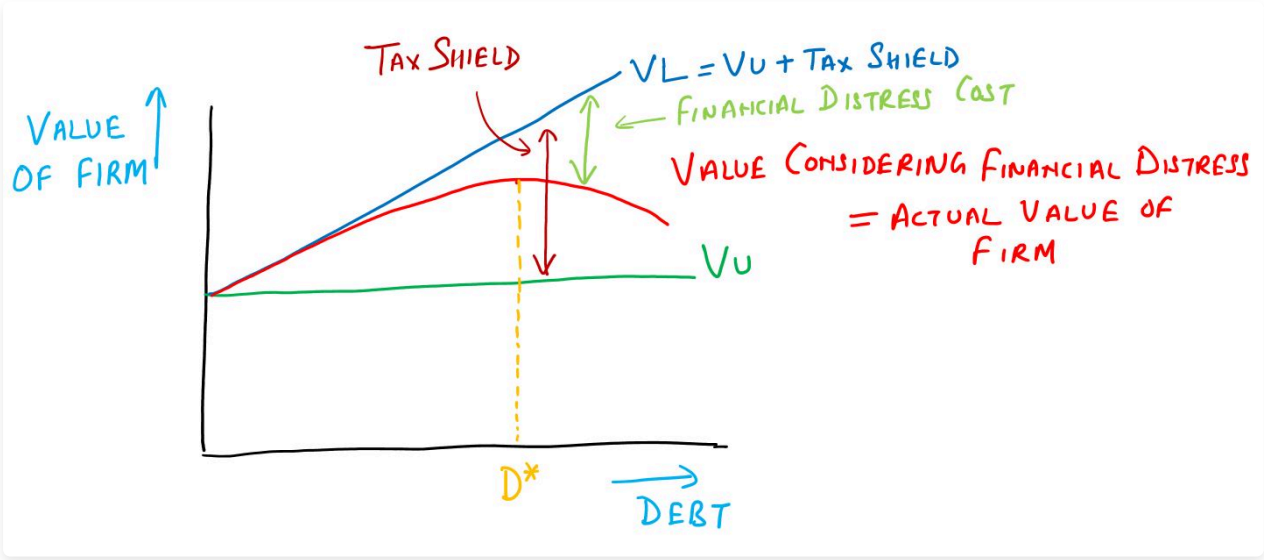
The costs mentioned in points 2,3 and 4 are **Agency Costs**. Here the stockholders are tempted to pursue selfish strategies to hurt the bondholders and help themselves.

---

13. Optimal Capital Structure



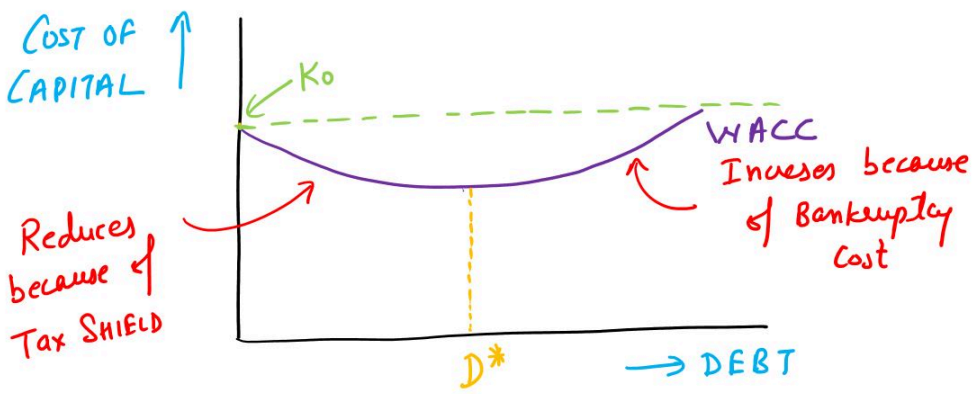
Modigliani and Miller (MM) argue that the firm's value rises with leverage in the presence of corporate taxes. Further we learnt that financial distress costs rises with leverage and this reduces the value of the firm. The integration of positive tax effects and negative distress costs appears in the Figure.



In the figure, the Blue line represents the value of the firm in a world without bankruptcy costs (what we learnt from MM). The Red curve represents the value of the firm with bankruptcy costs.

The Red curve rises as the firm moves from all equity to a small amount of debt. Here, the present value of the distress costs is minimal because the probability of distress is so small. However, as more and more debt is added, the present value of these costs rises at an increasing rate.

At some point, the increase in the present value of these costs from an additional dollar of debt equals the increase in the present value of the tax shield. This is the debt level maximizing the value of the firm and is represented by D* in the Figure. In other words, D* is the optimal amount of debt. Bankruptcy costs increase faster than the tax shield beyond this point, implying a reduction in firm value from further leverage.



Look at the graph to understand the impact of financial distress costs on weighted average cost of capital (WACC). The WACC falls as debt is added to the capital structure. After reaching D*, the WACC rises. The optimal amount of debt produces the lowest WACC.

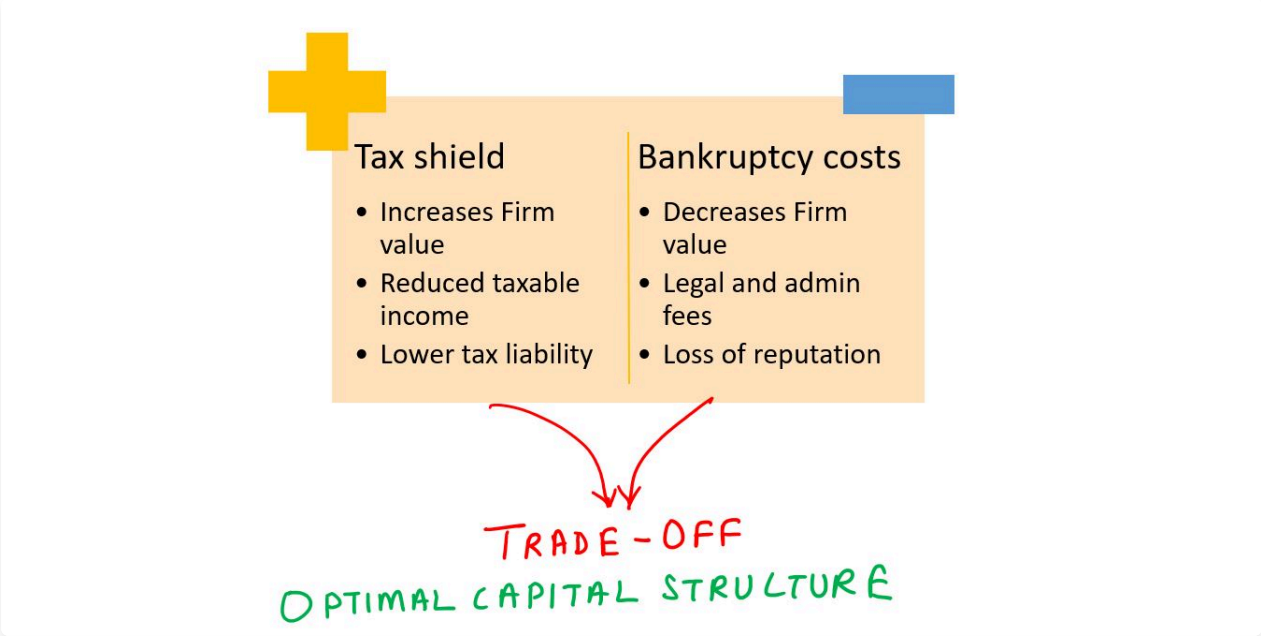
This is called **Static trade off theory** of Capital Structure.

---

14. Trade-off theory

The Trade-off Theory, is built upon the Modigliani-Miller (MM) propositions.

The trade-off theory of capital structure posits that when firms make decisions about their capital structure—how much debt versus equity to use—they must weigh the benefits of debt financing against the potential costs of financial distress. It is also called **Static Trade Off Theory**.



On one hand, debt financing offers tax advantages because interest payments are tax-deductible expenses. This means that a firm can lower its taxable income by deducting interest expenses, resulting in a reduction of its tax liability. These tax benefits make debt financing an attractive option for many firms, as it can lead to significant savings in tax payments.

However, on the other hand, taking on too much debt increases the risk of financial distress. Financial distress refers to the difficulty a firm faces in meeting its financial obligations, such as interest and principal payments on debt. If a firm cannot meet these obligations, it may face serious consequences, including bankruptcy. Financial distress can also lead to other costs, such as loss of reputation, decreased access to credit, and disruptions in business operations.

In essence, the value of a leveraged firm is determined by adding the tax shield and subtracting the present value (PV) of financial distress costs from the value of an unleveraged firm. The firm's value reaches its peak when the difference between the tax shield and financial distress costs is maximized.

At zero debt, the firm's value mirrors that of an unleveraged firm, as per MM's proposition without taxes.

As debt is introduced, the firm's value steadily rises due to the inclusion of tax shields, aligning with MM's proposition with taxes, which advocates for maximizing value at 100% debt.

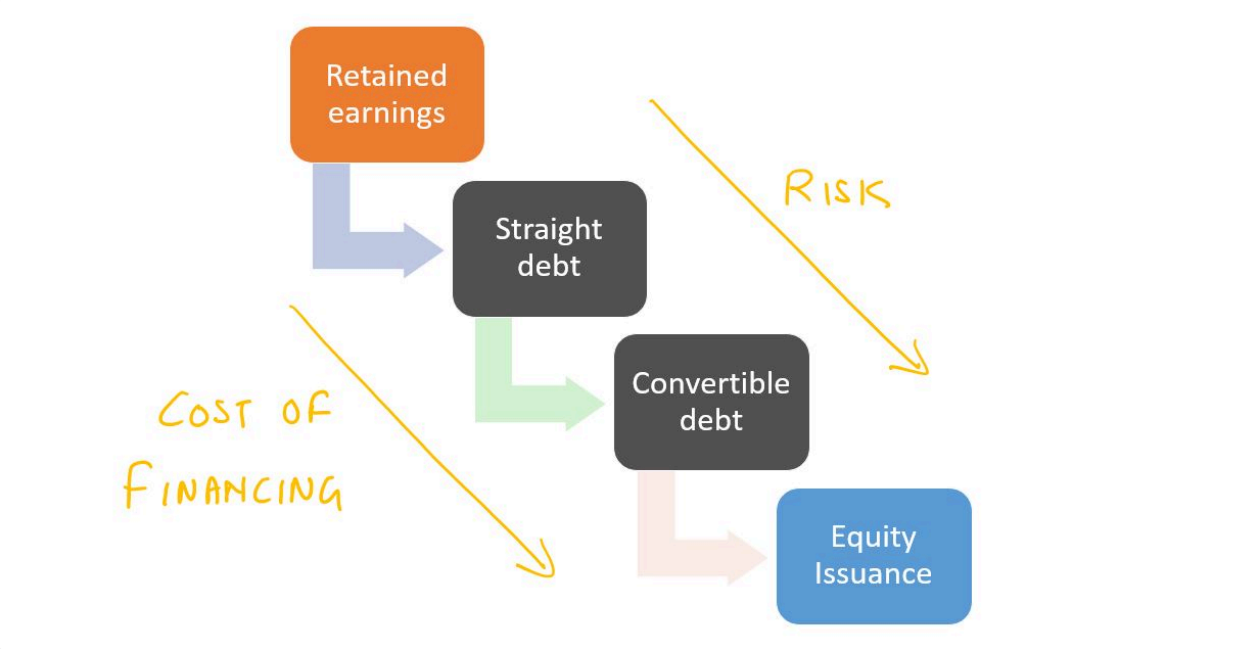
However, as leverage increases further, the costs associated with financial distress also escalate. This leads to a point where the optimal capital structure is achieved, striking a balance between tax benefits and financial distress costs.

Therefore, according to the trade-off theory, firms must strike a balance between the tax benefits of debt and the costs of financial distress when determining their optimal capital structure. They must consider how much debt to take on to maximize the tax advantages while minimizing the risks associated with financial distress. This optimal mix of debt and equity helps to minimize the overall cost of capital and maximize the value of the firm for its shareholders.

---

15. Pecking Order Theory

The Pecking Order theory suggests firms have a hierarchy of preferred financing sources, with internal financing being the most preferred, followed by debt, and then equity issuance as a last resort. This theory was proposed by Myers and Majluf in 1984.



At the heart of Pecking Order theory lies the belief of the manager that equity issuance should only occur when the company is perceived to be overvalued. For instance, if the current market price of the firm's shares is Rs 80, but the manager assesses their true value to be Rs 100, they would refrain from issuing additional shares. This emphasizes the importance of timing in equity issuance decisions, even if it is in contrast with the trade-off theory of debt versus equity.

However, such timing strategies are only viable when there exists an **information asymmetry between the manager and investors**, with the manager possessing more insights into the firm's prospects.

Company managers typically possess more information regarding the company's performance, prospects, risks, and future outlook than external users such as creditors (debt holders) and investors (shareholders). Therefore, to compensate for information asymmetry, external users demand a higher return to counter the risk that they are taking. In essence, due to information asymmetry, external sources of finances demand a higher rate of return to compensate for higher risk.

From the investor's perspective, the issuance of stock may signal that the company was previously overvalued, while debt issuance could imply undervaluation. This complicates the firm's decision-making process, particularly when assessing whether the firm is indeed overvalued or undervalued.

In cases where the firm is undervalued, the decision to issue debt is straightforward. However, in situations of perceived overvaluation, the decision becomes more complex.

Here is an explanation of the Pecking Order theory:

1. Internal Financing
Firms prefer to use internal funds, such as retained earnings, as the primary source of financing. This is because internal financing does not involve any information asymmetry or signaling issues, and it avoids the costs associated with external financing.

2. Debt Issuance
When internal funds are insufficient, firms prefer to issue debt rather than equity. This preference for debt stems from the idea that issuing debt is less likely to signal negative information to investors compared to equity issuance.

3. Safety of Securities
The Pecking Order theory suggests that firms should issue safer securities before riskier ones. For example, if a firm needs to issue debt, it should first issue straight debt before considering more complex or risky forms of debt, such as convertible debt.

4. Equity Issuance

Equity issuance is considered a last resort under the Pecking Order theory. Firms should only consider issuing equity when internal funds and debt capacity are insufficient to meet financing needs.

---

15. Pecking Order Theory

The Pecking Order theory and the Trade-off theory of capital structure offer differing perspectives on how firms determine their optimal mix of debt and equity financing. Here's a comparison highlighting their differences:

1. Target Amount of Leverage

Trade-off Theory: This theory suggests that firms aim to achieve an optimal level of leverage where the marginal benefit of debt (e.g., tax shield) equals the marginal cost of debt (e.g., distress costs). Firms actively manage their capital structure to maintain this equilibrium.

Pecking Order Theory: In contrast, the Pecking Order theory does not propose a specific target leverage ratio. Instead, firms prioritize financing needs based on available internal funds and external debt. Equity issuance is seen as a last resort, leading to a more dynamic capital structure driven by financing requirements rather than a predefined target ratio.

2. Use of Debt by Profitable Firms

Trade-off Theory: Profitable firms are expected to utilize more debt due to their greater cash flows, which increases their debt capacity. These firms may actively seek higher leverage to capitalize on the tax benefits associated with debt.

Pecking Order Theory: Profitable firms tend to rely less on debt according to the Pecking Order theory. They generate ample cash internally, reducing their need for external financing. Consequently, they may have lower debt levels as they prioritize internal funds over debt financing.

3. Preference for Financial Slack

Trade-off Theory: This theory does not specifically address a preference for financial slack. Instead, it focuses on optimizing the trade-off between tax benefits and financial distress costs associated with debt.

Pecking Order Theory: The Pecking Order theory acknowledges firms' preference for financial slack as a means to mitigate the difficulties of obtaining financing at reasonable costs. Firms prioritize bond financing over equity issuance to avoid signaling overvaluation concerns to investors. However, they are mindful of not overleveraging to the point of encountering financial distress costs.

---

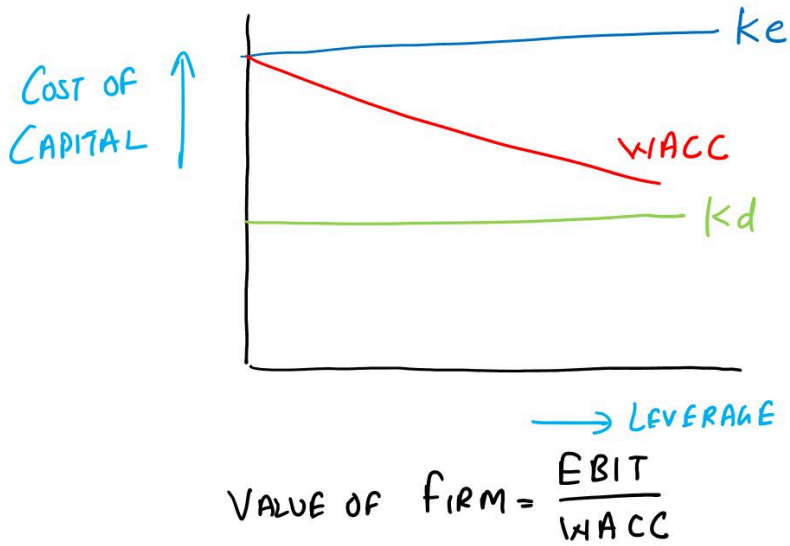
16. Approaches to Capital Structure

Let us understand various historical approaches to capital structure.

---

16. Approaches to Capital Structure

The Net Income (NI) approach to capital structure emphasizes the impact of debt on the firm's cost of capital (WACC) and overall value.



According to this approach:

1. Debt is a cheaper source of finance
The approach recognizes that debt carries a lower cost of capital compared to equity due to the tax deductibility of interest payments. This tax shield benefit makes debt financing an attractive option for firms.

2. No impact on cost of equity capital
The approach assumes that increasing the use of debt does not directly affect investors' perceptions or the cost of equity capital. Therefore, the cost of equity remains unchanged as debt levels fluctuate.

3. Decrease in WACC
With the tax shield benefit from debt, the weighted average cost of capital (WACC) is expected to decrease as more debt is added to the capital structure. This is because the tax shield reduces the overall cost of capital.

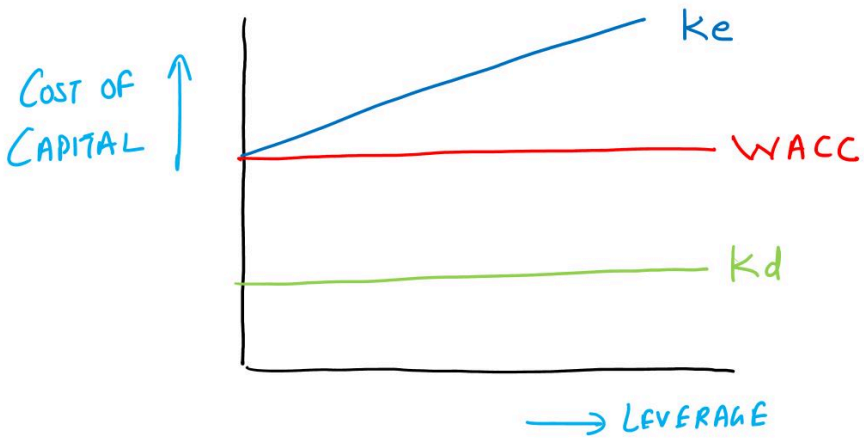
4. Increase in firm value
As the WACC decreases due to increased debt utilization, the value of the firm is expected to increase. The decrease in WACC reflects a more efficient capital structure, leading to higher firm value according to the Net Income approach.

5. Optimal Capital Structure
The approach suggests that there exists no optimal level of leverage. The firm should take as much debt (leverage), as much possible. More the debt, better it is.

---

16. Approaches to Capital Structure

The Net Operating Income (NOI) approach to capital structure also evaluates the impact of debt on the firm's cost of capital (WACC) and overall value.



Here's an analysis of the Net Operating Income approach:

1. Benefit of Lower Cost of Debt Capital, Offset by Higher Required Rate of Return By Equityholders
The NOI approach acknowledges the benefit of debt financing, which typically carries a lower cost of capital compared to equity. However, it also recognizes that as the firm increases its leverage, the risk associated with debt increases. Consequently, equity holders may demand a higher required rate of return to compensate for the increased risk, which will offset the benefit of lower debt capital costs.

2. Effect on WACC
Unlike the Net Income approach, the NOI approach suggests that the changes in the cost of debt and equity capital balance each other out, resulting in no significant impact on the overall WACC. The increase in the required rate of return by equity holders due to higher leverage offsets the decrease in the cost of debt capital, leading to a constant WACC.

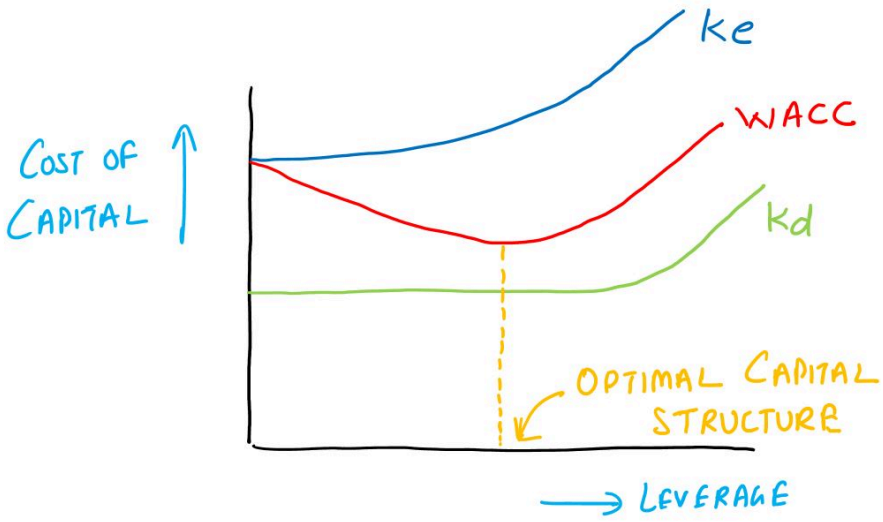
3. Constant Firm Value
With WACC remaining constant regardless of changes in leverage, the value of the firm is not influenced by the capital structure according to the NOI approach. This implies that the firm's value remains constant regardless of the proportion of debt and equity financing used.

The net operating income (NOI) approach is same as M&M approach. It is based on the notion that there is a conservation of investment value. No matter how you divide the investment value pie between debt and equity claims, the total pie (or investment value of the firm) stays the same. Therefore leverage is said to be irrelevant. Behavioral support for the M&M position is based on the homemede arbitrage process.

---

16. Approaches to Capital Structure

The Traditional Approach to capital structure evaluates lies somewhere in between Net Income approach and Net Operating Income approach. As per this approach the cost of capital (and thus value of firm) is not independent of capital structure.



Here's an analysis of this approach:

1. WACC has a minimum
Initially, with the introduction of cheaper debt financing, the WACC decreases as the cost of debt starts getting lower. However, as the firm increases its leverage, the cost of equity capital tends to rise due to increased financial risk. Eventually, the increase in the cost of equity capital is not able to offset the decrease in the cost of debt, leading to a rise in WACC after a certain point. At this point, WACC is minimum.

2. Optimal Capital Structure
The Traditional Approach identifies the optimal capital structure as the point where the WACC is minimized. This optimal mix of debt and equity financing balances the benefits of cheaper debt with the increasing costs of equity capital, resulting in the lowest possible WACC.

3. Firm Value
At the optimal capital structure, where the WACC is minimized, the value of the firm is maximized.

In summary, the Traditional Approach suggests that capital structure decisions are relevant for determining the value of the firm. By carefully balancing the use of debt and equity financing, management can increase the total value of the firm.

---

17. Illustrations

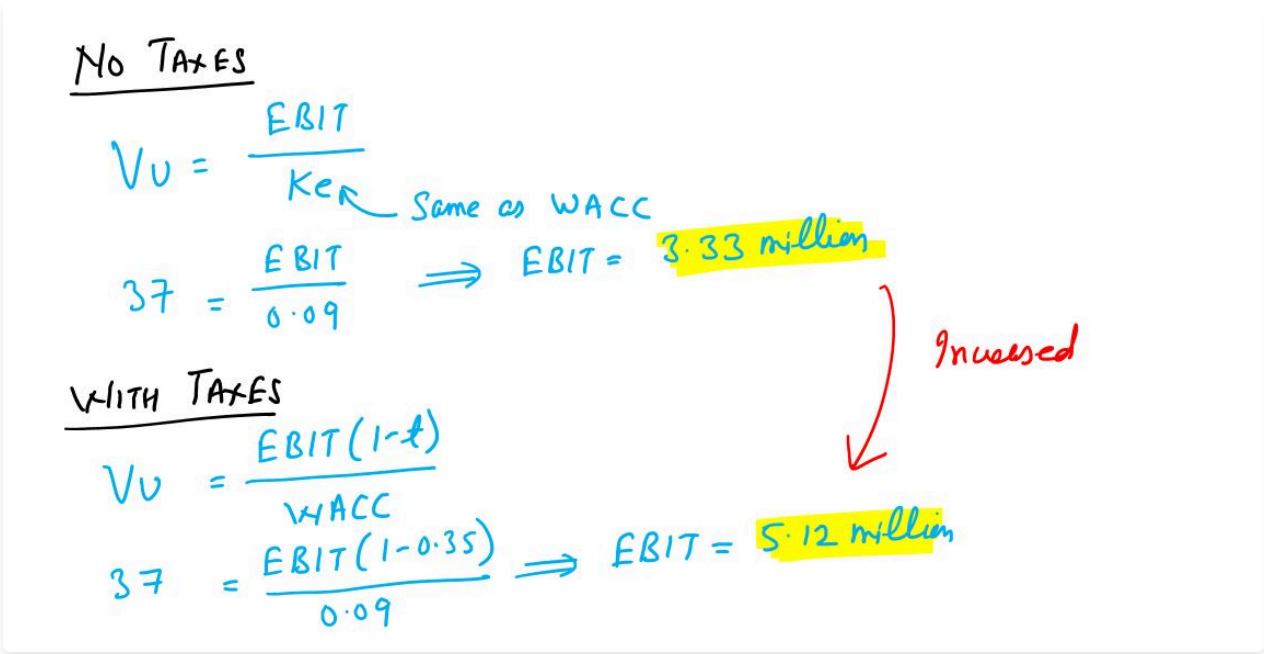
Let us understand these concepts now, by going through some of illustrations.

---

17. Illustrations

Nirma Corporation Ltd uses no debt in its capital structure. The weighted average cost of capital is 9 percent. If the current market value of the equity is Rs 37 million and there are no taxes, what is EBIT? Suppose now the corporate tax rate is 35 percent. What is EBIT in this case?

Solution:



17. Illustrations

Indigo Airlines is currently an unlevered firm. The company expects to generate Rs 153.85 in earnings before interest and taxes (EBIT) in perpetuity. The corporate tax rate is 35%. All earnings after tax are paid out as dividends. The firm is considering a capital restructuring to allow Rs 200 of debt. Its cost of debt capital is 10%. Unlevered firms in the same industry have a cost of equity capital of 20%. What will the new value of Indigo Airlines be?

Solution:

$$V_U = \frac{EBIT(1-t)}{K_o}$$

$$= \frac{153.85 \times (1-0.35)}{0.20}$$

$$= 500$$

$$V_L = V_U + \text{Tax Shield}$$

$$= 500 + 0.35 \times 200$$

$$= 570$$