

# **Introduction to corporate finance**

## **UHU008**

### **Syllabus and Distribution of Marks**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Cr</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

# **Aim of the course**

- This course aims to provide the students with the fundamental concepts, principles and approaches of corporate finance, enable the students to apply relevant principles and approaches in solving problems of corporate finance and help the students improve their overall capacities.

# **Introduction to Corporate Finance & Financial Statements Analysis**

## **Introduction to corporate finance**

Finance and corporate finance. Forms of business organizations, basic types of financial management decisions, the goal of financial management, the agency problem. The role of the financial manager; basic types of financial management decisions.

## **Financial statements analysis**

Balance sheet, income statement, cash flow, fund flow financial statement analysis Computing and interpreting financial ratios; conducting trend analysis and Du Pont analysis.

# **The time value of money**

## **Risk and return**

### **The time value of money**

Time value of money, future value and compounding, present value and discounting, uneven cash flow and annuity, discounted cash flow valuation.

### **Risk and return**

Introduction to systematic and unsystematic risks, computation of risk and return, security market line, capital asset pricing model.

# **Long-term financial planning & Financial Decisions**

- Various sources of long term financing, the elements and role of financial planning, financial planning model, percentage of sales approach, external financing needed.
- Cost of capital, financial leverage, operating leverage. Capital structure, theories of capital structure net income , net operating income & M&M proposition I and II.

# **Capital Markets**

- Nature of capital market, Primary market- features of primary market, parties involved in primary Market, various modes of issue of shares, allotment of Shares, factors to be considered by Investors, Secondary market- features of secondary market, regulatory framework, members of stock exchanged, different groups of securities, 'Settlement Period, determination of stock prices, market capitalisation, determination of sensex value, risk in the Stock Market

# **Short-term financial planning and management**

- Working capital, operating cycle, cash cycle, cash budget, short-term financial policy, cash management, inventory management, credit management.

# Capital budgeting

- Concepts and procedures of capital budgeting, investment criteria ( net present value, payback, discounted payback, average accounting return, internal rate of return, profitability index ), incremental cash flows, scenario analysis, sensitivity analysis, break-even analysis,

# **Dividend policy**

- Dividend, dividend policy, Various models of dividend policy ( Residual approach, Walter model, Gordon Model, M&M, Determinants of dividend policy.

# Security valuation

- Bond features, bond valuation, bond yields, bond risks, stock features, common stock valuation, and dividend discount & dividend growth models. Common stock yields, preferred stock valuation.

# Course Learning Outcomes

1. Apply best practice tools and methods in corporate finance and investment management to different settings.
2. Evaluate critically corporate financial management practices with the aim of proposing and implementing improvements
3. Apply the methods and procedures of financial management, with particular reference to investment evaluation, investment management, capital budgeting, corporate evaluation, risk management.

# Cntd....

4. Apply the methods and procedures to value stocks and bonds; assess the risk and return of assets.
5. Estimate a company's cost of capital; determine whether a company is creating or destroying value; select a company's optimal mix of debt and equity financing; and compensate shareholders in the most convenient way.
6. Ability to take optimal dividend decisions using the base of different relevant theories of dividend

# Distribution Marks

## Distribution of marks

Mid Semester Exam	30
End Semester Exam	45
Quizzes (Two)	10
Presentation	05
Case Study Discussion	05

**THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY, PATIALA**  
**SCHOOL OF HUMANITITES & SOCIAL SCIENCES**  
**UHU008: Introduction to Corporate Finance**

L	T	P	Cr.
3	0	0	3

S.No.	Topics	Lectures
1	<b>Finance and corporate finance.</b> Forms of business organizations, basic types of financial management decisions, the goal of financial management, the agency problem. The role of the financial manager; basic types of financial management decisions.	3
2.	<b>Financial statements analysis-</b> Balance sheet, income statement, cash flow, fund flow financial statement analysis Computing and interpreting financial ratios; conducting trend analysis and Du Pont analysis. <b>Relevant Case Study</b>	4
3.	<b>The time value of money-</b> Time value of money, future value and compounding, present value and discounting, uneven cash flow and annuity, discounted cash flow valuation.	3
4.	<b>Risk and return:</b> Introduction to systematic and unsystematic risks, computation of risk and return, security market line, capital asset pricing model. <b>Relevant Case Study</b>	4

5.	<b>Long-term financial planning</b> Various sources of long term financing, the elements and role of financial planning, financial planning model, percentage of sales approach, external financing needed. <b>Relevant Case Study</b>	3
6.	<b>Financing Decisions:</b> Cost of capital, financial leverage, operating leverage. Capital structure, theories of capital structure net income, net operating income & M&M proposition I and II. <b>Relevant Case Study</b>	4
7.	<b>Capital Markets:</b> Nature of capital market, Primary market- features of primary market, parties involved in primary Market, various modes of issue of shares, allotment of Shares, factors to be considered by Investors,	3
8.	<b>Secondary or Stock market-</b> features of secondary market, regulatory framework, members of stock exchanged, different groups of securities, 'Settlement Period, determination of stock prices, market capitalization, determination of sensex value, risk in the Stock Market	4
9.	<b>Short-term financial planning and management:</b> Working capital, operating cycle, cash cycle, cash budget, short-term financial policy, cash management, inventory management, credit management. <b>Relevant Case Study</b>	4
10.	<b>Capital budgeting or Investment Decisions :</b> Concepts and procedures of capital budgeting, investment criteria ( net present value, payback, discounted payback, average accounting return, internal rate of return, profitability index ), incremental cash flows, scenario analysis, sensitivity analysis, break-even analysis, <b>Relevant Case Study</b>	5
11.	<b>Dividend policy or Dividend Decisions :</b> Dividend, dividend policy, Various models of dividend policy ( Residual approach, Walter model,	3

	Gordon Model, M&M, Determinants of dividend policy.	
12.	<b>Security valuation:</b> Bond features, bond valuation, bond yields, bond risks, stock features, common stock valuation, and dividend discount & dividend growth models. Common stock yields, preferred stock valuation. <b>Relevant Case Study</b>	3
13	<b>Case Study Discussion</b>	2

# Textbook and References

- **Textbook**
- Principles of Corporate Finance, 9th edition, Brealey, Myers & Allen, The McGraw-Hill
- Companies, Inc., 2007. Financial Management: Theory and Practice, Brigham & Ehrhardt, 10th edition, Cengage
- Learning, 2002. Fundamentals of Financial Management, 12th edition, Horne & Wachowicz, Pearson Education, Inc., 2005.
- **References**
- Van Horne, James, C (2002). Principles of Financial Management, Pearson
- Brigham. Eugene F. and Houston. Joel F. (2006). Fundamentals of Financial Management, 10<sup>th</sup> Edition, Cengage Learning
- Pandey, I. M., Financial management, Vikas Publishing House Pvt. Ltd., Noida, 2011, 12th ed.
- Elton, Edwin J. and M.J.Gruber(2007),‘Modern Portfolio Theory and Investment Analysis’, 7th Edition, John Wiley and Sons.

# **Finance and Corporate finance.**



# What Is Finance?

- Virtually all individuals and organizations earn or raise money and spend or invest money. Finance is the processes by which money is transferred (financing and investing) among businesses, individuals, and governments

# FINANCE-MEANING

- **Finance** is a field that deals with the study of investments. It includes the dynamics of assets and liabilities over time under conditions of different degrees of uncertainty and risk. Finance can also be defined as the science of money management.

## Contd....

- A key point in finance is the time value of money, which states that purchasing power of one unit of currency can vary over time.
- Finance aims to price assets based on their risk level and their expected rate of return. Finance can be broken into three different sub-categories: public finance, corporate finance and personal finance.

# BREAKING DOWN 'Finance

- The study of finance can also take many forms, depending on the field or area of finance which one wishes to study.
- For instance, economics is considered a pillar of financial science, where both macro and microeconomic factors affect virtually all levels of financial decisions and outcomes at all levels.

# Forms of Business Organisation

- Sole Proprietorship
- Partnership
- Private Limited Company
- Public Limited Company
- Public Enterprises

# Sole Proprietorship

- One man Control
- Top secrecy
- Limited Capital
- Limited sources
- Unlimited liabilities
- Small in size

# Partnership

- Partners (2 to 20 and in case of banking 2 to 10)
- Partnership Deed
- Unlimited Liabilities
- Top Secrecy
- Active partners and sleeping partners

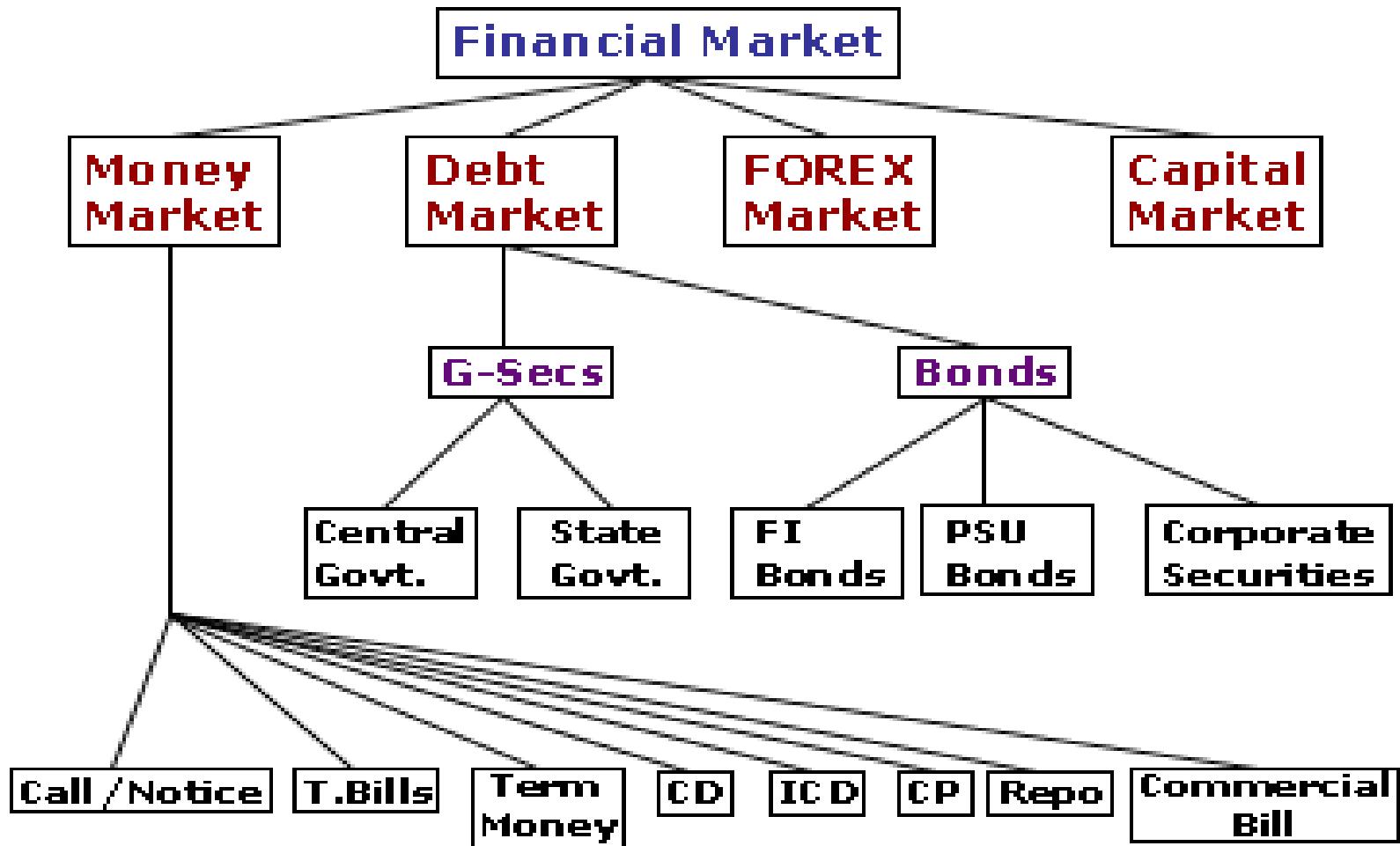
# Private Limited Company

- Members 2 to 50
- Limited Liabilities
- Special privileges
- No offer to public (NO IPO)
- Commencement of business
- Documents for incorporation

# Public Limited Company

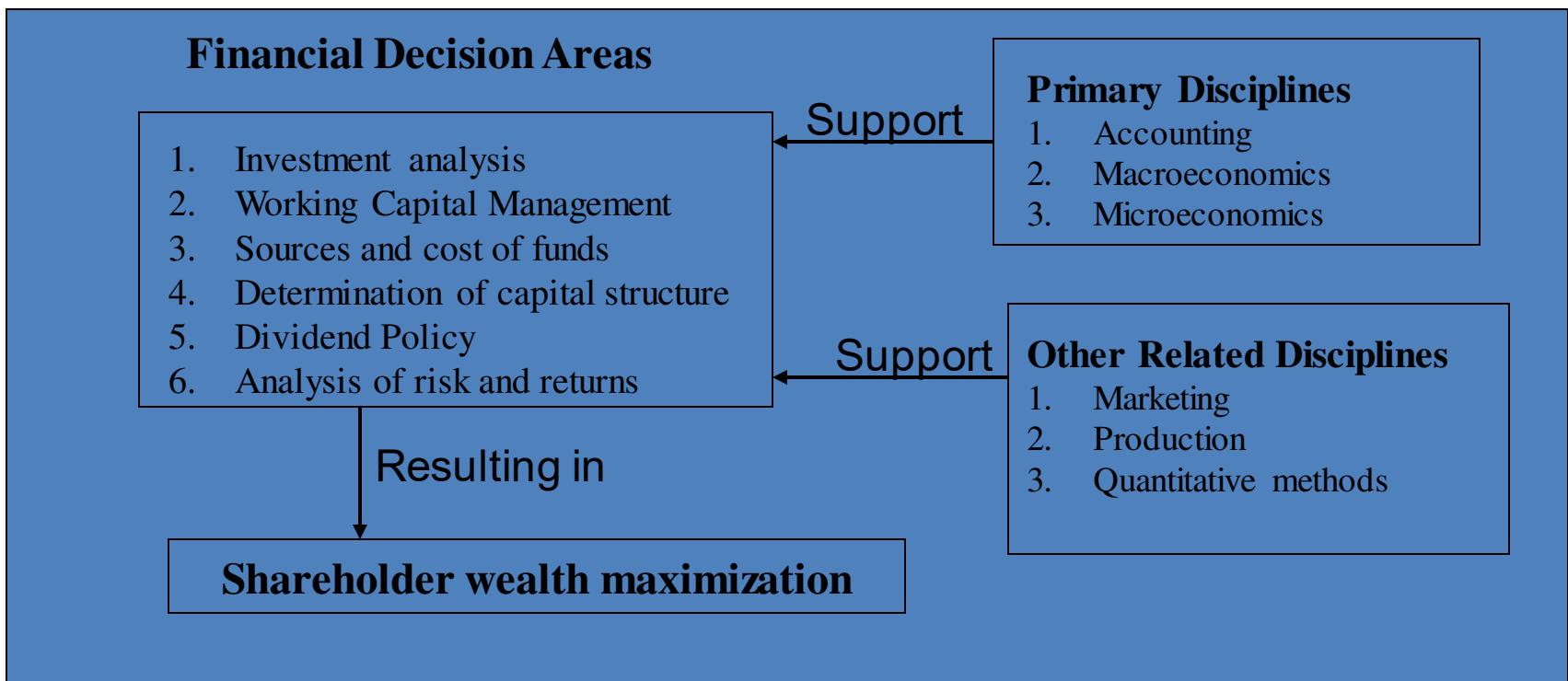
- Members 7 to unlimited
- Limited Liabilities
- No Special privileges
- Offer to public
- Commencement of business
- Documents for incorporation
- Large in size
- Huge resources

# Financial Market



# INTRODUCTION

- ‘FM’ may be defined as the art & science of managing money. FM is concerned with the duties of the financial managers in the business firm.
- Relationship of financial management and other supportive

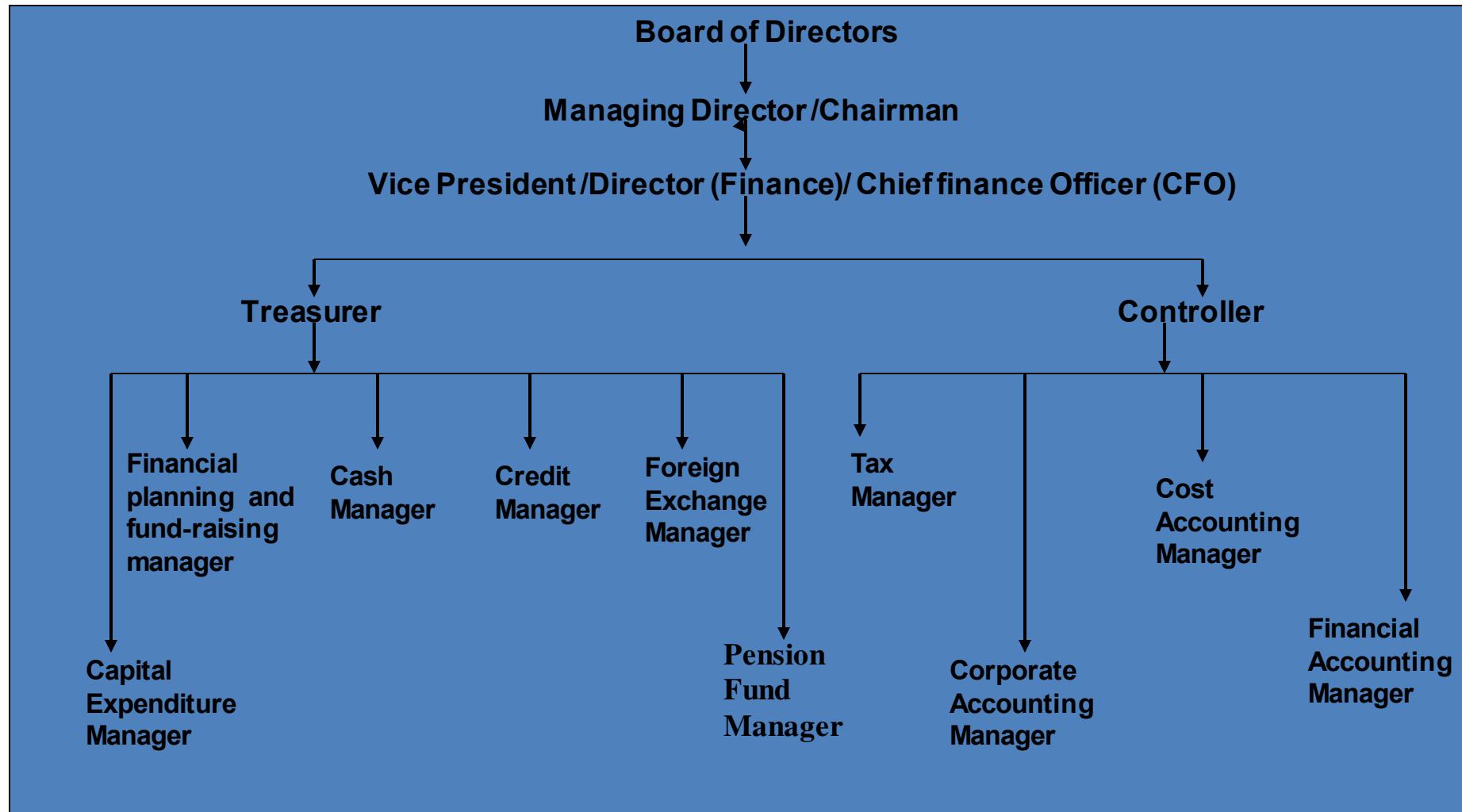


## **FUNCTIONS OF FINANCE UNDER MODERN APPROACH**

Financial Management in the modern sense of the firm can be broken down into three major decisions as functions of finance. These are :

- The investment decision
- The financing decision
- The dividend decision

# ORGANISATION OF FINANCE FUNCTION



# THE INVESTMENT DECISION

The investment decision relates to the selection of assets in which funds will be invested by a firm. The assets which can be acquired fall into two broad categories

- ◆ Long term assets (which yield return over a period over a time in future.) —**CAPITAL BUDGETING.**
- ◆ Short term or current assets (convertible into cash usually within one year.) —**WORKING CAPITAL MANAGEMENT.**

## • **CAPITAL BUDGETING**

Capital budgeting is the most crucial financial decision of the firm. It refers to selection of an asset or investment proposal or course of action whose benefits are likely to be available in future over the lifetime of the project. The main elements of capital budgeting are:

- Choice of the new assets out of the alternatives available or relocation of the capital when an existing asset fails to justify the funds committed.
- Capital budgeting decision is the analysis of risk and uncertainty.
- The concept and measurement of cost of capital.

- **WORKING CAPITAL MANAGEMENT (WCM)**

WCM is concerned with the management of current assets. The key strategies and considerations in ensuring a tradeoff between profitability and liquidity is one of the major dimensions of WCM. The management of working capital has two basic ingredients:

- An overview of working capital management as a whole
- Efficient management of the individual current assets such as cash, receivables and inventory.

# THE FINANCING DECISION

The investment decision is broadly concerned with the assets-mix or the composition of the assets of the firm. A capital structure with a reasonable proportion of debt and equity capital is called the ***Optimal Capital Structure***. The two aspects of financing decision are :

- ❖ The of capital structure theory
- ❖ The capital structure decision

## THE DIVIDEND DECISION

The dividend should be analysed in relation to the financing decision of the firm. Two alternatives are available in dealing with the profits of a firm:

- ❖ They can be distributed to the shareholders in the form of the dividends
- ❖ They can be retained in the business itself.

The decision as to which course should be followed depends largely on the significant dividend decision, the ***dividend –pay –out ratio***, i.e. what proportion of net profits should be paid out to the shareholders.

# **OBJECTIVES OF FINANCIAL MANAGEMENT**

The objective provide a framework for optimum financial decision making. They are concerned with designing a method of operating the internal investment and financing of a firm.there are two widely discussed approaches under this, these are:

 **Profit Maximisation**

 **Wealth Maximisation**



# PROFIT MAXIMISATION

Profit /EPS maximisation should be undertaken and those that decrease profits or EPS are to be avoided. Profit is the test of economic efficiency. It leads to efficient allocation of resources, as resources tend to be directed to uses which in terms of profitability are the most desirable. Financial management is mainly concerned with the efficient economic resources namely capital. The main technical flaws of this criteria are :

- Ambiguity
- Timing of benefits
- Uncertaininity



# WEALTH MAXIMISATION

Wealth maximisation is also known as ***Value or Net present worth maximisation***. Its operational features satisfy all the three requirements of the operational of the financial course of action namely, exactness, quality of benefits, and the time value of money. Two important issues related to the value/share price maximisation are:

- ❖ ***Focus on stakeholders***, stakeholders include groups such as employees, customers, suppliers, creditors, owners and others who have a direct link to the firm.
- ❖ ***EVA (Economic Value Added)*** –EVA is equal to the after-tax operating profits of a firm less the cost of the firm to finance investments.



# **Introduction to Financial Statement Analysis**

# **Chapter Outline**

**2.1 Firms' Disclosure of Financial Information**

**2.2 The Balance Sheet**

**2.3 The Income Statement**

**2.4 The Statement of Cash Flows**

**2.5 Other Financial Statement Information**

**2.6 Financial Statement Analysis**

**2.7 Financial Reporting in Practice**



# Introduction

- Although the corporate organizational structure greatly facilitates the firm's access to investment capital, it also means that stock ownership is most investors' sole tie to the company.
- How, then, do investors learn enough about a company to know whether or not they should invest in it?
- How can financial managers assess the success of their own firm and compare it to the performance of competitors?
- One way firms evaluate their performance and communicate this information to investors is through their financial statements.
- Firms **issue financial statements regularly** to communicate financial information to the investment community.



## 2.1 Firms' Disclosure of Financial Information

- Financial statements are accounting reports with past performance information that a firm issues periodically (usually quarterly and annually).
- U.S. public companies are required to file their financial statements with the U.S. Securities and Exchange Commission (SEC) on a quarterly basis on form 10-Q and annually on form 10-K.
- They must also send an annual report with their financial statements to their shareholders each year.
- Private companies often prepare financial statements as well, but they usually do not have to disclose these reports to the public.



## 2.1 Firms' Disclosure of Financial Information

- Reports about a company's performance must be understandable and accurate.
- **Generally Accepted Accounting Principles (GAAP)** provide a common set of rules and a standard format for public companies to use when they prepare their reports.
- This standardization also makes it easier to compare the financial results of different firms. Investors also need some assurance that the financial statements are prepared accurately.
- Corporations are required to hire a neutral third party, known as an auditor, to check the annual financial statements, to ensure that the annual financial statements are reliable and prepared according to GAAP.



## 2.1 Firms' Disclosure of Financial Information

- Analysis, however, shows that more than 25,000 of the approximately 48,000 domestic listed companies on the 85 major securities exchanges in the world use IFRS (international financial reporting standards)
- Many countries and multinational companies would like the differences between GAAP and IFRS eliminated. Blending the two would help comparisons between businesses based in different regions. Advocates believe the merger would simplify management, investment, transparency and accountant training.
- The **main difference between the standards** is that IFRS is principles-based and GAAP relies on rules and guidelines.



## **2.1 Firms' Disclosure of Financial Information**

- Types of Financial Statements
  - Balance Sheet
  - Income Statement
  - Statement of Cash Flows
  - Statement of Stockholders' Equity



## 2.2 Balance Sheet

- A snapshot in time of the firm's financial position
- The Balance Sheet Identity:

$$\text{Assets} = \text{Liabilities} + \text{Stockholders' Equity}$$



## 2.2 Balance Sheet

- Assets
  - What the company owns
- Liabilities
  - What the company owes
- Stockholder's Equity
  - The difference between the value of the firm's assets and liabilities

# 2.2 Balance Sheet

## Assets

- **Current Assets:**
- Cash or expected to be turned into cash in the next year
- Cash
  - Marketable Securities
  - Accounts Receivable
  - Inventories
  - Other Current Assets
    - Example: Pre-paid expenses

# 2.2 Balance Sheet

## Assets

- **Long-Term Assets (e.g. Net Property, Plant, & Equipment)**

Depreciation (and Accumulated Depreciation): The firm reduces the value of fixed assets (other than land) over time according to a depreciation schedule that depends on the asset's life span. Depreciation is not an actual cash expense that the firm pays; it is a way of recognizing that buildings and equipment wear out and thus become less valuable the older they get.

Book Value = Acquisition cost – Accumulated depreciation

- **Goodwill and intangible assets**

Amortization: If the firm assesses that the value of these intangible assets declined over time, it will reduce the amount listed on the balance sheet by an amortization or impairment charge that captures the change in value of the acquired assets. Like depreciation, amortization is not an actual cash expense.

- **Other Long-Term Assets (e.g. Investments in Long-term Securities)**

# Table 2.1

## Global Conglomerate Corporation Balance Sheet for 2012 and 2011

GLOBAL CONGLOMERATE CORPORATION		
Consolidated Balance Sheet		
Year Ended December 31 (in \$ million)		
Assets	2012	2011
<b>Current Assets</b>		
Cash	21.2	19.5
Accounts receivable	18.5	13.2
Inventories	15.3	14.3
Other current assets	2.0	1.0
<b>Total current assets</b>	<b>57.0</b>	<b>48.0</b>
<b>Long-Term Assets</b>		
Land	22.2	20.7
Buildings	36.5	30.5
Equipment	39.7	33.2
Less accumulated depreciation	(18.7)	(17.5)
Net property, plant, and equipment	79.7	66.9
Goodwill and intangible assets	20.0	20.0
Other long-term assets	21.0	14.0
<b>Total long-term assets</b>	<b>120.7</b>	<b>100.9</b>
<b>Total Assets</b>	<b>177.7</b>	<b>148.9</b>



## 2.2 Balance Sheet

- Goodwill and intangible assets:
- For example, Global paid \$25 million in 2010 for a firm whose tangible assets had a book value of \$5 million.
- The remaining \$20 million appears as goodwill and intangible assets in Table 2.1.

## 2.2 Balance Sheet

### Liabilities

- Current Liabilities: Due to be paid within the next year
  - Accounts Payable
  - Short-Term Debt/Notes Payable
  - Current Maturities of Long-Term Debt
  - Other Current Liabilities
    - Taxes Payable
    - Wages Payable



## 2.2 Balance Sheet

- Net Working Capital
  - Current Assets – Current Liabilities

## 2.2 Balance Sheet

### Liabilities

- Long-Term Liabilities
  - Long-Term Debt
  - Capital Leases
  - Deferred Taxes
  - Deferred taxes are taxes that are owed but have not yet been paid. Firms generally keep two sets of financial statements: one for financial reporting and one for tax purposes. Because deferred taxes will eventually be paid, they appear as a liability on the balance sheet

# Table 2.1 (cont'd)

## Global Conglomerate Corporation Balance Sheet for 2012 and 2011

Liabilities and Stockholders' Equity	2012	2011
<b>Current Liabilities</b>		
Accounts payable	29.2	24.5
Notes payable/short-term debt	3.5	3.2
Current maturities of long-term debt	13.3	12.3
Other current liabilities	2.0	4.0
Total current liabilities	48.0	44.0
<b>Long-Term Liabilities</b>		
Long-term debt	99.9	76.3
Capital lease obligations	—	—
Total debt	99.9	76.3
Deferred taxes	7.6	7.4
Other long-term liabilities	—	—
Total long-term liabilities	107.5	83.7
<b>Total Liabilities</b>	<b>155.5</b>	<b>127.7</b>
<b>Stockholders' Equity</b>	<b>22.2</b>	<b>21.2</b>
<b>Total Liabilities and Stockholders' Equity</b>	<b>177.7</b>	<b>148.9</b>



## 2.2 Balance Sheet

- Stockholder's Equity
  - Book Value of Equity
    - Book Value of Assets – Book Value of Liabilities
      - Could possibly be negative
      - Many of the firm's valuable assets may not be captured on the balance sheet



## 2.2 Balance Sheet

- Market Value Versus Book Value
  - Market Value of Equity (Market Capitalization)
    - Market Price per Share  $\times$  Number of Shares Outstanding
      - Cannot be negative
      - Often differs substantially from book value

## 2.2 Balance Sheet

- Market Value Versus Book Value
  - Market-to-Book Ratio
    - aka Price-to-Book Ratio

$$\text{Market-to-Book Ratio} = \frac{\text{Market Value of Equity}}{\text{Book Value of Equity}}$$

- Value Stocks
  - Low M/B ratios
- Growth stocks
  - High M/B ratios

## 2.2 Balance Sheet

- A firm's market capitalization measures the market value of the firm's equity, or the value that remains after the firm has paid its debts.
- But what is the value of the business itself?
- The enterprise value of a firm (also called the total enterprise value or TEV) assesses the value of the underlying business assets, unencumbered by debt and separate from any cash and marketable securities.
- Enterprise Value, Total Enterprise Value (TEV)

Enterprise Value = Market Value of Equity + Debt - Cash



## 2.2 Balance Sheet

- From Example 2.1, Global's market capitalization in 2012 is \$50.4 million.
- Its debt is \$116.7 million (\$3.5 million of notes payable, \$13.3 million of current maturities of long term debt, and remaining long-term debt of \$99.9 million).
- Therefore, given its cash balance of \$21.2 million, Global's enterprise value is  $50.4 + 116.7 - 21.2 = \$145.9$  million.
- **The enterprise value can be interpreted as the cost to take over the business.**
- That is, it would cost  $50.4 + 116.7 = \$167.1$  million to buy all of Global's equity and pay off its debts, but because we would acquire Global's \$21.2 million in cash, the net cost of the business is only  $167.1 - 21.2 = \$145.9$  million.



## 2.2 Balance Sheet

- Ideally, the balance sheet would provide us with an accurate assessment of the true value of the firm's equity.
- Unfortunately, this is unlikely to be the case.
- First, many of the assets listed on the balance sheet are valued based on their historical cost rather than their true value today.
- A second, and probably more important, problem is that many of the firm's valuable assets are not captured on the balance sheet. Consider, for example, the expertise of the firm's employees, the firm's reputation in the marketplace, the relationships with customers and suppliers, the value of future research and development innovations, and the quality of the management team. These are all assets that add to the value of the firm that do not appear on the balance sheet.

# Textbook Example 2.1

## Market Versus Book Value

### Problem

If Global has 3.6 million shares outstanding, and these shares are trading for a price of \$14 per share, what is Global's market capitalization? How does the market capitalization compare to Global's book value of equity?

# Textbook Example 2.1 (cont'd)

## Solution

Global's market capitalization is  $(3.6 \text{ million shares}) \times (\$14/\text{share}) = \$50.4 \text{ million}$ . This market capitalization is significantly higher than Global's book value of equity of \$22.2 million. Thus, investors are willing to pay  $50.4/22.2 = 2.27$  times the amount Global's shares are "worth" according to their book value.



# Alternative Example 2.1

- **Problem**
  - Rylan Enterprises has 5 million shares outstanding.
  - The market price per share is \$22.
  - The firm's book value of equity is \$50 million.
  - **What is Rylan's market capitalization?**
  - **How does the market capitalization compare to Rylan's book value of equity?**



# Alternative Example 2.1

- **Solution**
  - Rylan's market capitalization is \$110 million
    - $5 \text{ million shares} \times \$22 \text{ share} = \$110 \text{ million.}$
    - The market capitalization is significantly higher than Rylan's book value of equity of \$50 million.



## 2.3 Income Statement

- When you want somebody to get to the point, you might ask him or her for the “bottom line.” This expression comes from the **income statement**. The income statement or statement of financial performance lists the firm’s revenues and expenses over a period of time.
- The last or “bottom” line of the income statement shows the firm’s net income, which is a measure of its profitability during the period.
- The income statement is sometimes called a profit and loss, or “P&L” statement, and the net income is also referred to as the firm’s earnings.
- Whereas the balance sheet shows the firm’s assets and liabilities at a given point in time, the income statement shows the flow of revenues and expenses generated by those assets and liabilities between two dates.



## 2.3 Income Statement

- Total Sales/Revenues
  - *minus*
- Cost of Sales
  - *equals*
- Gross Profit



## 2.3 Income Statement

- Gross Profit
  - *minus*
- Operating Expenses
  - Selling, General, and Administrative Expenses
  - R&D
  - Depreciation & Amortization
- *equals*
- Operating Income



## 2.3 Income Statement

- Operating Income
  - *plus/minus*
- Other Income/Other Expenses
  - *equals*
- Earnings Before Interest and Taxes (EBIT)



## 2.3 Income Statement

- Earnings Before Interest and Taxes (EBIT)
  - *plus/minus*
- Interest Income/Interest Expense
  - *equals*
- Pre-Tax Income



## 2.3 Income Statement

- Pre-Tax Income
  - *minus*
- Taxes
  - *equals*
- Net Income

# Table 2.2 Global Conglomerate Corporation Income Statement Sheet for 2012 and 2011

GLOBAL CONGLOMERATE CORPORATION		
Income Statement		
Year Ended December 31 (in \$ million)		
	2012	2011
Total sales	186.7	176.1
Cost of sales	(153.4)	(147.3)
<b>Gross Profit</b>	<b>33.3</b>	<b>28.8</b>
Selling, general, and administrative expenses	(13.5)	(13.0)
Research and development	(8.2)	(7.6)
Depreciation and amortization	(1.2)	(1.1)
<b>Operating Income</b>	<b>10.4</b>	<b>7.1</b>
Other income	—	—
<b>Earnings Before Interest and Taxes (EBIT)</b>	<b>10.4</b>	<b>7.1</b>
Interest income (expense)	(7.7)	(4.6)
<b>Pretax Income</b>	<b>2.7</b>	<b>2.5</b>
Taxes	(0.7)	(0.6)
<b>Net Income</b>	<b>2.0</b>	<b>1.9</b>
Earnings per share:	\$0.556	\$0.528
Diluted earnings per share:	\$0.526	\$0.500



## 2.3 Income Statement

- **Gross Profit.**
- The first two lines of the income statement list the revenues from sales of products and the costs incurred to make and sell the products.
- Cost of sales shows costs directly related to producing the goods or services being sold, such as manufacturing costs.
- Other costs such as administrative expenses, research and development, and interest expenses are not included in the cost of sales. The third line is gross profit, which is the difference between sales revenues and the costs.



## 2.3 Income Statement

- **Operating Expenses.**
- The next group of items is operating expenses, i.e. expenses from the ordinary course of running the business that are not directly related to producing the goods or services being sold.
- They include administrative expenses and overhead, salaries, marketing costs, and research and development expenses.
- The third type of operating expense, depreciation and amortization, is not an actual cash expense but represents an estimate of the costs that arise from wear and tear or obsolescence of the firm's assets.
- The firm's gross profit net of operating expenses is called **operating income**.



## 2.3 Income Statement

- **Earnings before Interest and Taxes.**
- We next include other sources of income or expenses that arise from activities that are not the central part of a company's business.
- Income from the firm's financial investments is one example of other income that would be listed here.
- After we have adjusted for other sources of income or expenses, we have the firm's earnings before interest and taxes, or EBIT.



## 2.3 Income Statement

- **Pretax and Net Income.**
- From EBIT, we deduct the interest expense related to outstanding debt to compute Global's pretax income, and then we deduct corporate taxes to determine the firm's net income.
- Net income represents the total earnings of the firm's equity holders.
- **It is often reported on a per-share basis** as the firm's earnings per share (EPS), which we compute by dividing net income by the total number of shares outstanding:
  - $\text{EPS} = \frac{\text{Net Income}}{\text{Shares Outstanding}}$
  - $= \frac{\$2.0 \text{ Million}}{3.6 \text{ Million Shares}}$
  - $= \$0.556 \text{ per Share}$



## 2.3 Income Statement

- Earnings per Share

$$\text{EPS} = \frac{\text{Net Income}}{\text{Shares Outstanding}}$$

- Stock Options
- Convertible Bonds
- Dilution
  - Diluted EPS



## 2.4 Statement of Cash Flows

- The income statement provides a measure of the firm's profit over a given time period.
- However, **it does not indicate** the amount of cash the firm has generated.
- There are two reasons that net income does not correspond to cash earned.
- First, there are non-cash entries on the income statement, such as depreciation and amortization.
- Second, certain uses of cash, such as the purchase of a building or expenditures on inventory, are not reported on the income statement.



## 2.4 Statement of Cash Flows

- The firm's statement of cash flows utilizes the information from the income statement and balance sheet to determine how much cash the firm has generated, and how that cash has been allocated, during a set period.
- As we will see, from the perspective of an investor attempting to value the firm, the statement of cash flows provides what may be the most important information of the four financial statements.
- The statement of cash flows is divided into three sections: operating activities, investment activities, and financing activities.
-



## 2.4 Statement of Cash Flows

- Three Sections
  - **Operating Activities** (net income from the income statement. It then adjusts this number by adding back all non-cash entries related to the firm's operating activities)
  - **Investment Activities** (lists the cash used for investment)
  - **Financing Activities** (shows the flow of cash between the firm and its investors)

# 2.4 Statement of Cash Flows

- **Operating Activities**

- Adjusts net income by all non-cash items related to operating activities and changes in net working capital
  - Accounts Receivable – deduct the increases
  - Accounts Payable – add the increases
  - Inventories – deduct the increases
  - For instance, depreciation is deducted when computing net income, but it is not an actual cash outflow. Thus, we add it back to net income when determining the amount of cash the firm has generated. Similarly, we add back any other non-cash expenses (for example, deferred taxes or expenses related to stock-based compensation).



## 2.4 Statement of Cash Flows

- Next, we adjust for changes to net working capital that arise from changes to accounts receivable, accounts payable, or inventory.
- When a firm sells a product, it records the revenue as income even though it may not receive the cash from that sale immediately.
- Instead, it may grant the customer credit and let the customer pay in the future. The customer's obligation adds to the firm's accounts receivable.
- We use the following guidelines to adjust for changes in working capital:



## 2.4 Statement of Cash Flows

- 1. *Accounts Receivable* : When a sale is recorded as part of net income, but the cash has not yet been received from the customer, we must adjust the cash flows by deducting the increases in accounts receivable. This increase represents additional lending by the firm to its customers, and it reduces the cash available to the firm.
- 2. *Accounts Payable* : Conversely, we add increases in accounts payable. Accounts payable represents borrowing by the firm from its suppliers. This borrowing increases the cash available to the firm.
- 3. *Inventory* : Finally, we deduct increases to inventory. Increases to inventory are not recorded as an expense and do not contribute to net income (the cost of the goods are only included in net income when the goods are actually sold). However, the cost of increasing inventory is a cash expense for the firm and must be deducted.

## 2.4 Statement of Cash Flows

- **Investing Activities**

- *E.g. Capital Expenditures or Buying or Selling Marketable Securities*
- Purchases of new property, plant, and equipment are referred to as capital expenditures.
- Recall that capital expenditures do not appear immediately as expenses on the income statement.
- Instead, firms recognize these expenditures over time as depreciation expenses.
- To determine the firm's cash flow, we already added back depreciation because it is not an actual cash outflow.
- Now, we subtract the actual capital expenditure that the firm made.



## 2.4 Statement of Cash Flows

- **Financing Activities**
  - E.g. Payment of Dividends, Changes in Borrowings
  - The last section of the statement of cash flows shows the cash flows from financing activities.
  - Dividends paid to shareholders are a cash outflow. Global paid \$1 million to its shareholders as dividends in 2012.
  - The difference between a firm's net income and the amount it spends on dividends is referred to as the firm's retained earnings for that year:
  - $\text{Retained Earnings} = \text{Net Income} - \text{Dividends}$

# Table 2.3 Global Conglomerate Corporation Statement of Cash Flows for 2012 and 2011

GLOBAL CONGLOMERATE CORPORATION		
Statement of Cash Flows		
	Year Ended December 31 (in \$ million)	
	2012	2011
<b>Operating activities</b>		
Net income	2.0	1.9
Depreciation and amortization	1.2	1.1
Other non-cash items	(2.8)	(1.0)
Cash effect of changes in		
Accounts receivable	(5.3)	(0.3)
Accounts payable	4.7	(0.5)
Inventory	(1.0)	(1.0)
<b>Cash from operating activities</b>	<b>(1.2)</b>	<b>0.2</b>
<b>Investment activities</b>		
Capital expenditures	(14.0)	(4.0)
Acquisitions and other investing activity	(7.0)	(2.0)
<b>Cash from investing activities</b>	<b>(21.0)</b>	<b>(6.0)</b>
<b>Financing activities</b>		
Dividends paid	(1.0)	(1.0)
Sale (or purchase) of stock	—	—
Increase in borrowing	24.9	5.5
<b>Cash from financing activities</b>	<b>23.9</b>	<b>4.5</b>
<b>Change in cash and cash equivalents</b>	<b>1.7</b>	<b>(1.3)</b>

# Textbook Example 2.2

## The Impact of Depreciation on Cash Flow

### Problem

Suppose Global had an additional \$1 million depreciation expense in 2012. If Global's tax rate on pretax income is 26%, what would be the impact of this expense on Global's earnings? How would it impact Global's cash balance at the end of the year?

# Textbook Example 2.2 (cont'd)

## Solution

Depreciation is an operating expense, so Global's operating income, EBIT, and pretax income would fall by \$1 million. This decrease in pretax income would reduce Global's tax bill by  $26\% \times \$1 \text{ million} = \$0.26 \text{ million}$ . Therefore, net income would fall by  $1 - 0.26 = \$0.74 \text{ million}$ .

On the statement of cash flows, net income would fall by \$0.74 million, but we would add back the additional depreciation of \$1 million because it is not a cash expense. Thus, cash from operating activities would rise by  $-0.74 + 1 = \$0.26 \text{ million}$ . Thus, Global's cash balance at the end of the year would increase by \$0.26 million, the amount of the tax savings that resulted from the additional depreciation expense.



## 2.5 Other Financial Statement Information

- **The statement of stockholders' equity** breaks down the stockholders' equity computed on the balance sheet into the amount that came from issuing shares (par value plus paid-in capital) versus retained earnings.
- Because the book value of stockholders' equity is not a useful assessment of value for financial purposes, financial managers use the statement of stockholders' equity infrequently (so we will skip the computational details here).



## 2.5 Other Financial Statement Information

- Statement of Stockholders' Equity

Change in Stockholders' Equity = Retained Earnings

$$\begin{aligned} &+ \text{Net sales of stock} \\ &= \text{Net Income} \\ &- \text{Dividends} \\ &+ \text{Sales of stock} \\ &- \text{Repurchase of Stock} \end{aligned}$$



## 2.5 Other Financial Statement Information

- **The management discussion and analysis (MD&A)** is a preface to the financial statements in which the company's management discusses the recent year (or quarter), providing a background on the company and any significant events that may have occurred.
- Management may also discuss the coming year, and outline goals, new projects, and future plans.
- Management should also discuss any important risks that the firm faces or issues that may affect the firm's liquidity or resources.
- Management is also required to disclose any off-balance sheet transactions, which are transactions or arrangements that can have a material impact on the firm's future performance yet do not appear on the balance sheet.



# 2.5 Other Financial Statement Information

- **Notes to the Financial Statements**
- In addition to the four financial statements, companies provide extensive notes with further details on the information provided in the statements.
- For example, the notes document important accounting assumptions that were used in preparing the statements.
- They often provide information specific to a firm's subsidiaries or its separate product lines.
- They show the details of the firm's stock-based compensation plans for employees and the different types of debt the firm has outstanding.
- Details of acquisitions, spin-offs, leases, taxes, debt repayment schedules, and risk management activities are also given.
- The information provided in the notes is often very important to interpret fully the firm's financial statements.

# Textbook Example 2.3

## Sales by Product Category

### Problem

In the MD&A section of its financial statements, H. J. Heinz (HNZ) reported the following sales revenues by product category (\$ million):

	2012	2011
Ketchup and sauces	\$5,233	\$4,608
Meals and snacks	4,480	4,282
Infant/Nutritional foods	1,232	1,175
Other	705	641

Which category showed the highest percentage growth? If Heinz has the same percentage growth by category from 2012 to 2013, what will its total revenues be in 2013?

# Textbook Example 2.3 (cont'd)

## Solution

The percentage growth in the sales of ketchup and sauces was  $5233/4608 - 1 = 13.6\%$ . Similarly, growth in meals and snacks was 4.6%, infant/nutritional foods was 4.9%, and other categories were 10.0%. Thus, ketchup and sauces showed the highest growth.

If these growth rates continue for another year, sales of ketchup and sauces will be  $5233 \times 1.136 = \$5945$  million, and the other categories will be \$4686 million, \$1292 million, and \$776 million, respectively, for total revenues of \$12.7 billion.

# Alternative Example 2.3

- **Problem**

- HJ Heinz Company reported the following sales revenues by category:

	<b>2012</b>	<b>2011</b>
Ketchup and Sauces	\$ 5,233	\$ 4,608
Meals and Snacks	\$ 4,480	\$ 4,282
Infant/Nutrition	\$ 1,232	\$ 1,175
Other Processed Foods	\$ 705	\$ 641
Total	<hr/> \$ 11,650	<hr/> \$ 10,706

- **What was the percentage growth for each category?**
  - **If Heinz has the same percentage growth from 2012 to 2013, what will its total revenues be in 2013?**

# Alternative Example 2.3

- **Solution**

- Ketchup and Sauces
  - $(\$5,233 \div \$4,608) - 1 = 13.56\%$
- Meals and Snacks
  - $(\$4,480 \div \$4,282) - 1 = 4.62\%$
- Infant/Nutrition
  - $(\$1,232 \div \$1,175) - 1 = 4.85\%$
- Other
  - $(\$705 \div \$641) - 1 = 9.98\%$
- Total
  - $(\$11,650 \div \$10,706) - 1 = 8.82\%$



# Alternative Example 2.3

- **Solution** (continued)
  - Estimated 2013 Total Revenue
    - $\$11,650 \times (1 + 8.82\%)$
    - $\$11,650 \times 1.0882 = \$12,677$



## 2.6 Financial Statement Analysis

- Used to:
  - Compare the firm with itself over time
  - Compare the firm to other similar firms

# 2.6 Financial Statement Analysis

- Profitability Ratios
  - Gross Margin

$$\text{Gross Margin} = \frac{\text{Gross Profit}}{\text{Sales}}$$

- Operating Margin

$$\text{Operating Margin} = \frac{\text{Operating Income}}{\text{Sales}}$$



## 2.6 Financial Statement Analysis

- A firm's **gross margin** reflects its ability to sell a product for more than the cost of producing it. For example, in 2012, Global had gross margin of  $33.3/186.7 = 17.8\%$ .
- Because there are additional expenses of operating a business beyond the direct costs of goods sold, another important profitability ratio is the **operating margin**, the ratio of operating income to revenues. **It reveals how much a company earns before interest and taxes from each dollar of sales.**
- In 2012, Global's operating margin was  $10.4/186.7 = 5.57\%$ , an increase from its 2011 operating margin of  $7.1/176.1 = 4.03\%$ .

# 2.6 Financial Statement Analysis

- Profitability Ratios
  - EBIT Margin

$$\text{EBIT} = \frac{\text{EBIT}}{\text{Sales}}$$

- Net Profit Margin

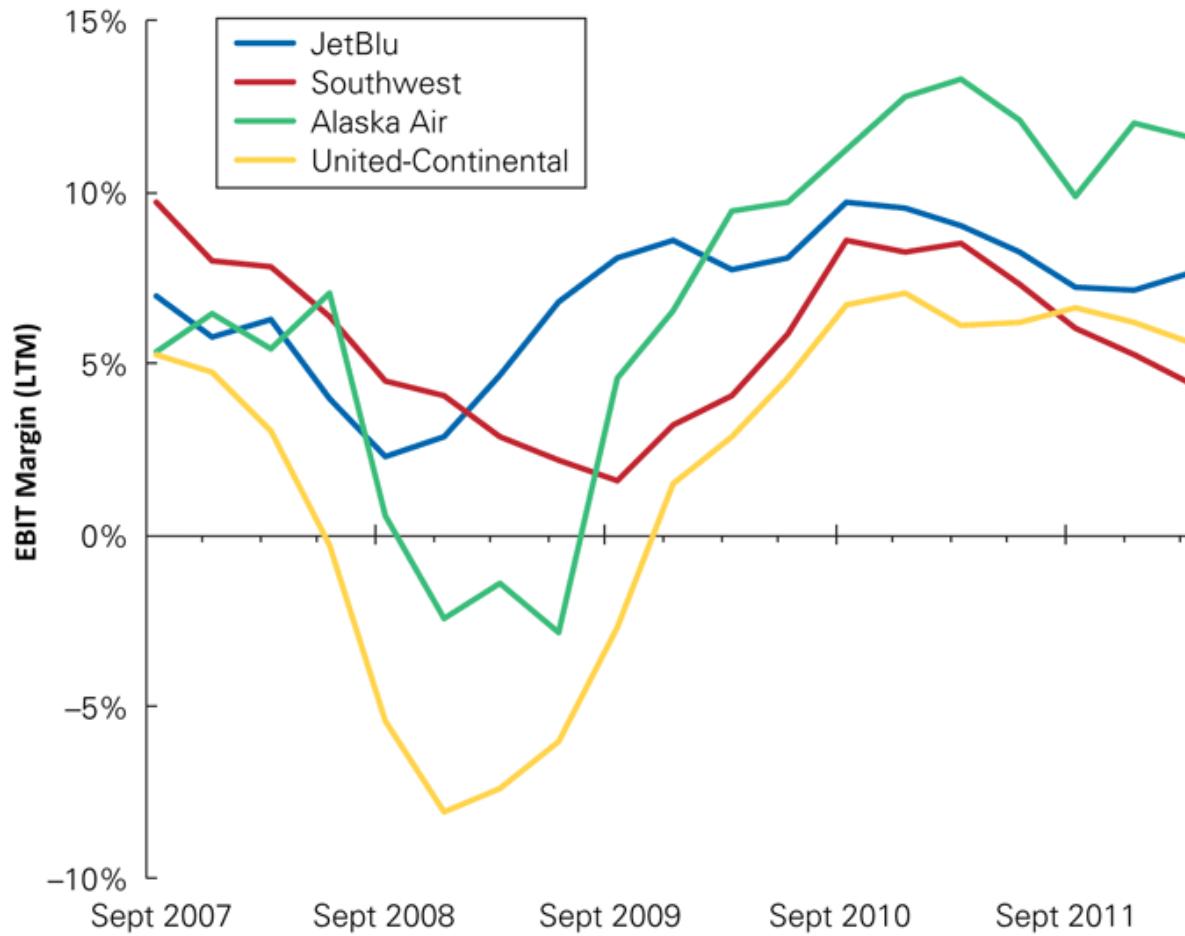
$$\text{Net Profit Margin} = \frac{\text{Net Income}}{\text{Total Sales}}$$



## 2.6 Financial Statement Analysis

- We can similarly compute a firm's EBIT margin =  $(\text{EBIT}/\text{Sales})$ .
- By comparing operating or EBIT margins across firms within an industry, we can assess the relative efficiency of the firms' operations.
- For example, Figure 2.1 compares the EBIT margins of four major U.S. airlines from 2007 to 2012.
- Notice the impact on profitability from the financial crisis during 2008–2009, as well as the consistently low profits of the largest and oldest of the carriers, United-Continental (UAL), relative to its competitors.

# Figure 2.1 EBIT Margins for Four U.S. Airlines



Source: Capital IQ



## 2.6 Financial Statement Analysis

- Liquidity Ratios
  - Current Ratio
    - Current Assets / Current Liabilities
  - Quick Ratio
    - $(\text{Cash} + \text{Short-Term Investments} + \text{A/R}) / \text{Current Liabilities}$
  - Cash Ratio
    - Cash / Current Liabilities



## 2.6 Financial Statement Analysis

- Financial analysts often use the information in the firm's balance sheet to assess its financial solvency or liquidity.
- Specifically, creditors often compare a firm's current assets and current liabilities **to assess whether the firm has sufficient working capital to meet its short-term needs.**
- This comparison can be summarized in the firm's **current ratio**
- Notice that Global's current ratio increased from  $48/44 = 1.09$  in 2011 to  $57/48 = 1.19$  in 2012.



## 2.6 Financial Statement Analysis

- **A more stringent test of the firm's liquidity is the quick ratio,** which compares only cash and “near cash” assets, such as short-term investments and accounts receivable, to current liabilities.
- In 2012, Global’s quick ratio was  $(21.2 + 18.5)/48 = 0.83$ .
- A higher current or quick ratio implies less risk of the firm experiencing a cash shortfall in the near future.
- A reason to exclude inventory is that it may not be that liquid; indeed an increase in the current ratio that results from an unusual increase in inventory could be an indicator that the firm is having difficulty selling its products.



## 2.6 Financial Statement Analysis

- Ultimately, firms need cash to pay employees and meet other obligations.
- Running out of cash can be very costly for a firm, so firms often gauge their cash position by calculating **the cash ratio, which is the most stringent liquidity ratio**
- Of course, all of these liquidity ratios are limited in that they only consider the firm's current assets.
- If the firm is able to generate significant cash quickly from its ongoing activities, it might be highly liquid even if these ratios are poor.

# Textbook Example 2.4

## Computing Liquidity Ratios

### Problem

Calculate Global's quick ratio and cash ratio. Based on these measures, how has its liquidity changed between 2011 and 2012?

# Textbook Example 2.4

## Solution

In 2011, Global's quick ratio was  $(19.5 + 13.2)/44 = 0.74$  and its cash ratio was  $19.5/44 = 0.44$ . In 2012, these ratios were 0.83 and  $21.2/48 = 0.44$ , respectively. Thus, Global's cash ratio remained stable over this period, while its quick ratio improved slightly. But although these liquidity measures have not deteriorated, a more worrisome indicator for investors regarding Global's liquidity might be its ongoing negative cash flow from operating and investing activities, shown in the statement of cash flows.



# Alternative Example 2.4

- **Problem**

- Based on the data on the following slide, calculate Rylan Corporation's quick ratio and cash ratio. **Based on these measures, how has its liquidity changed between 2011 and 2012?**

# Alternative Example 2.4

- **Problem**

<b>Balance Sheet</b>		
<b>Assets</b>	<b>2012</b>	<b>2011</b>
Cash	\$2,000,000	\$4,000,000
Short-Term Investments	\$7,000,000	\$6,000,000
Accounts Receivable	\$20,000,000	\$15,000,000
Inventory	\$26,000,000	\$23,000,000
Other Current Assets	\$10,000,000	\$9,000,000
<b>Total Current Assets</b>	<b>\$65,000,000</b>	<b>\$57,000,000</b>
Long-Term Assets	\$50,000,000	\$45,000,000
<b>Total Assets</b>	<b>\$115,000,000</b>	<b>\$102,000,000</b>
<b>Liabilities</b>	<b>Current Year</b>	<b>Prior Year</b>
Accounts Payable	\$10,000,000	\$7,000,000
Short-Term Debt	\$25,000,000	\$20,000,000
<b>Total Current Liabilities</b>	<b>\$35,000,000</b>	<b>\$27,000,000</b>
Long-Term Debt	\$30,000,000	\$30,000,000
<b>Total Liabilities</b>	<b>\$65,000,000</b>	<b>\$57,000,000</b>
<b>Total Equity</b>	<b>\$50,000,000</b>	<b>\$45,000,000</b>
<b>Total Liabilities and Equity</b>	<b>\$115,000,000</b>	<b>\$102,000,000</b>

# Alternative Example 2.4

- **Solution**

- Quick Ratio

- 2012:  $(\$2,000,000 + \$7,000,000 + \$20,000,000) / \$35,000,000 = 0.83$
    - 2011:  $(\$4,000,000 + \$6,000,000 + \$15,000,000) / \$27,000,000 = 0.93$

- Cash Ratio

- 2012:  $\$2,000,000 / \$35,000,000 = 0.06$
    - 2011:  $\$4,000,000 / \$27,000,000 = 0.15$

- Using either measure, Rylan's liquidity has deteriorated.



## 2.6 Financial Statement Analysis

- We can use the combined information in the firm's income statement and balance sheet to gauge how efficiently the firm is utilizing its net working capital.
- To evaluate the speed at which a company turns sales into cash, firms often compute the number of accounts receivable days
- That is, the number of days' worth of sales accounts receivable represents

## 2.6 Financial Statement Analysis

- Working Capital Ratios
  - Accounts Receivable Days

$$\text{Accounts Receivable Days} = \frac{\text{Accounts Receivable}}{\text{Average Daily Sales}}$$

- Accounts Payable Days

$$\text{Accounts Payable Days} = \frac{\text{Accounts Payable}}{\text{Average Daily Cost of Sales}}$$

- Inventory Days

$$\text{Inventory Days} = \frac{\text{Inventory}}{\text{Average Daily Cost of Sales}}$$



## 2.6 Financial Statement Analysis

- Given average daily sales of  $\$186.7 \text{ million}/365 = \$0.51 \text{ million}$  in 2012, Global's receivables of \$18.5 million represent  $18.5/0.51 = 36$  days' worth of sales.
- In other words, on average, Global takes a little over one month to collect payment from its customers.
- In 2011, Global's accounts receivable represented only 27 days' worth of sales.

## 2.6 Financial Statement Analysis

- Working Capital Ratios
  - Accounts Receivable Turnover

$$\text{Accounts Receivable Turnover} = \frac{\text{Annual Sales}}{\text{Accounts Receivable}}$$

- Accounts Payable Turnover

$$\text{Accounts Payable Turnover} = \frac{\text{Annual Cost of Sales}}{\text{Accounts Payable}}$$

- Inventory Turnover

$$\text{Inventory Turnover} = \frac{\text{Annual Cost of Sales}}{\text{Inventory}}$$



## 2.6 Financial Statement Analysis

- **Turnover ratios are an alternative way to measure working capital.**
- We compute turnover ratios by expressing annual revenues or costs as a multiple of the corresponding working capital account.
- Global's inventory turnover in 2012 is  $153.4/15.3 = 10.0^*$ , indicating that Global sold roughly 10 times its current stock of inventory during the year.
- Note that higher turnover corresponds to shorter days, and thus a more efficient use of working capital.



## 2.6 Financial Statement Analysis

- While working capital ratios can be meaningfully compared over time or within an industry, there are wide differences across industries.
- While the average large U.S. firm had about 45 days' worth of receivables and 65 days' worth of inventory in 2012, airlines tend to have minimal accounts receivable or inventory, as their customers pay in advance and they sell a transportation service as opposed to a physical commodity.
- On the other hand, distillers and wine producers tend to have very large inventory (over 300 days on average), as their products are often aged prior to sale.



## 2.6 Financial Statement Analysis

- Lenders often assess a firm's ability to meet its interest obligations by comparing its earnings with its interest expenses using an interest coverage ratio.
- One common ratio to consider is the firm's EBIT as a multiple of its interest expenses.
- A high ratio indicates that the firm is earning much more than is necessary to meet its required interest payments
- As a benchmark, creditors often look for an EBIT/Interest coverage ratio in excess of 5\* for high-quality borrowers.
- When EBIT/Interest falls below 1.5, lenders may begin to question a company's ability to repay its debts.



## 2.6 Financial Statement Analysis

- Interest Coverage Ratios
  - EBIT/Interest
  - EBITDA/Interest
    - $\text{EBITDA} = \text{EBIT} + \text{Depreciation and Amortization}$



# Textbook Example 2.5

## Computing Interest Coverage Ratios

### Problem

Assess Global's ability to meet its interest obligations by calculating interest coverage ratios using both EBIT and EBITDA.

# Textbook Example 2.5 (cont'd)

## Solution

In 2011 and 2012, Global had the following interest coverage ratios:

$$2011: \frac{\text{EBIT}}{\text{Interest}} = \frac{7.1}{4.6} = 1.54 \quad \text{and} \quad \frac{\text{EBITDA}}{\text{Interest}} = \frac{7.1 + 1.1}{4.6} = 1.78$$

$$2012: \frac{\text{EBIT}}{\text{Interest}} = \frac{10.4}{7.7} = 1.35 \quad \text{and} \quad \frac{\text{EBITDA}}{\text{Interest}} = \frac{10.4 + 1.2}{7.7} = 1.51$$

In this case Global's low—and declining—interest coverage could be a source of concern for its creditors.

# Alternative Example 2.5

- **Problem**

- Assess Rylan's ability to meet its interest obligations by calculating interest coverage ratios using both EBIT and EBITDA.

	Income Statement	
	2012	2011
Revenues	\$500,000,000	\$450,000,000
Less: Cost of Goods Sold	\$225,000,000	\$200,000,000
Gross Profit	\$275,000,000	\$250,000,000
Less: Operating Expenses	\$150,000,000	\$140,000,000
EBITDA	\$125,000,000	\$110,000,000
Less: Depreciation	\$25,000,000	\$22,500,000
EBIT	\$100,000,000	\$87,500,000
Less: Interest Expense	\$10,000,000	\$9,000,000
EBT	\$90,000,000	\$78,500,000
Less: Taxes (40%)	\$36,000,000	\$31,400,000
Net Income	\$54,000,000	\$47,100,000

# Alternative Example 2.5 (cont'd)

- **Solution**
  - EBIT/Interest
    - 2012:  $\$100,000,000 / \$10,000,000 = 10.0$
    - 2011:  $\$87,500,000 / \$9,000,000 = 9.72$
  - EBITDA/Interest
    - 2012:  $\$125,000,000 / \$10,000,000 = 12.5$
    - 2011:  $\$110,000,000 / \$9,000,000 = 12.2$
  - Using either measure, Rylan's ability to meet its obligations is very good and improving.

## 2.6 Financial Statement Analysis

- An important piece of information that we can learn from a firm's balance sheet is the firm's leverage, or the extent to which it relies on debt as a source of financing. The debt to equity ratio is a common ratio used to assess a firm's leverage.
- Leverage Ratios
  - Debt-Equity Ratio

$$\text{Debt-Equity Ratio} = \frac{\text{Total Debt}}{\text{Total Equity}}$$

- Debt-to-Capital Ratio

$$\text{Debt-to-Capital Ratio} = \frac{\text{Total Debt}}{\text{Total Equity} + \text{Total Debt}}$$



## 2.6 Financial Statement Analysis

- Because of the difficulty interpreting the book value of equity, the book debt-equity ratio is not especially useful.
- Indeed, the book value of equity might even be negative, making the ratio meaningless.
- For example, Domino's Pizza (DPZ) has, based on the strength of its cash flow, consistently borrowed in excess of the book value of its assets.
- In 2012, it had debt of \$1.6 billion, with a total book value of assets of only \$600 million and an equity book value of -\$1.4 billion!
- It is therefore most informative to compare the firm's debt to the market value of its equity.

## 2.6 Financial Statement Analysis

- Leverage Ratios
  - Net Debt
    - Total Debt + Excess Cash & Short-Term Investments
  - Debt-to-Enterprise Value

$$\text{Debt-to-Enterprise Value Ratio} = \frac{\text{Net Debt}}{\text{Market Value of Equity} + \text{Net Debt}}$$

- Equity Multiplier
  - Total Assets / Book Value of Equity

# 2.6 Financial Statement Analysis

- Valuation Ratios

- P/E Ratio

$$P / E \text{ Ratio} = \frac{\text{Market Capitalization}}{\text{Net Income}} = \frac{\text{Share Price}}{\text{Earnings per Share}}$$

- Enterprise Value to EBIT

$$\text{Enterprise Value to EBIT} = \frac{\text{Market Value of Equity} + \text{Debt} - \text{Cash}}{\text{EBIT}}$$

- Enterprise Value to Sales

$$\text{Enterprise Value to Sales} = \frac{\text{Market Value of Equity} + \text{Debt} - \text{Cash}}{\text{Sales}}$$



## 2.6 Financial Statement Analysis

- The P/E ratio is a simple measure that is used to assess whether a stock is over- or undervalued based on the idea that the value of a stock should be proportional to the level of earnings it can generate for its shareholders.
- P/E ratios can vary widely across industries
- For example, in January 2012, the average large U.S. firm had a P/E ratio of about 17.
- But software firms, which tend to have above-average growth rates, had an average P/E ratio of 32, while automotive firms, which were still feeling the effects of the recession, had an average P/E ratio of 9.
- The risk of the firm will also affect this ratio—all else equal, riskier firms have lower P/E ratios.



## 2.6 Financial Statement Analysis

- Because the P/E ratio considers the value of the firm's equity, it is sensitive to the firm's choice of leverage.
- The P/E ratio is therefore of limited usefulness when comparing firms with markedly different leverage. We can avoid this limitation by instead assessing the market value of the underlying business using valuation ratios based on the firm's enterprise value.
- Common ratios include the ratio of enterprise value to revenue, or enterprise value to operating income, EBIT, or EBITDA.
- These ratios compare the value of the business to its sales, operating profits, or cash flow.
- Like the P/E ratio, these ratios are used to make intra-industry comparisons of how firms are priced in the market.

# Textbook Example 2.6

## Computing Profitability and Valuation Ratios

### Problem

Consider the following data as of May 2012 for Wal-Mart Stores and Target Corporation (in \$ billion):

	Wal-Mart Stores (WMT)	Target Corporation (TGT)
Sales	446.9	69.9
EBIT	26.6	5.3
Depreciation and Amortization	8.1	2.1
Net Income	15.7	2.9
Market Capitalization	200.9	38.4
Cash	6.6	0.8
Debt	58.4	17.5

Compare Wal-Mart's and Target's EBIT margins, net profit margins, P/E ratios, and the ratio of enterprise value to sales, EBIT, and EBITDA.

# Textbook Example 2.6 (cont'd)

## Solution

Wal-Mart had an EBIT margin of  $26.6/446.9 = 6.0\%$ , a net profit margin of  $15.7/446.9 = 3.5\%$ , and a P/E ratio of  $200.9/15.7 = 12.8$ . Its enterprise value was  $200.9 + 58.4 - 6.6 = \$252.7$  billion, which has a ratio of  $252.7/446.9 = 0.57$  to sales,  $252.7/26.6 = 9.5$  to EBIT, and  $252.7/(26.6 + 8.1) = 7.3$  to EBITDA.

Target had an EBIT margin of  $5.3/69.9 = 7.6\%$ , a net profit margin of  $2.9/69.9 = 4.1\%$ , and a P/E ratio of  $38.4/2.9 = 13.2$ . Its enterprise value was  $38.4 + 17.5 - 0.8 = \$55.1$  billion, which has a ratio of  $55.1/69.9 = 0.79$  to sales,  $55.1/5.3 = 10.4$  to EBIT, and  $55.1/(5.3 + 2.1) = 7.4$  to EBITDA.

Note that while Target trades for a significantly higher multiple of sales than Wal-Mart (not surprising given its higher profit margins), the other valuation multiples are quite close, despite the large difference in the size of the two firms.

# Alternative Example 2.6

## Problem:

Consider the following data for the FY 2011 for Yahoo! and Google (in millions):

	Yahoo!	Google
Sales	\$4,984	\$37,905
EBIT	\$825	\$11,742
Depreciation & Amortization	\$648	\$1,851
Net Income	\$1,049	\$9,737
Market Capitalization	\$19,195	\$209,850
Cash	\$1,562	\$9,983
Debt	\$994	\$14,429



## Alternative Example 2.6 (cont'd)

### Problem: (cont'd)

Compare Yahoo! and Google's operating margin, net profit margin, P/E ratio, and the ratio of enterprise value to operating income and sales.

# Alternative Example 2.6 (cont'd)

## Solution:

Yahoo:

$$\text{EBIT Margin} = \$825 / \$4,984 = 16.55\%$$

$$\text{Net Profit Margin} = \$1,049 / \$4,984 = 21.04\%$$

$$\text{P/E Ratio} = \$19,195 / \$1,049 = 18.30$$

# Alternative Example 2.6 (cont'd)

## Solution:

Yahoo:

$$\text{Enterprise Value} = \$19,195 + \$994 - \$1,562 = \$18,627$$

$$\text{Enterprise Value/Sales} = \$18,627 / \$4,984 = 3.73$$

$$\text{Enterprise Value/EBIT} = \$18,627 / \$825 = 22.58$$

$$\text{Enterprise Value/EBITDA} = \$18,627 / (\$825 + \$648) = 12.65$$

# Alternative Example 2.6 (cont'd)

## Solution:

Google:

$$\text{EBIT Margin} = \$11,742 / \$37,905 = 30.98\%$$

$$\text{Net Profit Margin} = \$9,737 / \$37,905 = 25.69\%$$

$$\text{P/E Ratio} = \$209,850 / \$9,737 = 21.55$$

# Alternative Example 2.6 (cont'd)

## Solution:

Google:

$$\text{Enterprise Value} = \$209,850 + \$14,429 - \$9,983 = \$214,296$$

$$\text{Enterprise Value/Sales} = \$214,296 / \$37,905 = 5.65$$

$$\text{Enterprise Value/EBIT} = \$214,296 / \$11,742 = 18.25$$

$$\text{Enterprise Value/EBITDA} = \$214,296 / (\$11,742 + \$1,851) = \\ 15.77$$

# Alternative Example 2.6 (cont'd)

- To summarize:

Ratio	Yahoo!	Google
EBIT Margin	16.55%	30.98%
Net Profit Margin	21.04%	25.69%
P/E Ratio	18.30	21.55
Enterprise Value to Sales	3.73	5.65
Enterprise Value to EBIT	22.58	18.25
Enterprise Value to EBITDA	12.65	15.77

# Alternative Example 2.6 (cont'd)

## Solution (cont'd):

Even though Yahoo! And Google are competitors, their ratios look much different. Yahoo! has a lower profit margin and lower P/E ratio than Google. Their enterprise value to sales ratio is also lower than that of Google. The difference is consistent with Yahoo!'s lower margins.



## 2.6 Financial Statement Analysis

- Operating Returns
  - Return on Equity

$$\text{Return on Equity} = \frac{\text{Net Income}}{\text{Book Value of Equity}}$$

- Return on Assets

$$\text{Return on Assets} = \frac{\text{Net Income} + \text{Interest Expense}}{\text{Total Assets}}$$

- Return on Invested Capital

$$\text{Return on Invested Capital} = \frac{\text{EBIT} (1 - \text{Tax Rate})}{\text{Book Value of Equity} + \text{Net Debt}}$$



## 2.6 Financial Statement Analysis

- As a performance measure, ROA has the benefit that it is less sensitive to leverage than ROE.
- However, it is sensitive to working capital--for example, an equal increase in the firm's receivables and payables will increase total assets and thus lower ROA.
- To avoid this problem, we can consider the firm's return on invested capital (ROIC)



# Textbook Example 2.7

## Computing Operating Returns

### Problem

Assess how Global's ability to use its assets effectively has changed in the last year by computing the change in its return on assets and return on invested capital.

# Textbook Example 2.7 (cont'd)

## Solution

In 2012, Global's ROA was  $(2.0 + 7.7)/177.7 = 5.5\%$ , compared to an ROA in 2011 of  $(1.9 + 4.6)/148.9 = 4.4\%$ .

To compute the return on invested capital, we need to calculate after-tax EBIT, which requires an estimate of Global's tax rate. Because Net income = Pretax income  $\times (1 - \text{tax rate})$ , we can estimate  $(1 - \text{tax rate}) = \text{Net income}/\text{Pretax income}$ . Thus,  $\text{EBIT} \times (1 - \text{tax rate}) = 10.4 \times (2.0/2.7) = 7.7$  in 2012, and  $7.1 \times (1.9/2.5) = 5.4$  in 2011.

To compute invested capital, note first that Global's net debt was  $3.2 + 12.3 + 76.3 - 19.5 = 72.3$  in 2011 and  $3.5 + 13.3 + 99.9 - 21.2 = 95.5$  in 2012. Thus, ROIC in 2012 was  $7.7/(22.2 + 95.5) = 6.5\%$ , compared with  $5.4/(21.2 + 72.3) = 5.8\%$  in 2011.

The improvement in Global's ROA and ROIC from 2011 to 2012 suggests that Global was able to use its assets more effectively and increase its return over this period.



# Alternative Example 2.7

- **Problem**

- Using the balance sheet in Alternative Example 2.4 and the income statement in Alternative Example 2.5, assess how Rylan's ability to use its assets effectively has changed in the last year by computing the change in its return on assets and return on invested capital.

# Alternative Example 2.7 (cont'd)

- **Solution**
  - Return on Assets

$$\text{Return on Assets}_{2011} = \frac{\$47,100,000 + \$9,000,000}{\$102,000,000} = 55.0\%$$

$$\text{Return on Assets}_{2012} = \frac{\$54,000,000 + \$10,000,000}{\$115,000,000} = 55.7\%$$

# Alternative Example 2.7 (cont'd)

- **Solution**

- Return on Invested Capital

Return on Invested Capital<sub>2011</sub> =

$$\frac{\$87,500,000 (1 - .40)}{\$45,000,000 + (\$20,000,000 + \$30,000,000) - \$4,000,000} = 57.69\%$$

Return on Invested Capital<sub>2012</sub> =

$$\frac{\$100,000,000 (1 - .40)}{\$50,000,000 + (\$25,000,000 + \$30,000,000) - \$2,000,000} = 58.25\%$$

- Both ROA and ROIC improved slightly, indicating a more efficient use of its assets.



## 2.6 Financial Statement Analysis

- We can gain further insight into a firm's ROE using a tool called the DuPont Identity (named for the company that popularized its use), which expresses the ROE in terms of the firm's profitability, asset efficiency, and leverage

## 2.6 Financial Statement Analysis

- The DuPont Identity

$$\text{ROE} = \underbrace{\left( \frac{\text{Net Income}}{\text{Sales}} \right)}_{\text{Net Profit Margin}} \times \underbrace{\left( \frac{\text{Sales}}{\text{Total Assets}} \right)}_{\text{Asset Turnover}} \times \underbrace{\left( \frac{\text{Total Assets}}{\text{Book Value of Equity}} \right)}_{\text{Equity Multiplier}}$$

# Textbook Example 2.8

## Determinants of ROE

### Problem

For the year ended January 2012, Wal-Mart Stores had sales of \$446.9 billion, net income of \$15.7 billion, assets of \$193.4 billion, and a book value of equity of \$71.3 billion. For the same period, Target (TGT) had sales of \$69.9 billion, net income of \$2.9 billion, total assets of \$46.6 billion, and a book value of equity of \$15.8 billion. Compare these firms' profitability, asset turnover, equity multipliers, and return on equity during this period. If Target had been able to match Wal-Mart's asset turnover during this period, what would its ROE have been?

# Textbook Example 2.8 (cont'd)

## Solution

Wal-Mart's net profit margin (from Example 2.6) was  $15.7/446.9 = 3.51\%$ , which was below Target's net profit margin of  $2.9/69.9 = 4.15\%$ . On the other hand, Wal-Mart used its assets more efficiently, with an asset turnover of  $446.9/193.4 = 2.31$ , compared to only  $69.9/46.6 = 1.50$  for Target. Finally, Target had greater leverage (in terms of book value), with an equity multiplier of  $46.6/15.8 = 2.95$ , relative to Wal-Mart's equity multiplier of  $193.4/71.3 = 2.71$ . Next, let's compute the ROE of each firm directly, and using the DuPont Identity:

$$\text{Wal-Mart ROE} = \frac{15.7}{71.3} = 22.0\% = 3.51\% \times 2.31 \times 2.71$$

$$\text{Target ROE} = \frac{2.9}{15.8} = 18.4\% = 4.15\% \times 1.50 \times 2.95$$

Note that due to its lower asset turnover, Target had a lower ROE than Wal-Mart despite its higher net profit margin and leverage. If Target had been able to match Wal-Mart's asset turnover, its ROE would have been significantly higher:  $4.15\% \times 2.31 \times 2.95 = 28.3\%$ .

# Alternative Example 2.8

- **Problem**

- The following data is for FY 2011

	<b>Yahoo!</b>	<b>Google</b>
Sales	\$4,984	\$37,905
Total Assets	\$14,783	\$72,574
Book Value of Equity	\$12,581	\$58,145
Net Income	\$1,049	\$9,737

- Compare these firms' profitability, asset turnover, equity multipliers, and return on equity during this period.



# **Alternative Example 2.8 (cont'd)**

- **Problem**

- If Yahoo! had been able to match Google's asset turnover during this period, what would its ROE have been?

# Alternative Example 2.8 (cont'd)

- **Solution**

- Yahoo!

- Net Profit Margin =  $\$1,049 / \$4,984 = 21.04\%$
    - Total Asset Turnover =  $\$4,984 / \$14,783 = 0.337$
    - Equity Multiplier =  $\$14,783 / \$12,581 = 1.18$
    - ROE =  $\$1,049 / \$12,581 = 8.34\%$

- Google

- Net Profit Margin =  $\$9,737 / \$37,905 = 25.69\%$
    - Total Asset Turnover =  $\$37,905 / \$72,574 = 0.522$
    - Equity Multiplier =  $\$72,574 / \$58,145 = 1.25$
    - ROE =  $\$9,737 / \$58,145 = 16.75\%$

# Alternative Example 2.8 (cont'd)

- **Solution**

- Google had a higher Profit Margin, Total Asset Turnover, and Equity Multiplier. Thus, it is not surprising that Google had a superior ROE.
- If Yahoo! had been able to match Google's asset turnover during this period, its ROE would have been:  $\text{ROE} = 21.04\% \times 0.522 \times 1.18 = 12.97\%$ , or over 50% higher.



## 2.8 Financial Reporting in Practice

- Even with safeguards, reporting abuses still happen:
  - Enron
  - WorldCom
  - Sarbanes-Oxley Act (SOX)
  - Dodd-Frank Act

# Table 2.4

## A Summary of Key Financial Ratios

Profitability Ratios		Interest Coverage Ratios	
Gross Margin	$\frac{\text{Gross Profit}}{\text{Sales}}$	EBIT/Coverage	$\frac{\text{EBIT}}{\text{Interest Expense}}$
Operating Margin	$\frac{\text{Operating Income}}{\text{Sales}}$	EBITDA/Coverage	$\frac{\text{EBITDA}}{\text{Interest Expense}}$
EBIT Margin	$\frac{\text{EBIT}}{\text{Sales}}$		
Net Profit Margin	$\frac{\text{Net Income}}{\text{Sales}}$		
Liquidity Ratios		Leverage Ratios	
Current Ratio	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$	Debt-Equity Ratio	$\frac{\text{Total Debt}}{\text{Book (or Market) Value of Equity}}$
Quick Ratio	$\frac{\text{Cash & Short-term Investments} + \text{Accounts Receivable}}{\text{Current Liabilities}}$	Debt-to-Capital Ratio	$\frac{\text{Total Debt}}{\text{Total Equity} + \text{Total Debt}}$
Cash Ratio	$\frac{\text{Cash}}{\text{Current Liabilities}}$	Debt-to-Enterprise Value Ratio	$\frac{\text{Net Debt}}{\text{Enterprise Value}}$
Working Capital Ratios		Equity Multiplier (book)	$\frac{\text{Total Assets}}{\text{Book Value of Equity}}$
Accounts Receivable Days	$\frac{\text{Accounts Receivable}}{\text{Average Daily Sales}}$	Equity Multiplier (market)	$\frac{\text{Enterprise Value}}{\text{Market Value of Equity}}$
Accounts Payable Days	$\frac{\text{Accounts Payable}}{\text{Average Daily Cost of Sales}}$		
Inventory Days	$\frac{\text{Inventory}}{\text{Average Daily Cost of Sales}}$		
Accounts Receivable Turnover	$\frac{\text{Annual Sales}}{\text{Accounts Receivable}}$	Valuation Ratios	
Accounts Payable Turnover	$\frac{\text{Annual Cost of Sales}}{\text{Accounts Payable}}$	Market-to-Book Ratio	$\frac{\text{Market Value of Equity}}{\text{Book Value of Equity}}$
Inventory Turnover	$\frac{\text{Annual Cost of Sales}}{\text{Inventory}}$	Price-Earnings Ratio	$\frac{\text{Share Price}}{\text{Earnings per Share}}$
Operating Returns		Enterprise Value Ratios	$\frac{\text{Enterprise Value}}{\text{EBIT or EBITDA or Sales}}$
Asset Turnover	$\frac{\text{Sales}}{\text{Total Assets}}$		
Return on Equity (ROE)	$\frac{\text{Net Income}}{\text{Book Value of Equity}}$		
Return on Assets (ROA)	$\frac{\text{Net Income} + \text{Interest Expense}}{\text{Book Value of Assets}}$		
Return on Invested Capital (ROIC)	$\frac{\text{EBIT} (1 - \text{Tax Rate})}{\text{Book Value of Equity} + \text{Net Debt}}$		

# Table 2.5

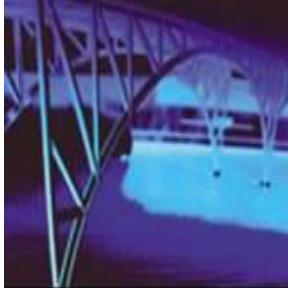
## 2009–2013

### Financial Statement Data and Stock Price Data for Mydeco Corp.

Mydeco Corp. 2009–2013	(All data as of fiscal year end; in \$ million)				
Income Statement	2009	2010	2011	2012	2013
Revenue	404.3	363.8	424.6	510.7	604.1
Cost of Goods Sold	(188.3)	(173.8)	(206.2)	(246.8)	(293.4)
<b>Gross Profit</b>	<b>216.0</b>	<b>190.0</b>	<b>218.4</b>	<b>263.9</b>	<b>310.7</b>
Sales and Marketing	(66.7)	(66.4)	(82.8)	(102.1)	(120.8)
Administration	(60.6)	(59.1)	(59.4)	(66.4)	(78.5)
Depreciation & Amortization	(27.3)	(27.0)	(34.3)	(38.4)	(38.6)
<b>EBIT</b>	<b>61.4</b>	<b>37.5</b>	<b>41.9</b>	<b>57.0</b>	<b>72.8</b>
Interest Income (Expense)	(33.7)	(32.9)	(32.2)	(37.4)	(39.4)
<b>Pretax Income</b>	<b>27.7</b>	<b>4.6</b>	<b>9.7</b>	<b>19.6</b>	<b>33.4</b>
Income Tax	(9.7)	(1.6)	(3.4)	(6.9)	(11.7)
<b>Net Income</b>	<b>18.0</b>	<b>3.0</b>	<b>6.3</b>	<b>12.7</b>	<b>21.7</b>
<i>Shares outstanding (millions)</i>	55.0	55.0	55.0	55.0	55.0
<i>Earnings per share</i>	\$0.33	\$0.05	\$0.11	\$0.23	\$0.39
Balance Sheet	2009	2010	2011	2012	2013
Assets					
Cash	48.8	68.9	86.3	77.5	85.0
Accounts Receivable	88.6	69.8	69.8	76.9	86.1
Inventory	33.7	30.9	28.4	31.7	35.3
<b>Total Current Assets</b>	<b>171.1</b>	<b>169.6</b>	<b>184.5</b>	<b>186.1</b>	<b>206.4</b>
Net Property, Plant & Equip.	245.3	243.3	309	345.6	347.0
Goodwill & Intangibles	361.7	361.7	361.7	361.7	361.7
<b>Total Assets</b>	<b>778.1</b>	<b>774.6</b>	<b>855.2</b>	<b>893.4</b>	<b>915.1</b>
Liabilities & Stockholders' Equity					
Accounts Payable	18.7	17.9	22.0	26.8	31.7
Accrued Compensation	6.7	6.4	7.0	8.1	9.7
<b>Total Current Liabilities</b>	<b>25.4</b>	<b>24.3</b>	<b>29.0</b>	<b>34.9</b>	<b>41.4</b>
Long-term Debt	500.0	500.0	575.0	600.0	600.0
<b>Total Liabilities</b>	<b>525.4</b>	<b>524.3</b>	<b>604.0</b>	<b>634.9</b>	<b>641.4</b>
Stockholders' Equity	252.7	250.3	251.2	258.5	273.7
<b>Total Liabilities &amp; Stockholders' Equity</b>	<b>778.1</b>	<b>774.6</b>	<b>855.2</b>	<b>893.4</b>	<b>915.1</b>
Statement of Cash Flows	2009	2010	2011	2012	2013
Net Income	18.0	3.0	6.3	12.7	21.7
Depreciation & Amortization	27.3	27.0	34.3	38.4	38.6
Chg. in Accounts Receivable	3.9	18.8	(0.0)	(7.1)	(9.2)
Chg. in Inventory	(2.9)	2.8	2.5	(3.3)	(3.6)
Chg. in Payables & Accrued Comp.	2.2	(1.1)	4.7	5.9	6.5
<b>Cash from Operations</b>	<b>48.5</b>	<b>50.5</b>	<b>47.8</b>	<b>46.6</b>	<b>54.0</b>
Capital Expenditures	(25.0)	(25.0)	(100.0)	(75.0)	(40.0)
<b>Cash from Investing Activities</b>	<b>(25.0)</b>	<b>(25.0)</b>	<b>(100.0)</b>	<b>(75.0)</b>	<b>(40.0)</b>
Dividends Paid	(5.4)	(5.4)	(5.4)	(5.4)	(6.5)
Sale (or purchase) of stock	—	—	—	—	—
Debt Issuance (Pay Down)	—	—	75.0	25.0	—
<b>Cash from Financing Activities</b>	<b>(5.4)</b>	<b>(5.4)</b>	<b>69.6</b>	<b>19.6</b>	<b>(6.5)</b>
<b>Change in Cash</b>	<b>18.1</b>	<b>20.1</b>	<b>17.4</b>	<b>(8.8)</b>	<b>7.5</b>
<b>Mydeco Stock Price</b>	<b>\$7.92</b>	<b>\$3.30</b>	<b>\$5.25</b>	<b>\$8.71</b>	<b>\$10.89</b>



# Time Value of Money



# ***After studying Chapter 3, you should be able to:***

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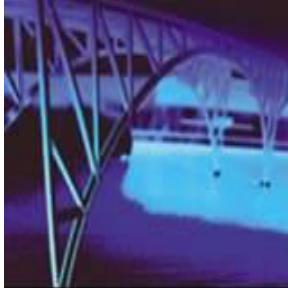
- 1. Understand what is meant by "the time value of money."**
- 2. Understand the relationship between present and future value.**
- 3. Describe how the interest rate can be used to adjust the value of cash flows – both forward and backward – to a single point in time.**
- 4. Calculate both the future and present value of: (a) an amount invested today; (b) a stream of equal cash flows (an annuity); and (c) a stream of mixed cash flows.**
- 5. Distinguish between an “ordinary annuity” and an “annuity due.”**
- 6. Use interest factor tables and understand how they provide a shortcut to calculating present and future values.**
- 7. Use interest factor tables to find an unknown interest rate or growth rate when the number of time periods and future and present values are known.**
- 8. Build an “amortization schedule” for an installment-style loan.**



# ***The Time Value of Money***

---

- ◆ **The Interest Rate**
- ◆ **Simple Interest**
- ◆ **Compound Interest**
- ◆ **Amortizing a Loan**
- ◆ **Compounding More Than Once per Year**

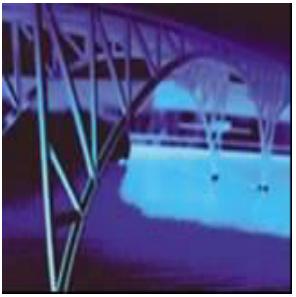


# The Interest Rate

Which would you prefer -- \$10,000  
today or \$10,000 in 5 years?

Obviously, \$10,000 today.

You already recognize that there is  
TIME VALUE TO MONEY!!



## Why TIME?

Why is **TIME** such an important element in your decision?

**TIME** allows you the *opportunity* to postpone consumption and earn **INTEREST**.



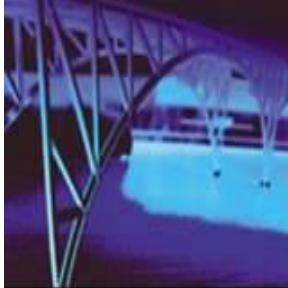
# Types of Interest

## ◆ **Simple Interest**

Interest paid (earned) on only the original amount, or principal, borrowed (lent).

## ◆ **Compound Interest**

Interest paid (earned) on any previous interest earned, as well as on the principal borrowed (lent).



# ***Simple Interest Formula***

---

## **Formula**

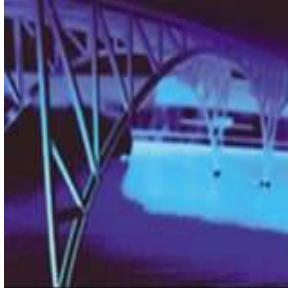
$$\text{SI} = P_0(i)(n)$$

**SI:** Simple Interest

**P<sub>0</sub>:** Deposit today (t=0)

**i:** Interest Rate per Period

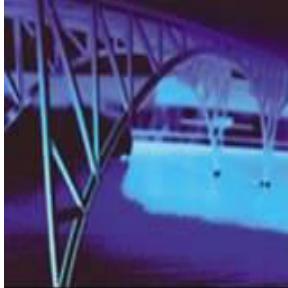
**n:** Number of Time Periods



# Simple Interest Example

- ◆ Assume that you deposit \$1,000 in an account earning 7% simple interest for 2 years. *What is the accumulated interest at the end of the 2nd year?*

$$\begin{aligned}\textcolor{red}{\text{◆ SI}} &= \textcolor{green}{P_0(i)(n)} \\ &= \$1,000(\textcolor{purple}{.07})(\textcolor{blue}{2}) \\ &= \textcolor{red}{\$140}\end{aligned}$$

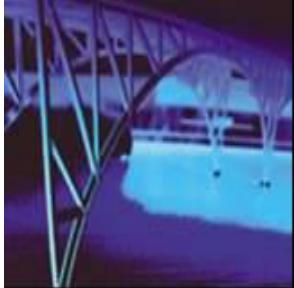


# Simple Interest ( $FV$ )

- ◆ What is the **Future Value ( $FV$ )** of the deposit?

$$\begin{aligned} FV &= P_0 + SI \\ &= \$1,000 + \$140 \\ &= \$1,140 \end{aligned}$$

- ◆ **Future Value** is the value at some future time of a present amount of money, or a series of payments, evaluated at a given interest rate.

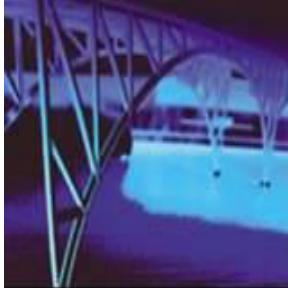


# Simple Interest (PV)

- ◆ What is the **Present Value (PV)** of the previous problem?

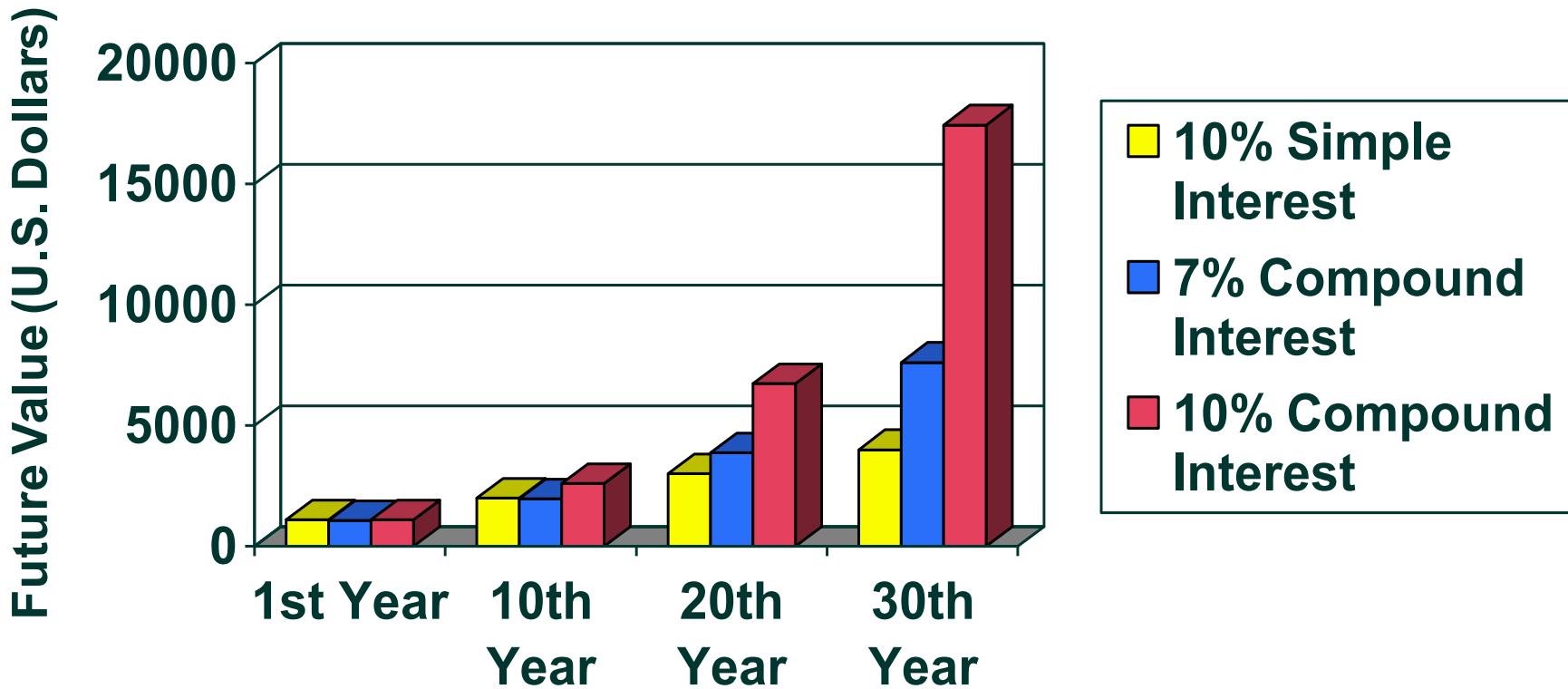
*The Present Value is simply the \$1,000 you originally deposited. That is the value today!*

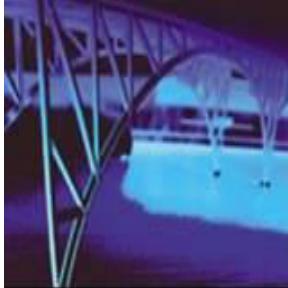
- ◆ **Present Value** is the current value of a future amount of money, or a series of payments, evaluated at a given interest rate.



# Why Compound Interest?

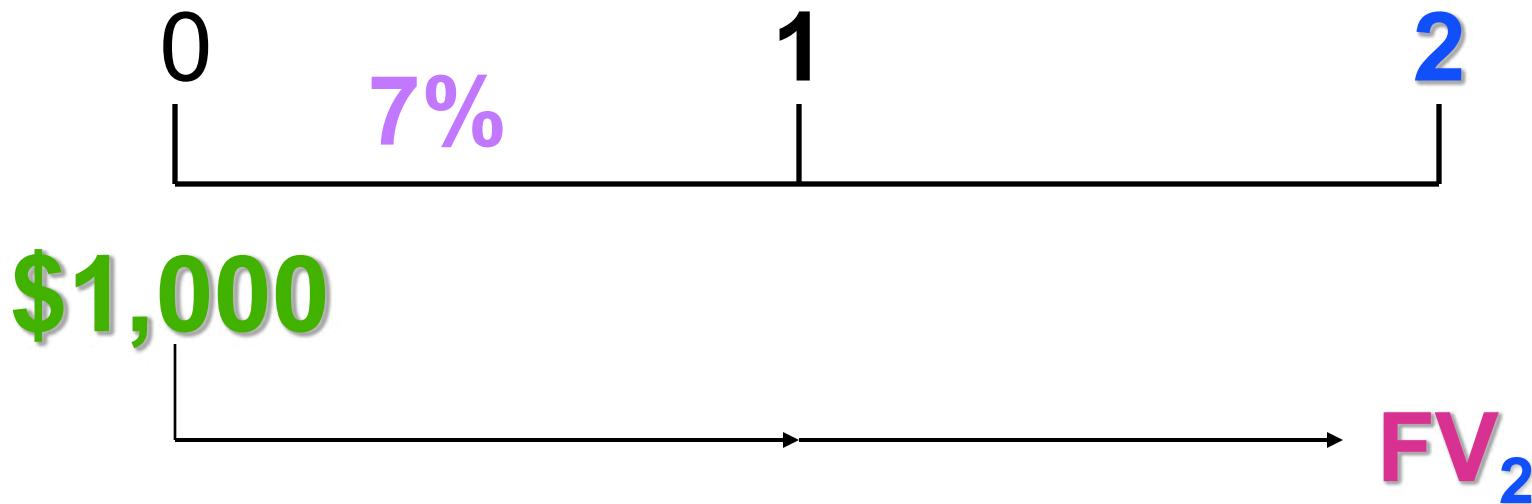
## Future Value of a Single \$1,000 Deposit





# ***Future Value Single Deposit (Graphic)***

Assume that you deposit **\$1,000** at a compound interest rate of **7%** for **2 years**.





# ***Future Value Single Deposit (Formula)***

---

$$\mathbf{FV_1} = \mathbf{P_0} (1+\mathbf{i})^{\mathbf{1}} \\ = \$1,000 (1.07) \\ = \$1,070$$

## **Compound Interest**

**You earned \$70 interest on your \$1,000 deposit over the first year.**

**This is the same amount of interest you would earn under simple interest.**



# ***Future Value Single Deposit (Formula)***

$$FV_1 = P_0 (1+i)^1$$
$$= \$1,000 (1.07)$$
$$= \$1,070$$

↓

$$FV_2 = FV_1 (1+i)^1$$
$$= P_0 (1+i)(1+i) = \$1,000(1.07)(1.07)$$
$$= P_0 (1+i)^2 = \$1,000(1.07)^2$$
$$= \$1,144.90$$

You earned an *EXTRA \$4.90* in Year 2 with compound over simple interest.



# ***General Future Value Formula***

---

$$\mathbf{FV}_1 = P_0(1+i)^1$$

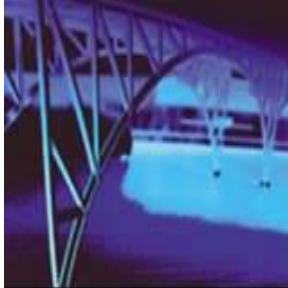
$$\mathbf{FV}_2 = P_0(1+i)^2$$

etc.

**General Future Value Formula:**

$$\mathbf{FV}_n = P_0 (1+i)^n$$

or  $\mathbf{FV}_n = P_0 (\mathbf{FVIF}_{i,n})$  -- See Table I

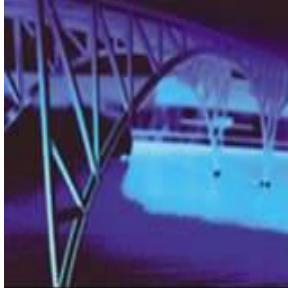


# ***Valuation Using Table I***

---

**FVIF<sub>i,n</sub>** is found on Table I  
at the end of the book.

Period	6%	7%	8%
1	1.060	1.070	1.080
2	1.124	1.145	1.166
3	1.191	1.225	1.260
4	1.262	1.311	1.360
5	1.338	1.403	1.469



# *Using Future Value Tables*

---

$$FV_2 = \$1,000 \text{ (} FVIF_{7\%, 2} \text{)}$$

$$= \$1,000 (1.145)$$

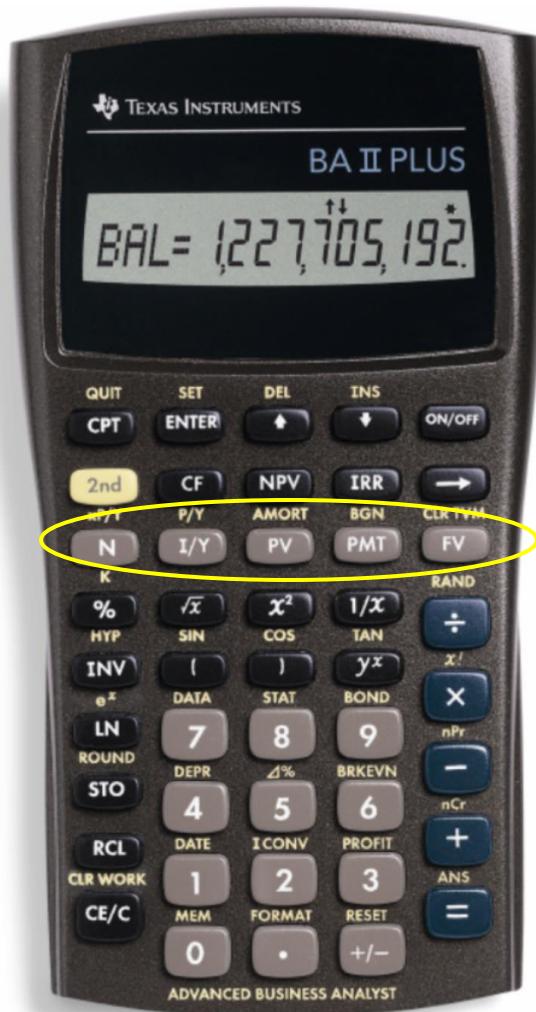
= \$1,145 [Due to Rounding]

Period	6%	7%	8%
1	1.060	1.070	1.080
2	1.124	1.145	1.166
3	1.191	1.225	1.260
4	1.262	1.311	1.360
5	1.338	1.403	1.469



# **TVM on the Calculator**

---



- ◆ Use the highlighted row of keys for solving any of the FV, PV, FVA, PVA, FVAD, and PVAD problems

**N:** Number of periods

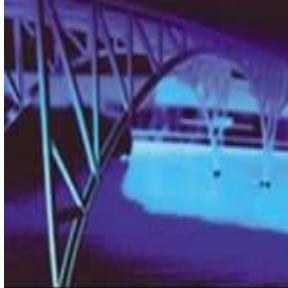
**I/Y:** Interest rate per period

**PV:** Present value

**PMT:** Payment per period

**FV:** Future value

**CLR TVM:** Clears all of the inputs into the above TVM keys



# ***Using The TI BAII+ Calculator***

---

**Inputs**

**N**

**I/Y**

**PV**

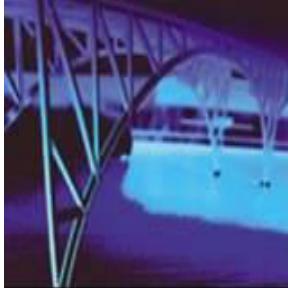
**PMT**

**FV**

**Compute**

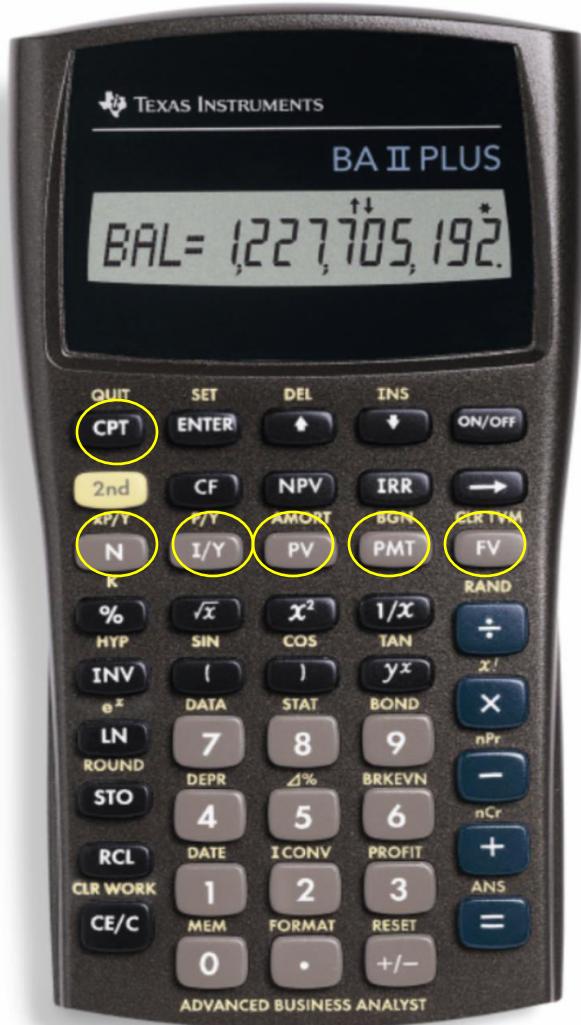


- Focus on 3<sup>rd</sup> Row of keys (will be displayed in slides as shown above)



# *Entering the FV Problem*

---



Press:

2<sup>nd</sup>

CLR TVM

2

N

7

I/Y

-1000

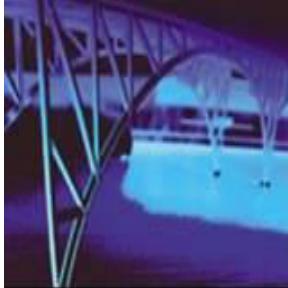
PV

0

PMT

CPT

FV



# **Solving the FV Problem**

<b>Inputs</b>	2	7	-1,000	0
	N	I/Y	PV	PMT
<b>Compute</b>	<b>1,144.90</b>			

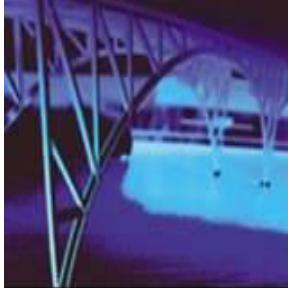
**N:** 2 Periods (enter as 2)

**I/Y:** 7% interest rate per period (enter as 7 NOT .07)

**PV:** \$1,000 (enter as negative as you have “less”)

**PMT:** Not relevant in this situation (enter as 0)

**FV:** Compute (Resulting answer is positive)

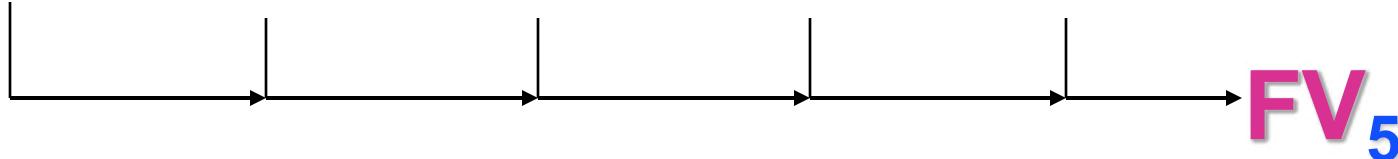


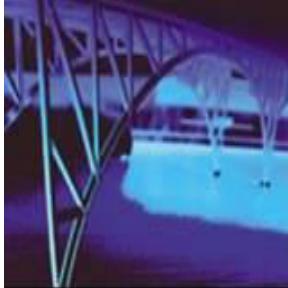
# Story Problem Example

Julie Miller wants to know how large her deposit of **\$10,000** today will become at a compound annual interest rate of **10%** for **5 years**.



**\$10,000**





# Story Problem Solution

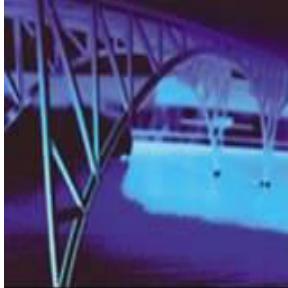
- ◆ Calculation based on general formula:

$$FV_n = P_0 (1+i)^n$$

$$\begin{aligned} FV_5 &= \$10,000 (1+ 0.10)^5 \\ &= \$16,105.10 \end{aligned}$$

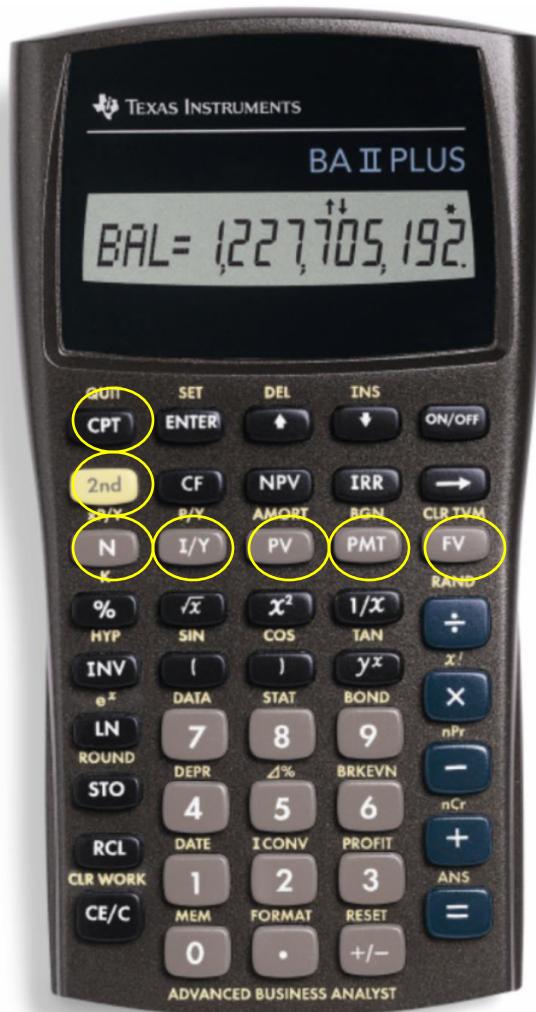
- ◆ Calculation based on Table I:

$$\begin{aligned} FV_5 &= \$10,000 (FVIF_{10\%, 5}) \\ &= \$10,000 (1.611) \\ &= \$16,110 \quad [Due \text{ to } Rounding] \end{aligned}$$



# *Entering the FV Problem*

---



Press:

**2<sup>nd</sup>**

**CLR TVM**

**5**

**N**

**10**

**I/Y**

**-10000**

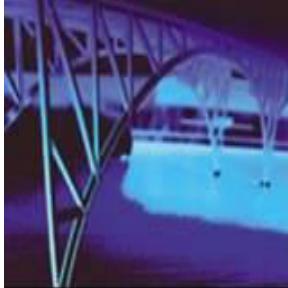
**PV**

**0**

**PMT**

**CPT**

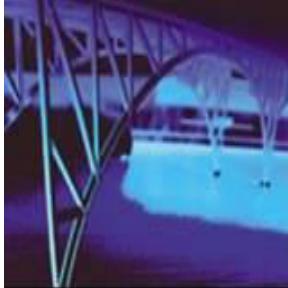
**FV**



# **Solving the FV Problem**

<b>Inputs</b>	5	10	-10,000	0
	N	I/Y	PV	PMT
<b>Compute</b>	<b>FV</b>			

The result indicates that a \$10,000 investment that earns 10% annually for 5 years will result in a future value of \$16,105.10.



# ***Double Your Money!!!***

---

**Quick!** How long does it take to double \$5,000 at a compound rate of 12% per year (approx.)?

---

We will use the “Rule-of-72”.



## The “Rule-of-72”

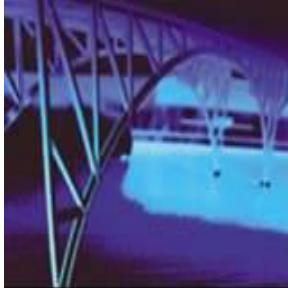
**Quick!** How long does it take to double \$5,000 at a compound rate of 12% per year (approx.)?

---

**Approx. Years to Double =  $72 / i\%$**

$$72 / 12\% = \underline{\text{6 Years}}$$

[Actual Time is 6.12 Years]

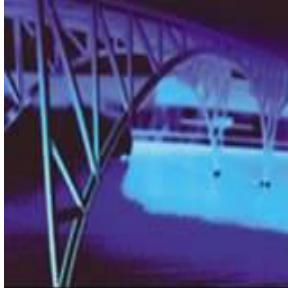


# **Solving the Period Problem**

<b>Inputs</b>	12	-1,000	0	+2,000
	N	I/Y	PV	PMT
<b>Compute</b>	<b>6.12 years</b>			

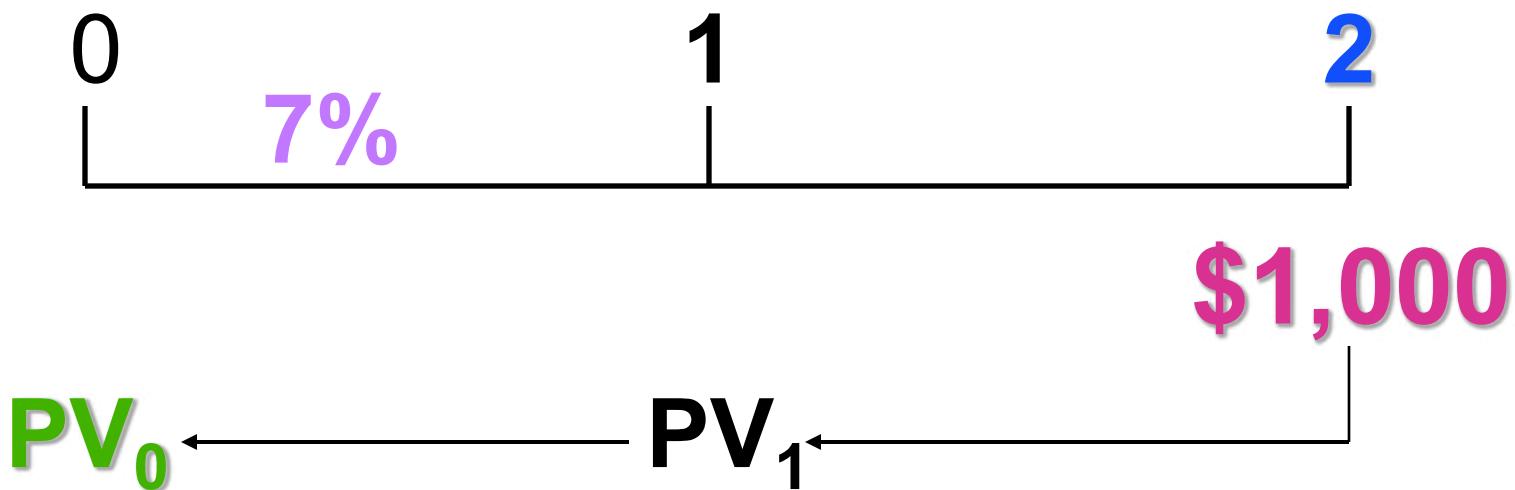
**The result indicates that a \$1,000 investment that earns 12% annually will double to \$2,000 in 6.12 years.**

*Note: 72/12% = approx. 6 years*



# ***Present Value Single Deposit (Graphic)***

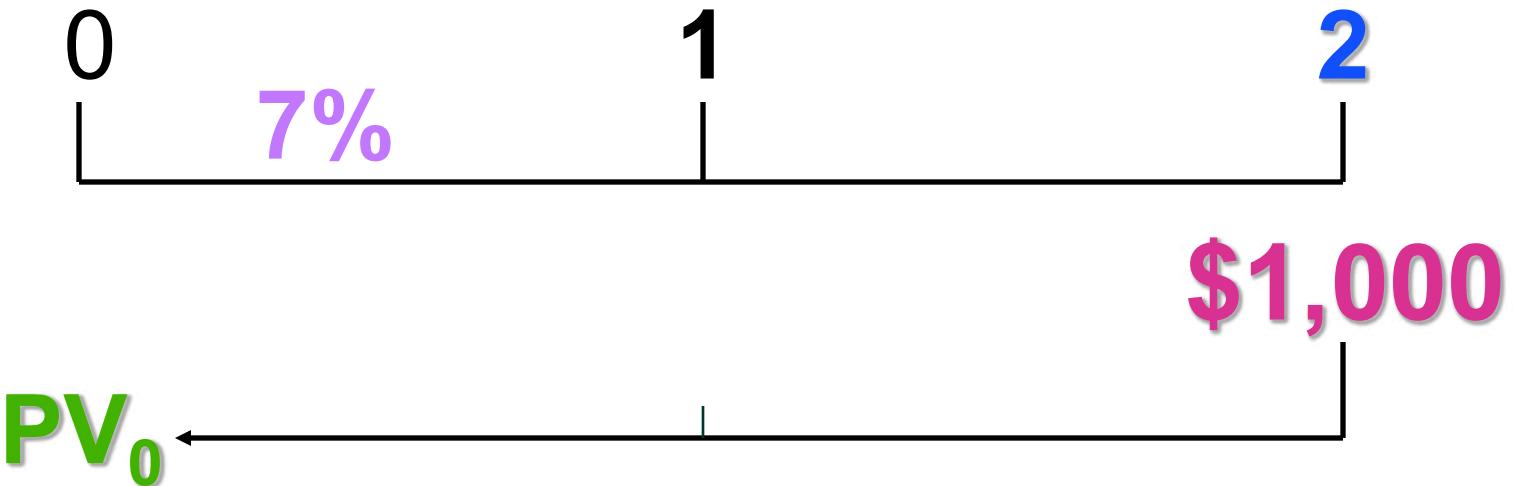
Assume that you need **\$1,000** in **2 years**.  
Let's examine the process to determine  
how much you need to deposit today at a  
discount rate of **7%** compounded annually.





# ***Present Value Single Deposit (Formula)***

$$\begin{aligned} \mathbf{PV_0} &= \mathbf{FV_2} / (1+i)^2 &= \$1,000 / (1.07)^2 \\ &= \mathbf{FV_2} / (1+i)^2 &= \$873.44 \end{aligned}$$





# **General Present Value Formula**

$$PV_0 = FV_1 / (1+i)^1$$

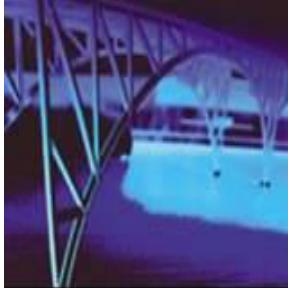
$$PV_0 = FV_2 / (1+i)^2$$

etc.

## **General Present Value Formula:**

$$PV_0 = FV_n / (1+i)^n$$

or  $PV_0 = FV_n (PVIF_{i,n})$  -- See Table II

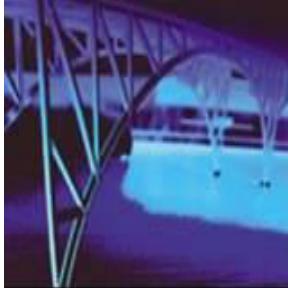


## ***Valuation Using Table II***

---

**PVIF<sub>i,n</sub>** is found on Table II  
at the end of the book.

Period	6%	7%	8%
1	.943	.935	.926
2	.890	.873	.857
3	.840	.816	.794
4	.792	.763	.735
5	.747	.713	.681



# *Using Present Value Tables*

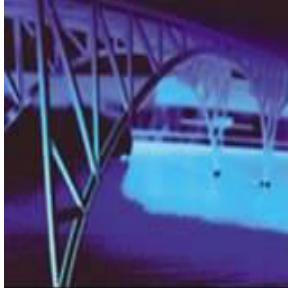
---

$$PV_2 = \$1,000 \text{ (PVIF}_{7\%, 2}\text{)}$$

$$= \$1,000 (.873)$$

= \$873 [Due to Rounding]

Period	6%	7%	8%
1	.943	.935	.926
2	.890	.873	.857
3	.840	.816	.794
4	.792	.763	.735
5	.747	.713	.681



# Solving the PV Problem

Inputs	2	7	0	+1,000
	N	I/Y	PV	PMT
Compute	-873.44			

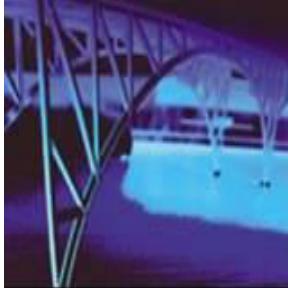
N: 2 Periods (enter as 2)

I/Y: 7% interest rate per period (enter as 7 NOT .07)

PV: Compute (Resulting answer is negative “deposit”)

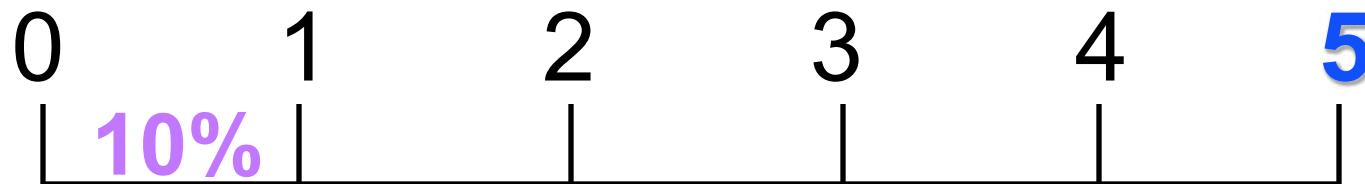
PMT: Not relevant in this situation (enter as 0)

FV: \$1,000 (enter as positive as you “receive \$”)



# Story Problem Example

Julie Miller wants to know how large of a deposit to make so that the money will grow to **\$10,000** in **5 years** at a discount rate of **10%**.





# Story Problem Solution

- ◆ Calculation based on general formula:

$$PV_0 = FV_n / (1+i)^n$$

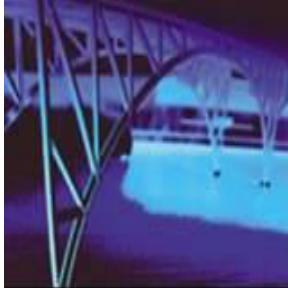
$$\begin{aligned} PV_0 &= \$10,000 / (1+ 0.10)^5 \\ &= \$6,209.21 \end{aligned}$$

- ◆ Calculation based on Table I:

$$PV_0 = \$10,000 (PVIF_{10\%, 5})$$

$$= \$10,000 (.621)$$

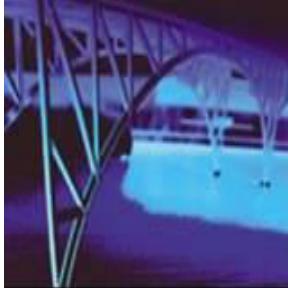
$$= \$6,210.00 \quad [Due \text{ to } Rounding]$$



# **Solving the PV Problem**

<b>Inputs</b>	5	10	0	+10,000
	N	I/Y	PV	PMT
<b>Compute</b>	<b>-6,209.21</b>			

The result indicates that a **\$10,000 future value that will earn 10% annually for 5 years** requires a **\$6,209.21 deposit today (present value)**.



# Types of Annuities

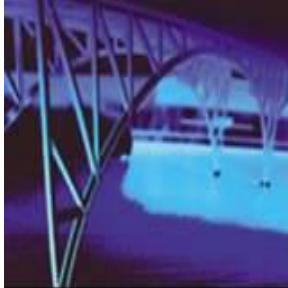
- ◆ *An Annuity* represents a series of equal payments (or receipts) occurring over a specified number of equidistant periods.
- ◆ Ordinary Annuity: Payments or receipts occur at the **end** of each period.
- ◆ Annuity Due: Payments or receipts occur at the **beginning** of each period.



## ***Examples of Annuities***

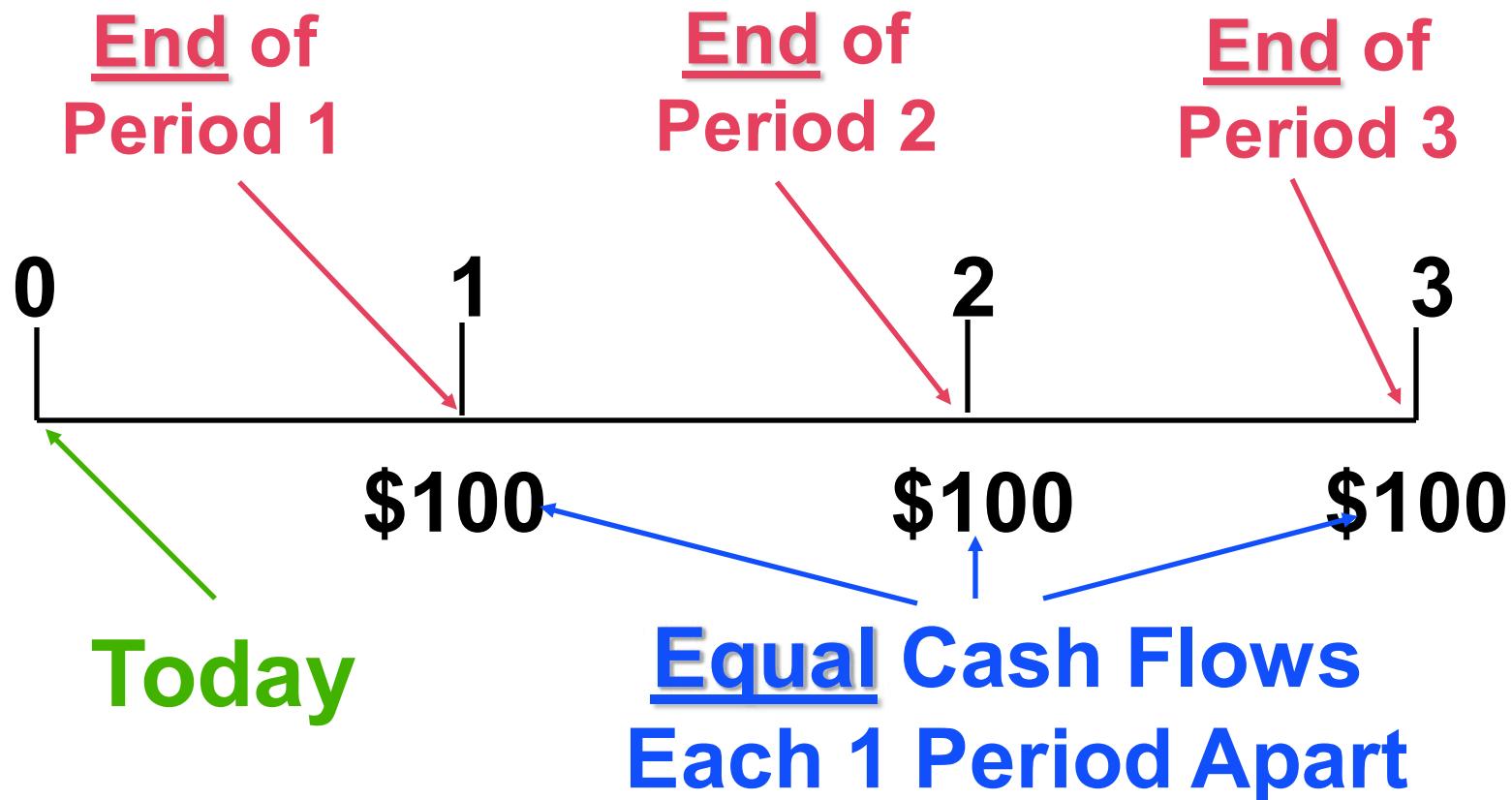
---

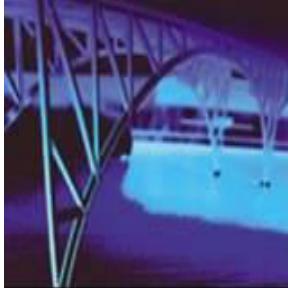
- ◆ **Student Loan Payments**
- ◆ **Car Loan Payments**
- ◆ **Insurance Premiums**
- ◆ **Mortgage Payments**
- ◆ **Retirement Savings**



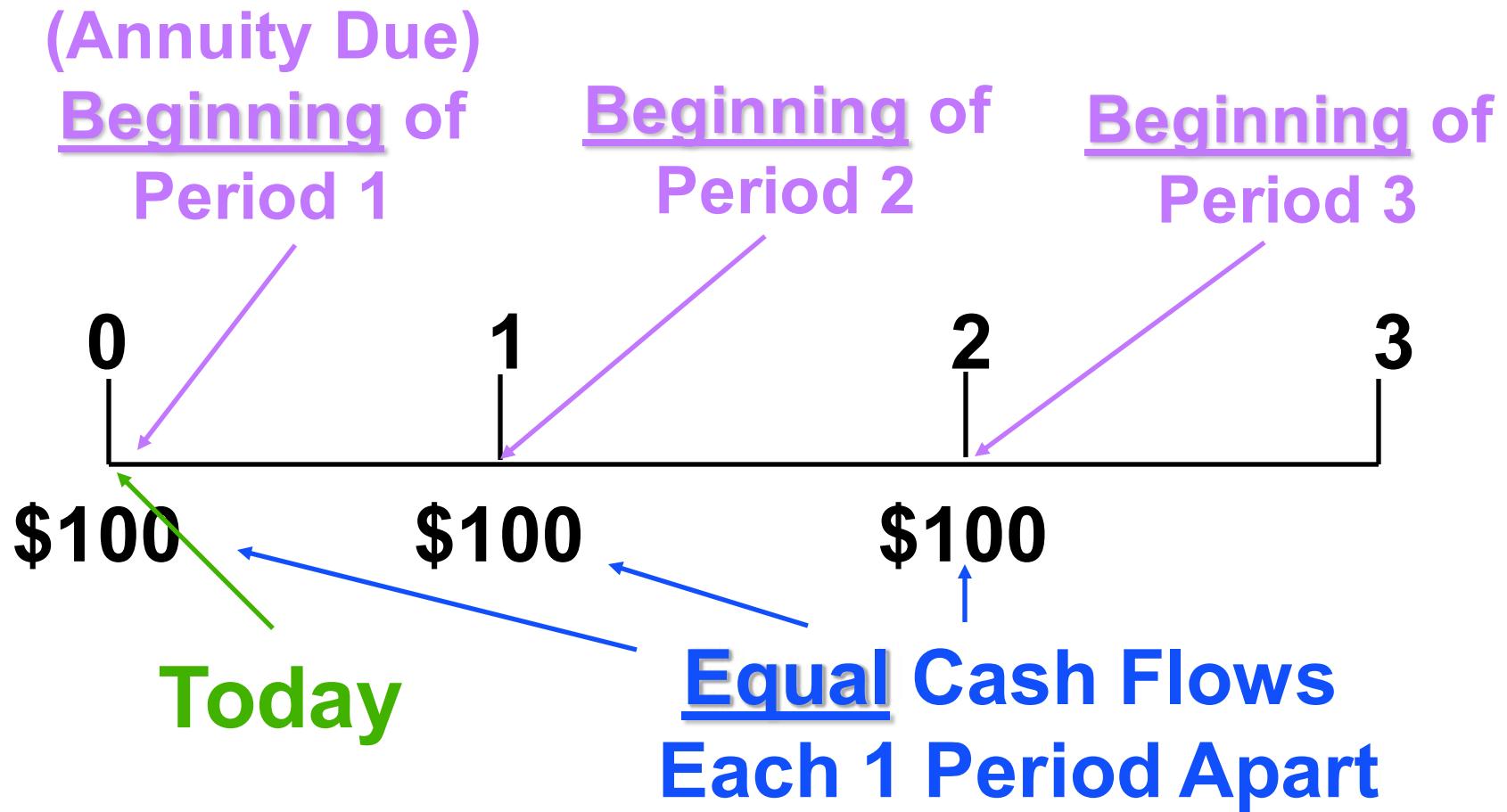
# Parts of an Annuity

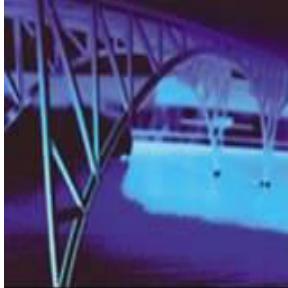
(Ordinary Annuity)





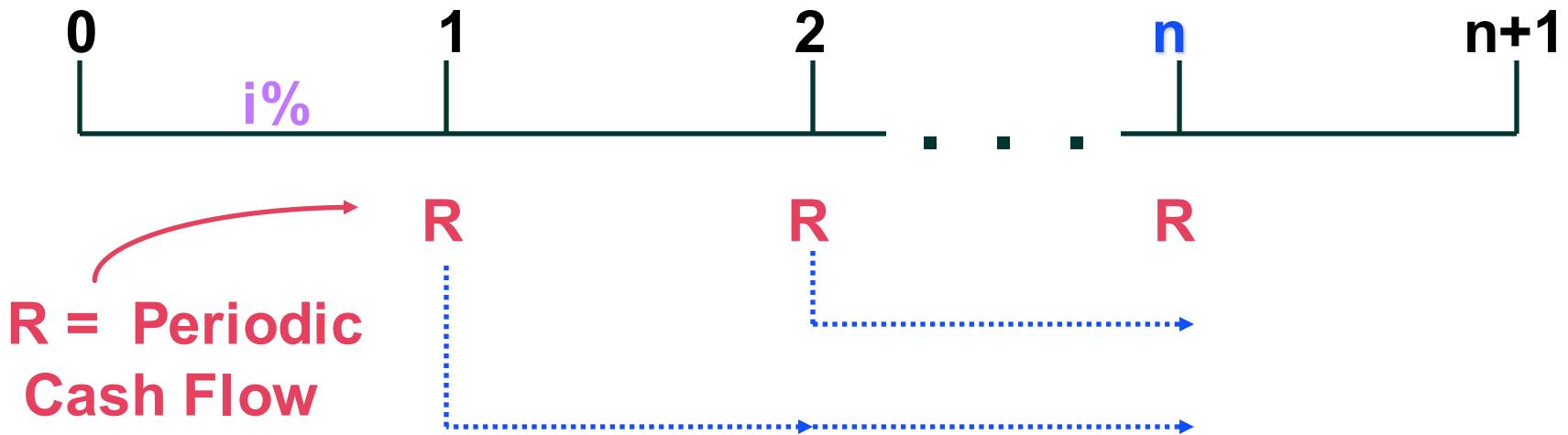
# Parts of an Annuity



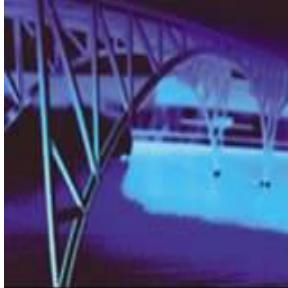


# Overview of an Ordinary Annuity -- FVA

Cash flows occur at the end of the period

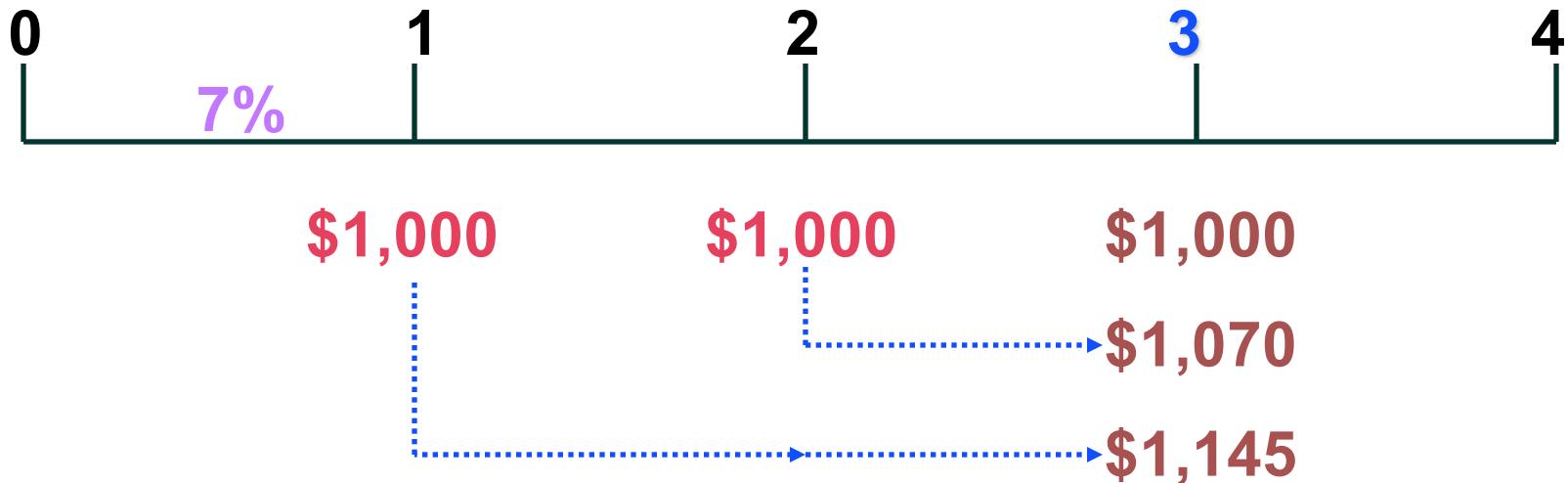


$$FVA_n = R(1+i)^{n-1} + R(1+i)^{n-2} + \dots + R(1+i)^1 + R(1+i)^0$$

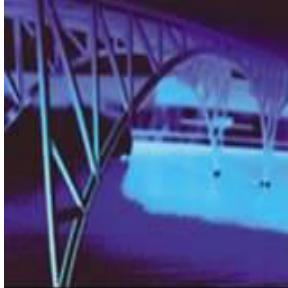


# ***Example of an Ordinary Annuity -- FVA***

**Cash flows occur at the end of the period**



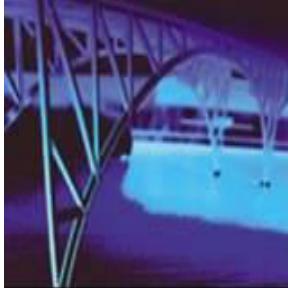
$$\begin{aligned}FVA_3 &= \$1,000(1.07)^2 + \\&\quad \$1,000(1.07)^1 + \$1,000(1.07)^0 \\&= \$1,145 + \$1,070 + \$1,000 \\&= \$3,215\end{aligned}$$



## ***Hint on Annuity Valuation***

---

The **future value** of an **ordinary annuity** can be viewed as occurring at the **end** of the last cash flow period, whereas the **future value** of an **annuity due** can be viewed as occurring at the **beginning** of the last cash flow period.



## **Valuation Using Table III**

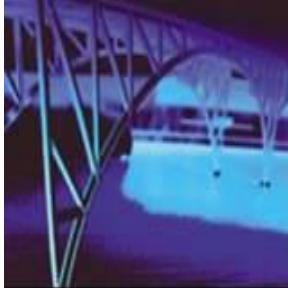
---

$$FVA_n = R (FVIFA_{i\%, n})$$

$$FVA_3 = \$1,000 (FVIFA_{7\%, 3})$$

$$= \$1,000 (3.215) = \$3,215$$

Period	6%	7%	8%
1	1.000	1.000	1.000
2	2.060	2.070	2.080
3	3.184	3.215	3.246
4	4.375	4.440	4.506
5	5.637	5.751	5.867



# **Solving the FVA Problem**

<b>Inputs</b>	3	7	0	-1,000	
	N	I/Y	PV	PMT	FV
<b>Compute</b>	<b>3,214.90</b>				

**N:** 3 Periods (enter as 3 year-end deposits)

**I/Y:** 7% interest rate per period (enter as 7 NOT .07)

**PV:** Not relevant in this situation (no beg value)

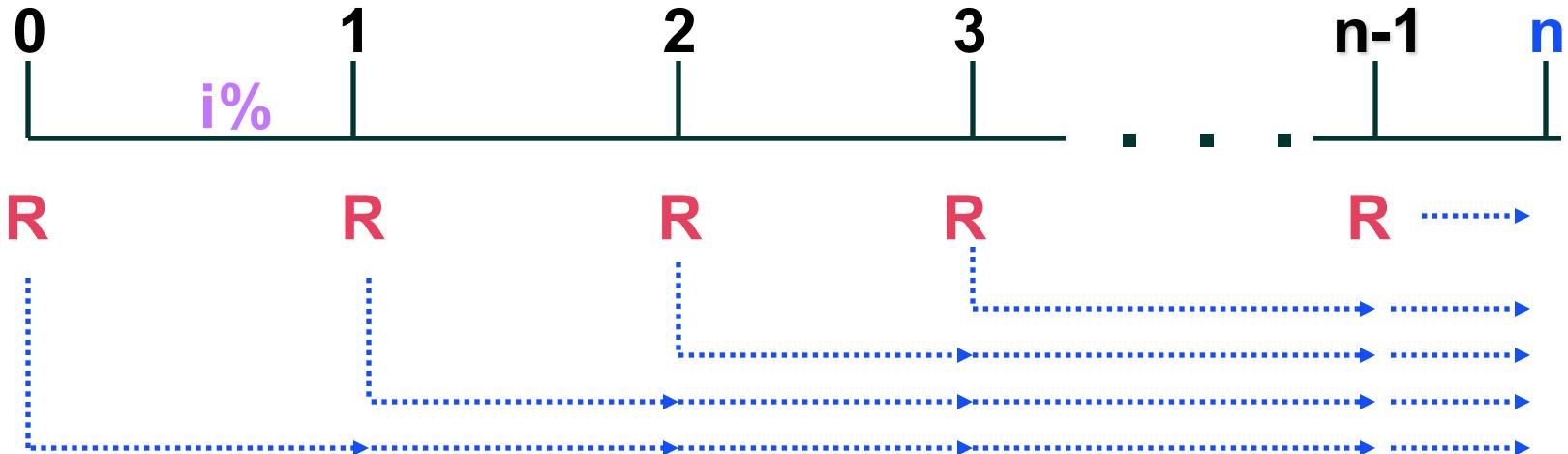
**PMT:** \$1,000 (negative as you deposit annually)

**FV:** Compute (Resulting answer is positive)



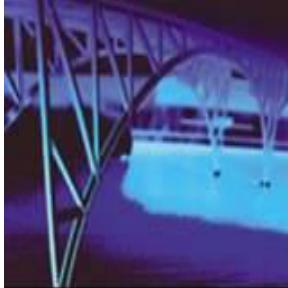
# ***Overview View of an Annuity Due -- FVAD***

**Cash flows occur at the beginning of the period**



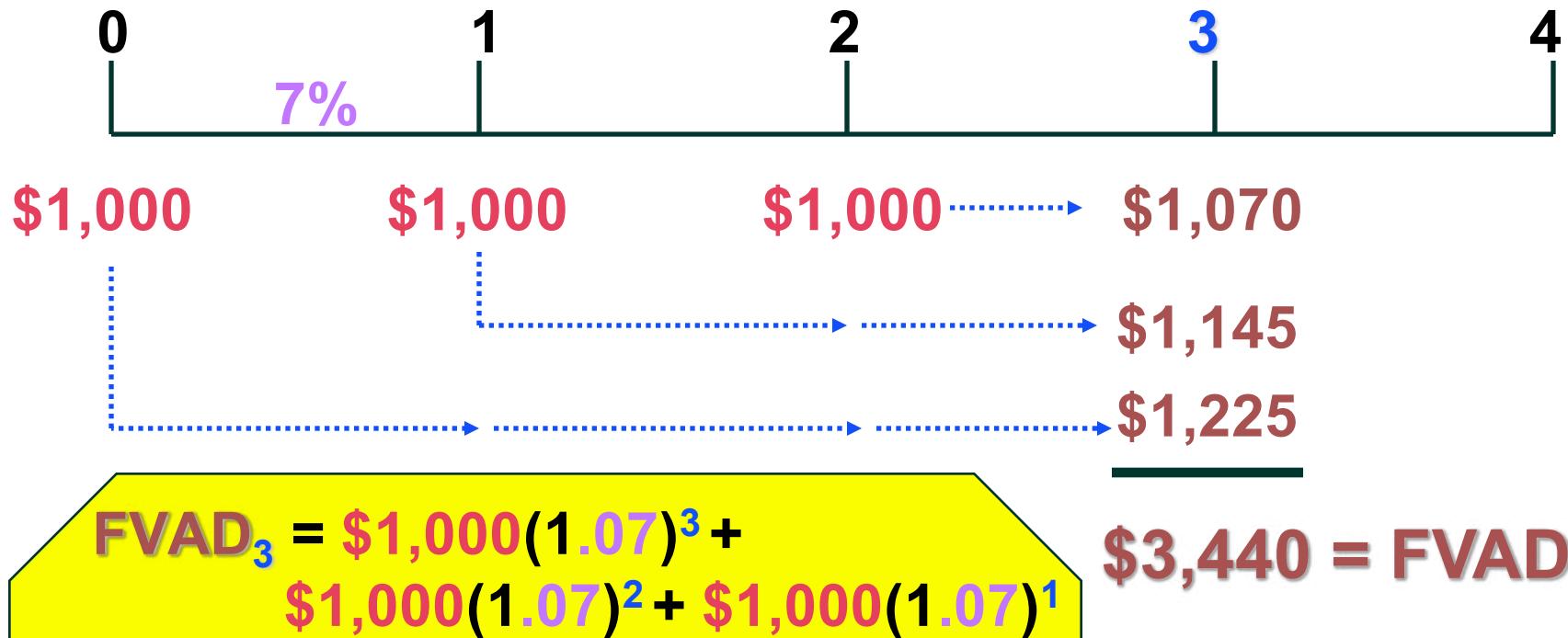
$$\begin{aligned} \mathbf{FVAD}_n &= R(1+i)^n + R(1+i)^{n-1} + \\ &\quad \dots + R(1+i)^2 + R(1+i)^1 \\ &= \mathbf{FVA}_n (1+i) \end{aligned}$$

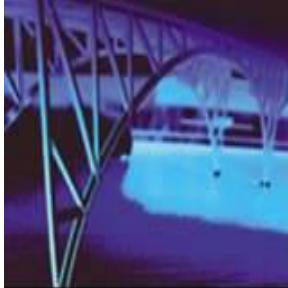
**FVAD<sub>n</sub>**



# *Example of an* Annuity Due -- FVAD

Cash flows occur at the beginning of the period





## **Valuation Using Table III**

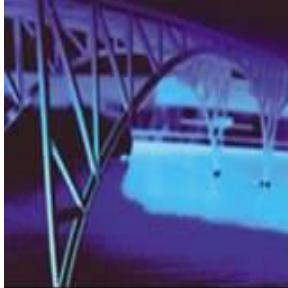
---

$$FVAD_n = R (FVIFA_{i\%, n})(1+i)$$

$$FVAD_3 = \$1,000 (FVIFA_{7\%, 3})(1.07)$$

$$= \$1,000 (3.215)(1.07) = \$3,440$$

Period	6%	7%	8%
1	1.000	1.000	1.000
2	2.060	2.070	2.080
3	3.184	3.215	3.246
4	4.375	4.440	4.506
5	5.637	5.751	5.867

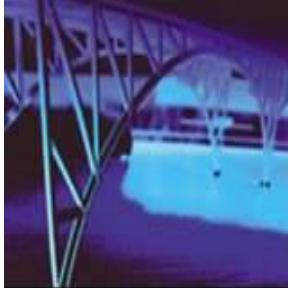


# Solving the FVAD Problem

<b>Inputs</b>	3	7	0	-1,000	
	N	I/Y	PV	PMT	FV
<b>Compute</b>	3,439.94				

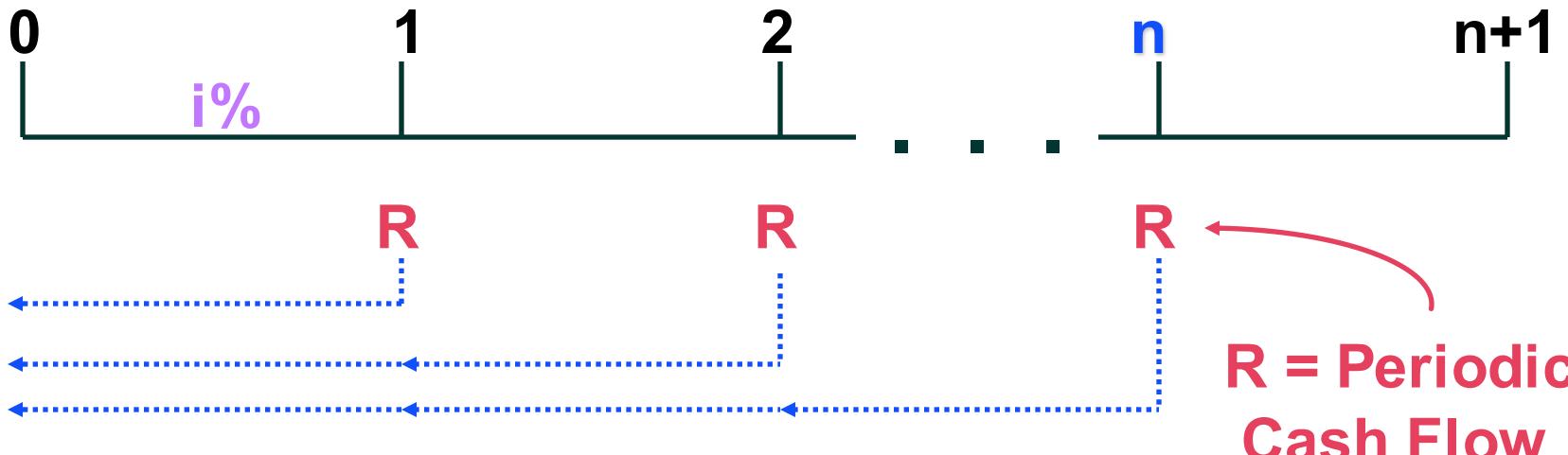
Complete the problem the same as an “ordinary annuity” problem, except you must change the calculator setting to “BGN” first. Don’t forget to change back!

Step 1:	Press	2 <sup>nd</sup>	BGN	keys
Step 2:	Press	2 <sup>nd</sup>	SET	keys
Step 3:	Press	2 <sup>nd</sup>	QUIT	keys



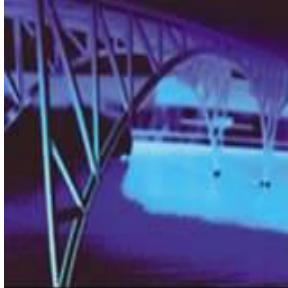
# Overview of an Ordinary Annuity -- PVA

Cash flows occur at the end of the period



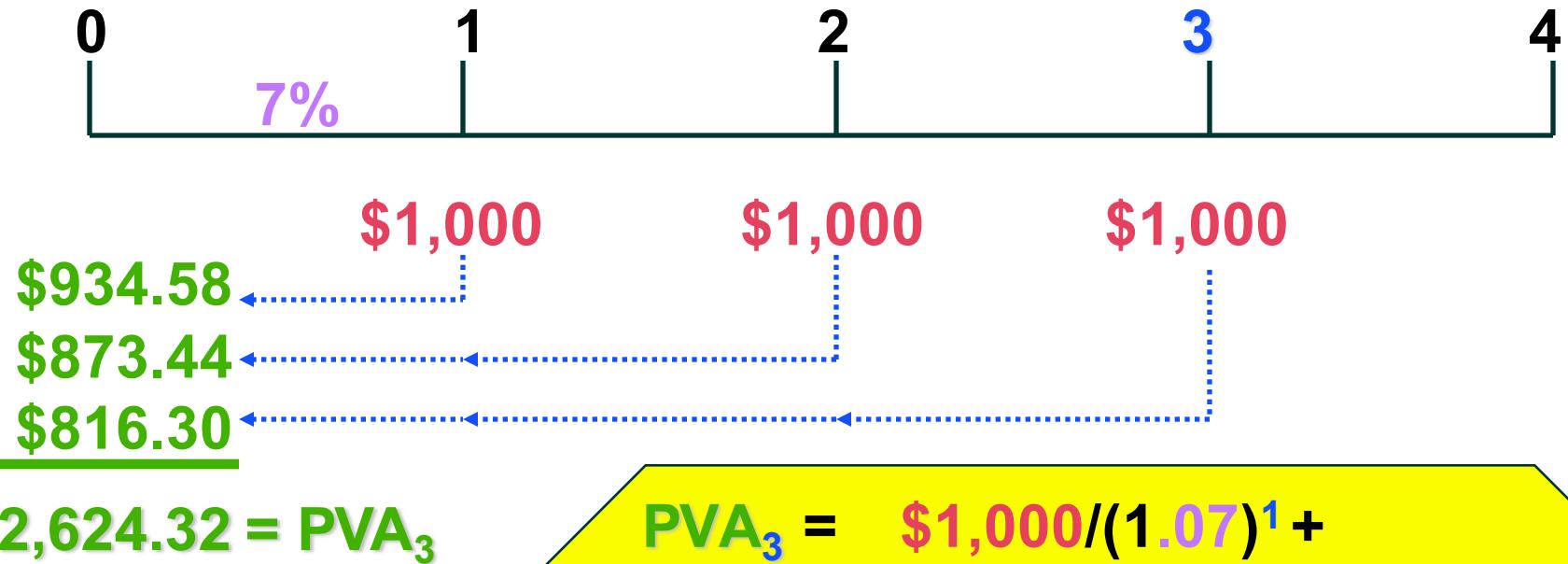
$PVA_n$

$$PVA_n = R/(1+i)^1 + R/(1+i)^2 + \dots + R/(1+i)^n$$

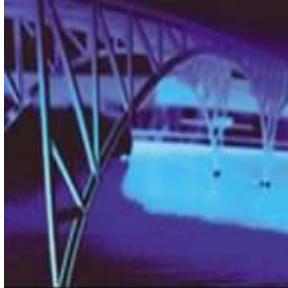


# *Example of an Ordinary Annuity -- PVA*

Cash flows occur at the end of the period



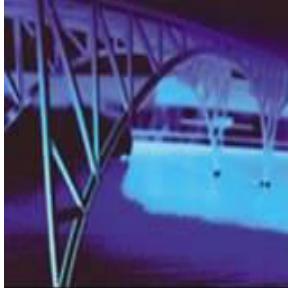
$$\begin{aligned}PVA_3 &= \$1,000/(1.07)^1 + \\&\quad \$1,000/(1.07)^2 + \\&\quad \$1,000/(1.07)^3 \\&= \$934.58 + \$873.44 + \$816.30 \\&= \$2,624.32\end{aligned}$$



## ***Hint on Annuity Valuation***

---

The **present value** of an **ordinary annuity** can be viewed as occurring at the **beginning** of the first cash flow period, whereas the **future value** of an **annuity due** can be viewed as occurring at the **end** of the first cash flow period.



## **Valuation Using Table IV**

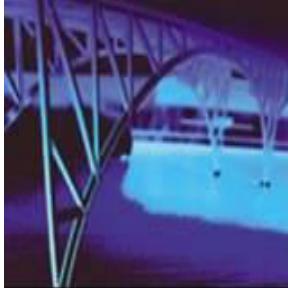
---

$$PVA_n = R (PVIFA_{i\%, n})$$

$$PVA_3 = \$1,000 (PVIFA_{7\%, 3})$$

$$= \$1,000 (2.624) = \$2,624$$

Period	6%	7%	8%
1	0.943	0.935	0.926
2	1.833	1.808	1.783
3	2.673	2.624	2.577
4	3.465	3.387	3.312
5	4.212	4.100	3.993



# **Solving the PVA Problem**

<b>Inputs</b>	3	7	-1,000	0
	N	I/Y	PV	PMT
<b>Compute</b>	2,624.32			

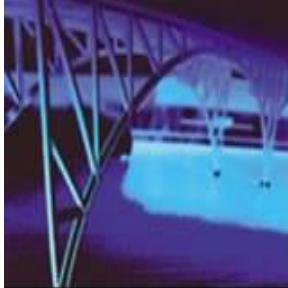
**N:** 3 Periods (enter as 3 year-end deposits)

**I/Y:** 7% interest rate per period (enter as 7 NOT .07)

**PV:** Compute (Resulting answer is positive)

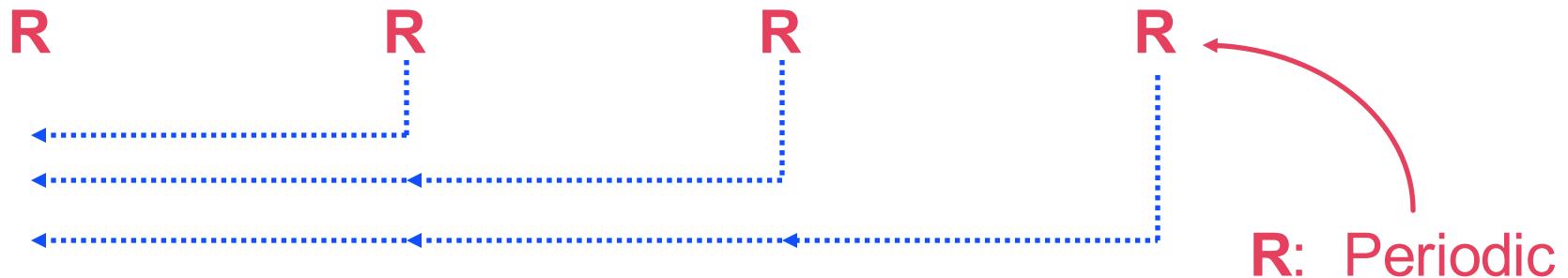
**PMT:** \$1,000 (negative as you deposit annually)

**FV:** Not relevant in this situation (no ending value)



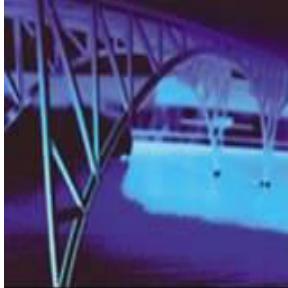
# Overview of an Annuity Due -- PVAD

Cash flows occur at the beginning of the period



PVAD<sub>n</sub>

$$\begin{aligned} \text{PVAD}_n &= R/(1+i)^0 + R/(1+i)^1 + \dots + R/(1+i)^{n-1} \\ &= \text{PVA}_n (1+i) \end{aligned}$$



# ***Example of an Annuity Due -- PVAD***

**Cash flows occur at the beginning of the period**



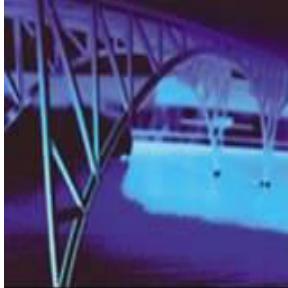
\$1,000.00      \$1,000      \$1,000

\$ 934.58

\$ 873.44

**\$2,808.02 = PVAD<sub>n</sub>**

$$\begin{aligned} PVAD_n &= \$1,000/(1.07)^0 + \$1,000/(1.07)^1 + \\ &\quad \$1,000/(1.07)^2 = \$2,808.02 \end{aligned}$$



## **Valuation Using Table IV**

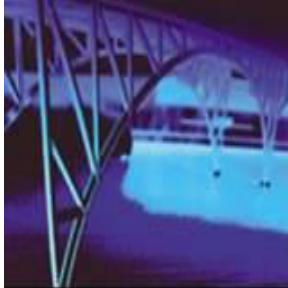
---

$$PVAD_n = R \ (PVIFA_{i\%, n})(1+i)$$

$$PVAD_3 = \$1,000 \ (PVIFA_{7\%, 3})(1.07)$$

$$= \$1,000 \ (2.624)(1.07) = \$2,808$$

Period	6%	7%	8%
1	0.943	0.935	0.926
2	1.833	1.808	1.783
3	2.673	2.624	2.577
4	3.465	3.387	3.312
5	4.212	4.100	3.993

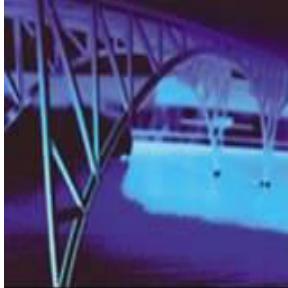


# Solving the PVAD Problem

Inputs	3	7	-1,000	0	
	N	I/Y	PV	PMT	FV
Compute					2,808.02

Complete the problem the same as an “ordinary annuity” problem, except you must change the calculator setting to “BGN” first. Don’t forget to change back!

Step 1:	Press	2 <sup>nd</sup>	BGN	keys
Step 2:	Press	2 <sup>nd</sup>	SET	keys
Step 3:	Press	2 <sup>nd</sup>	QUIT	keys



# ***Steps to Solve Time Value of Money Problems***

---

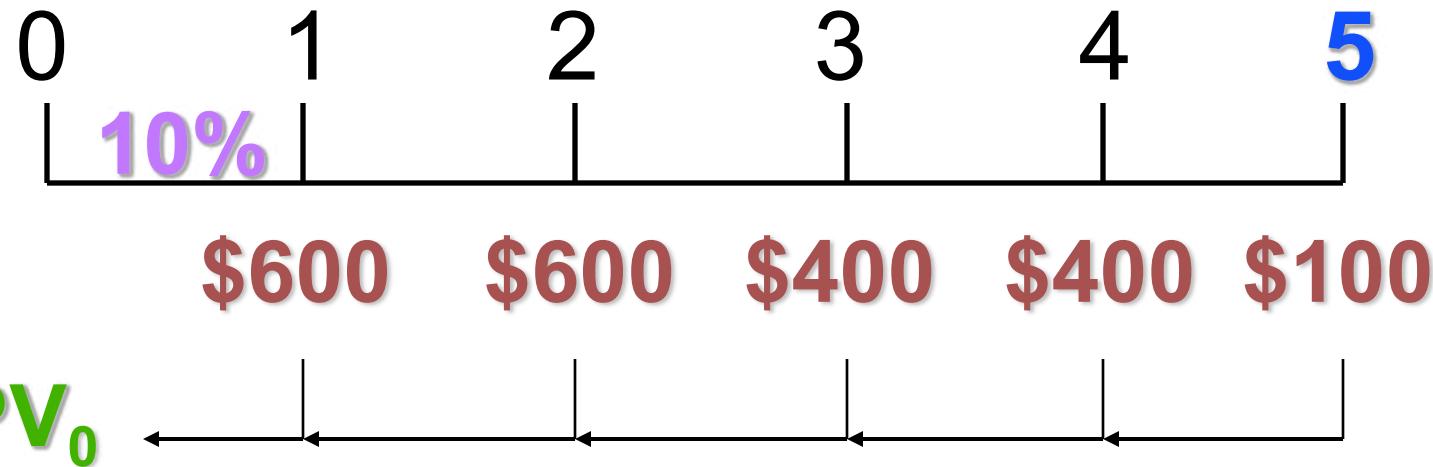
- 1. Read problem thoroughly**
- 2. Create a time line**
- 3. Put cash flows and arrows on time line**
- 4. Determine if it is a PV or FV problem**
- 5. Determine if solution involves a single CF, annuity stream(s), or mixed flow**
- 6. Solve the problem**
- 7. Check with financial calculator (optional)**

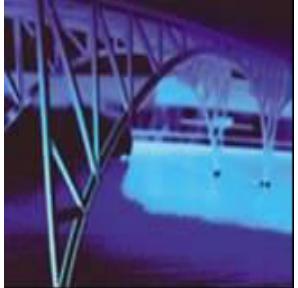


## **Mixed Flows Example**

---

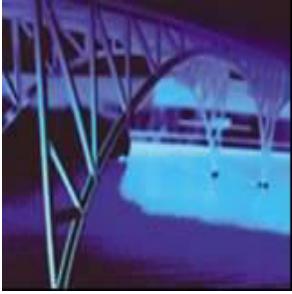
**Julie Miller will receive the set of cash flows below. What is the Present Value at a discount rate of 10%.**





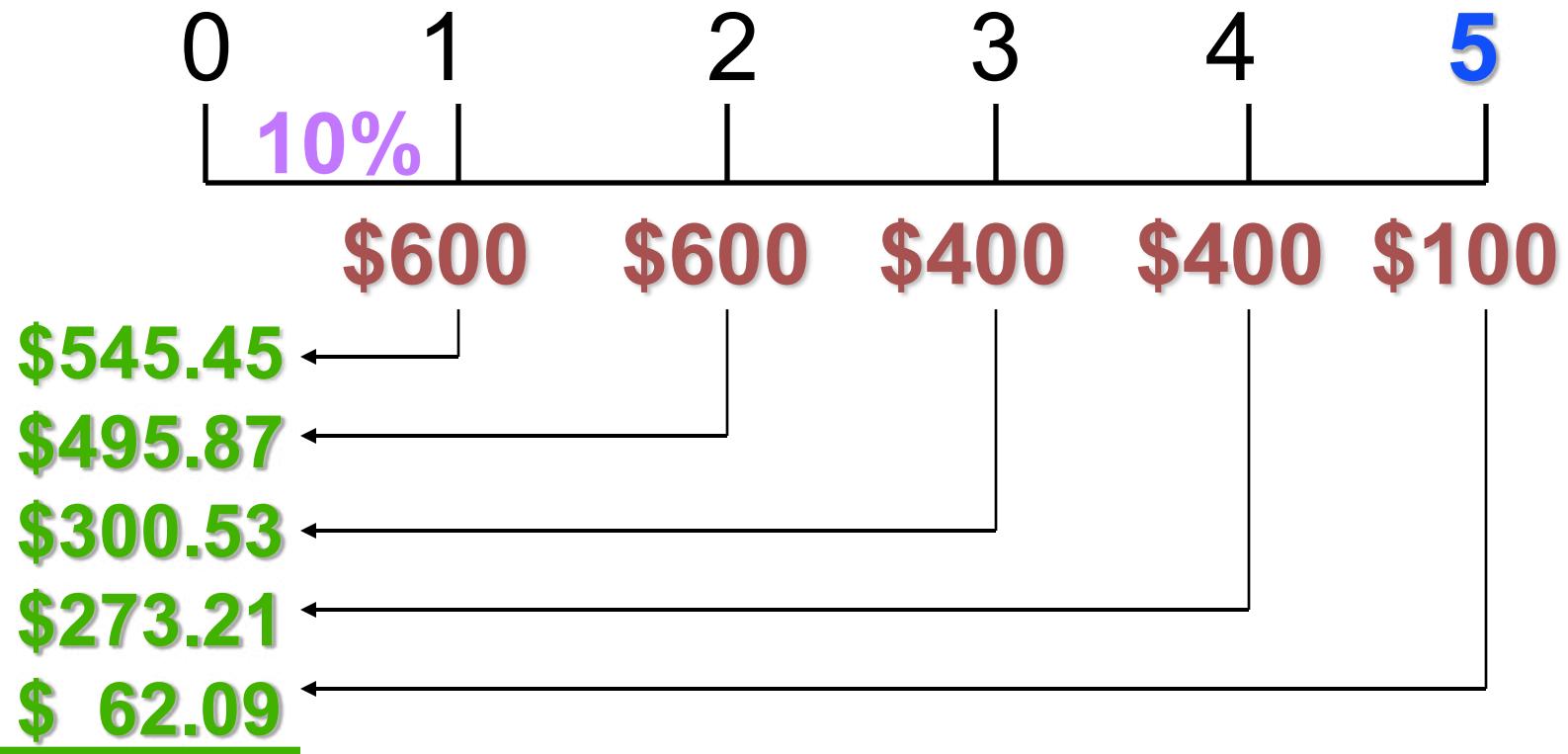
# How to Solve?

1. Solve a “*piece-at-a-time*” by discounting each *piece* back to t=0.
2. Solve a “*group-at-a-time*” by first breaking problem into groups of annuity streams and any single cash flow groups. Then discount each *group* back to t=0.

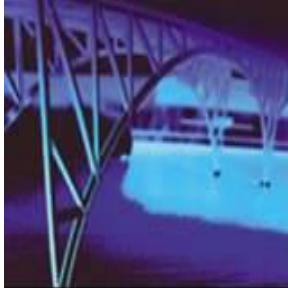


## ***“Piece-At-A-Time”***

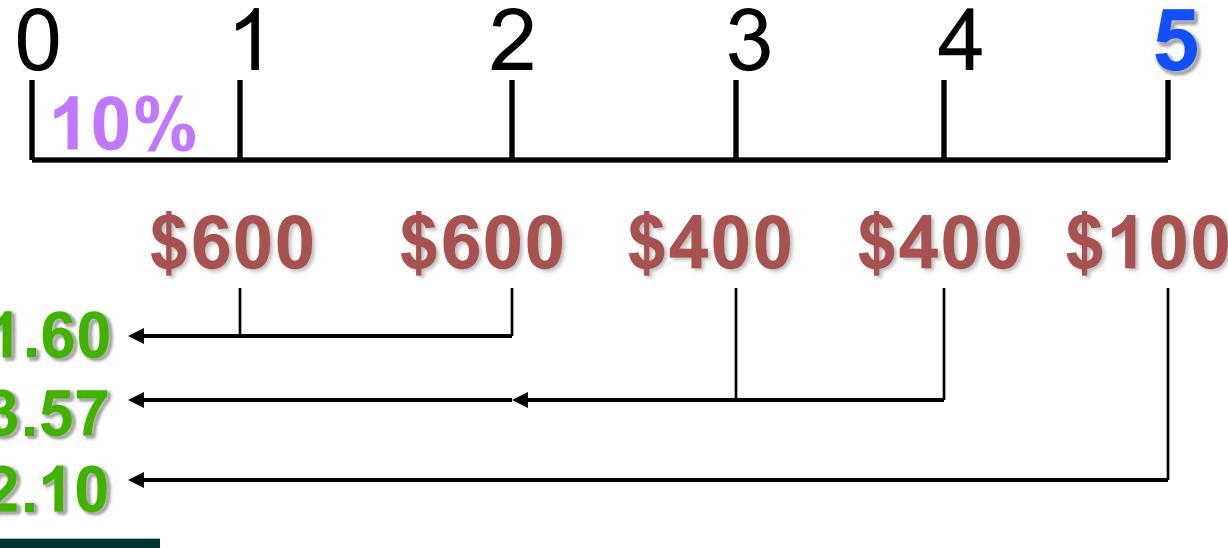
---



$$\$1677.15 = PV_0 \text{ of the Mixed Flow}$$



# **“Group-At-A-Time” (#1)**

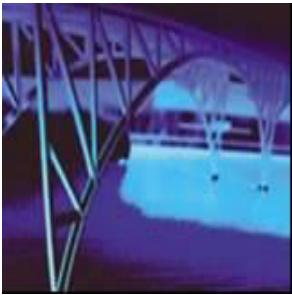


**\$1,677.27 = PV<sub>0</sub> of Mixed Flow [Using Tables]**

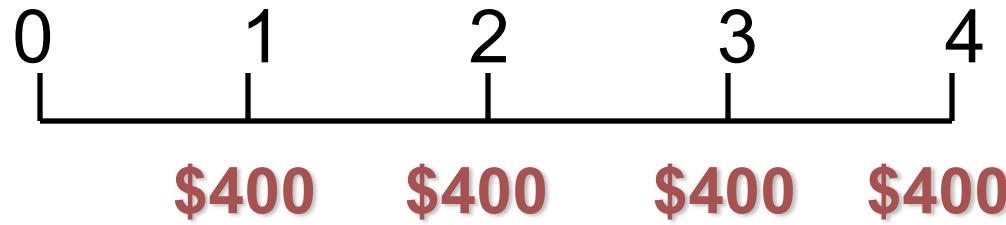
$$\$600(PVIFA_{10\%,2}) = \$600(1.736) = \$1,041.60$$

$$\$400(PVIFA_{10\%,2})(PVIF_{10\%,2}) = \$400(1.736)(0.826) = \$573.57$$

$$\$100 (PVIF_{10\%,5}) = \$100 (0.621) = \$62.10$$



## ***“Group-At-A-Time” (#2)***



**\$1,268.00**

**Plus**

**\$347.20**

**Plus**

**\$62.10**

**\$400**

**\$400**

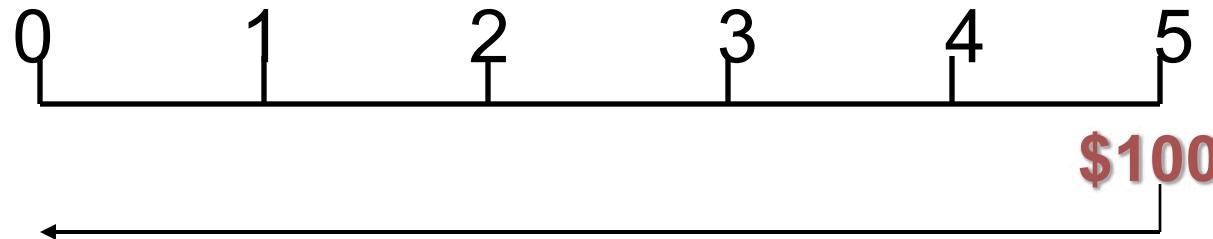
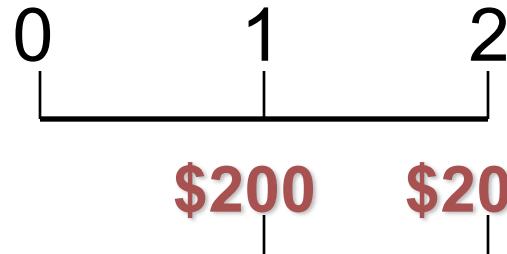
**\$400**

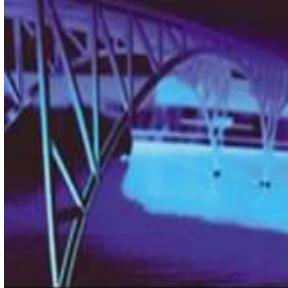
**\$400**

**\$200**

**\$200**

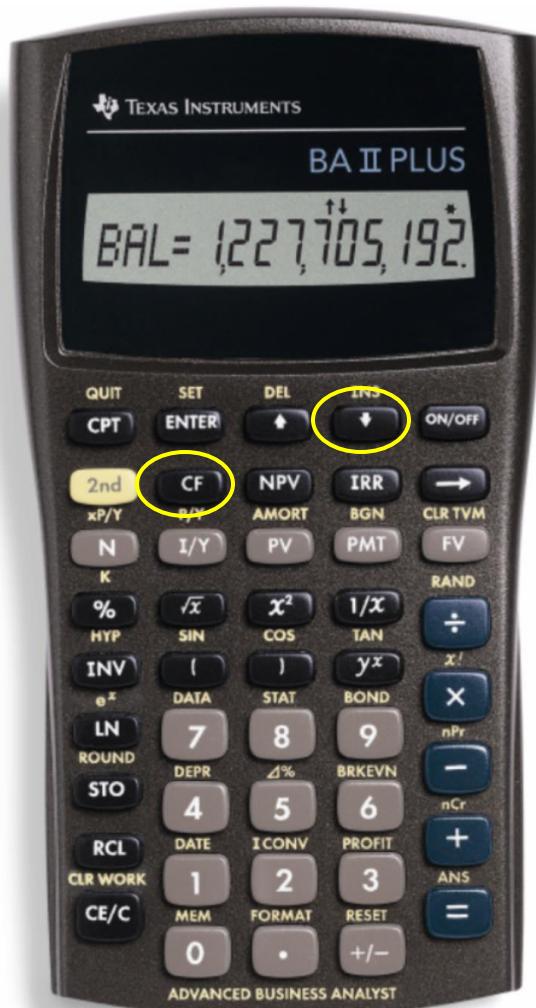
**PV<sub>0</sub> equals  
\$1677.30.**



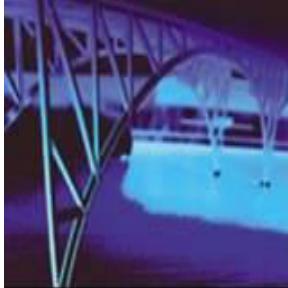


# Solving the Mixed Flows Problem using CF Registry

---



- ◆ Use the highlighted key for starting the process of solving a mixed cash flow problem
- ◆ Press the CF key and down arrow key through a few of the keys as you look at the definitions on the *next slide*



# **Solving the Mixed Flows Problem using CF Registry**

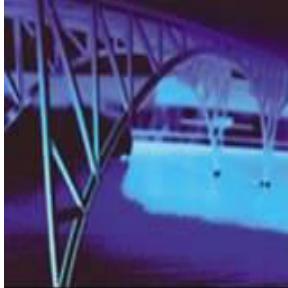
## **Defining the calculator variables:**

**For  $CF_0$ :** This is ALWAYS the cash flow occurring at time  $t=0$  (usually 0 for these problems)

**For  $C_{nn}$ :**\* This is the cash flow SIZE of the **nth** group of cash flows. Note that a “group” may only contain a single cash flow (e.g., \$351.76).

**For  $F_{nn}$ :**\* This is the cash flow FREQUENCY of the **nth** group of cash flows. Note that this is always a positive whole number (e.g., 1, 2, 20, etc.).

\* **nn** represents the **nth** cash flow or frequency. Thus, the **first** cash flow is **C01**, while the **tenth** cash flow is **C10**.

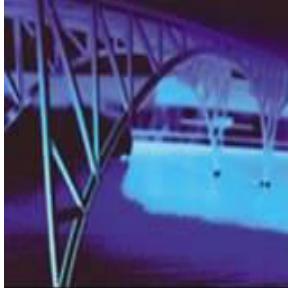


# **Solving the Mixed Flows Problem using CF Registry**

---

## **Steps in the Process**

Step 1:	Press	CF		key
Step 2:	Press	2 <sup>nd</sup>	CLR Work	keys
Step 3:	<u>For CF0</u> Press	0	Enter	↓ keys
Step 4:	<u>For C01</u> Press	600	Enter	↓ keys
Step 5:	<u>For F01</u> Press	2	Enter	↓ keys
Step 6:	<u>For C02</u> Press	400	Enter	↓ keys
Step 7:	<u>For F02</u> Press	2	Enter	↓ keys



# **Solving the Mixed Flows Problem using CF Registry**

## **Steps in the Process**

Step 8: <u>For C03</u> Press	100	Enter	↓	keys
Step 9: <u>For F03</u> Press	1	Enter	↓	keys
Step 10: Press	↓	↓		keys
Step 11: Press	NPV			key
Step 12: <u>For I=</u> , Enter	10	Enter	↓	keys
Step 13: Press	CPT			key

**Result:** Present Value = \$1,677.15



# ***Frequency of Compounding***

**General Formula:**

$$FV_n = PV_0(1 + [i/m])^{mn}$$

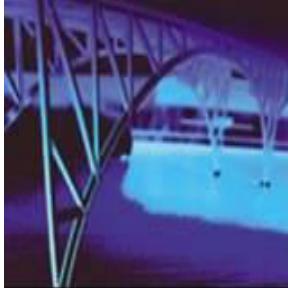
**n:** Number of Years

**m:** Compounding Periods per Year

**i:** Annual Interest Rate

**FV<sub>n,m</sub>:** FV at the end of Year n

**PV<sub>0</sub>:** PV of the Cash Flow today



## Impact of Frequency

Julie Miller has \$1,000 to invest for 2 Years at an annual interest rate of 12%.

Annual       $FV_2 = 1,000(1 + [.12/1])^{(1)(2)}$

$$= 1,254.40$$

Semi       $FV_2 = 1,000(1 + [.12/2])^{(2)(2)}$

$$= 1,262.48$$



## Impact of Frequency

Qrtly

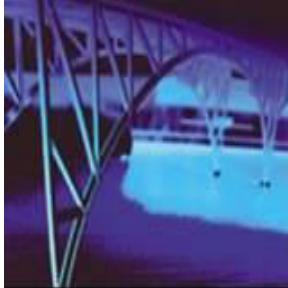
$$\begin{aligned} FV_2 &= 1,000(1 + [.12/4])^{(4)(2)} \\ &= 1,266.77 \end{aligned}$$

Monthly

$$\begin{aligned} FV_2 &= 1,000(1 + [.12/12])^{(12)(2)} \\ &= 1,269.73 \end{aligned}$$

Daily

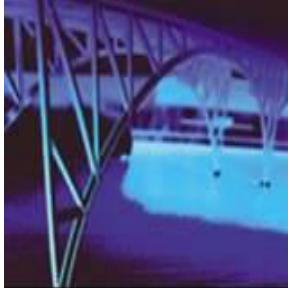
$$\begin{aligned} FV_2 &= 1,000(1 + [.12/365])^{(365)(2)} \\ &= 1,271.20 \end{aligned}$$



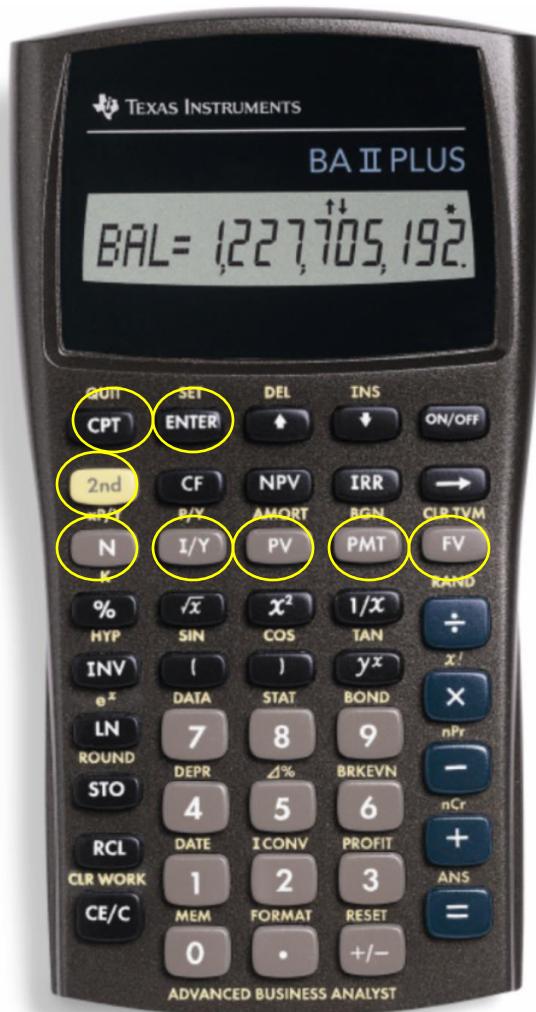
# **Solving the Frequency Problem (Quarterly)**

<b>Inputs</b>	<b>2(4)</b>	<b>12/4</b>	<b>-1,000</b>	<b>0</b>	
	<b>N</b>	<b>I/Y</b>	<b>PV</b>	<b>PMT</b>	<b>FV</b>
<b>Compute</b>	<b>1266.77</b>				

The result indicates that a \$1,000 investment that earns a 12% annual rate compounded quarterly for 2 years will earn a future value of \$1,266.77.



# Solving the Frequency Problem (Quarterly Altern.)



Press:

**2<sup>nd</sup>**   **P/Y**   **4**   **ENTER**

**2<sup>nd</sup>**   **QUIT**

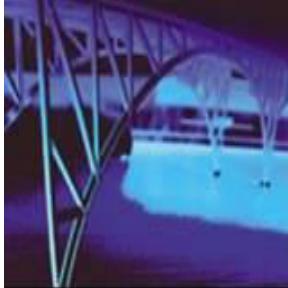
**12**   **I/Y**

**-1000**   **PV**

**0**   **PMT**

**2**   **2<sup>nd</sup>**   **xP/Y**   **N**

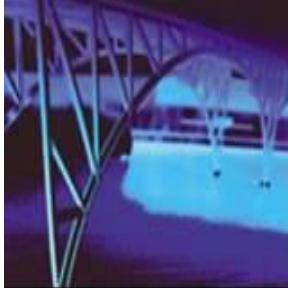
**CPT**   **FV**



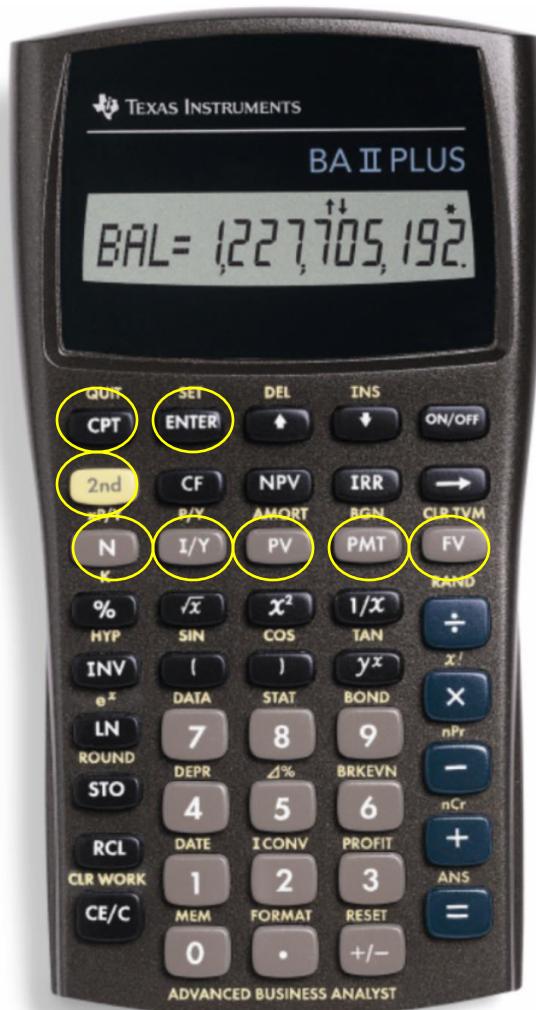
# **Solving the Frequency Problem (Daily)**

<b>Inputs</b>	2(365)	12/365	-1,000	0	
	N	I/Y	PV	PMT	FV
<b>Compute</b>					1271.20

The result indicates that a \$1,000 investment that earns a 12% annual rate compounded daily for 2 years will earn a future value of \$1,271.20.



# Solving the Frequency Problem (Daily Alternative)



Press:

**2<sup>nd</sup>** **P/Y** **365** **ENTER**

**2<sup>nd</sup>** **QUIT**

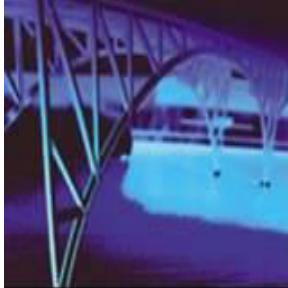
**12** **I/Y**

**-1000** **PV**

**0** **PMT**

**2** **2<sup>nd</sup>** **xP/Y** **N**

**CPT** **FV**



# **Effective Annual Interest Rate**

## **Effective Annual Interest Rate**

The actual rate of interest earned (paid) after adjusting the *nominal rate* for factors such as the number of compounding periods per year.

$$(1 + [ i / m ] )^m - 1$$



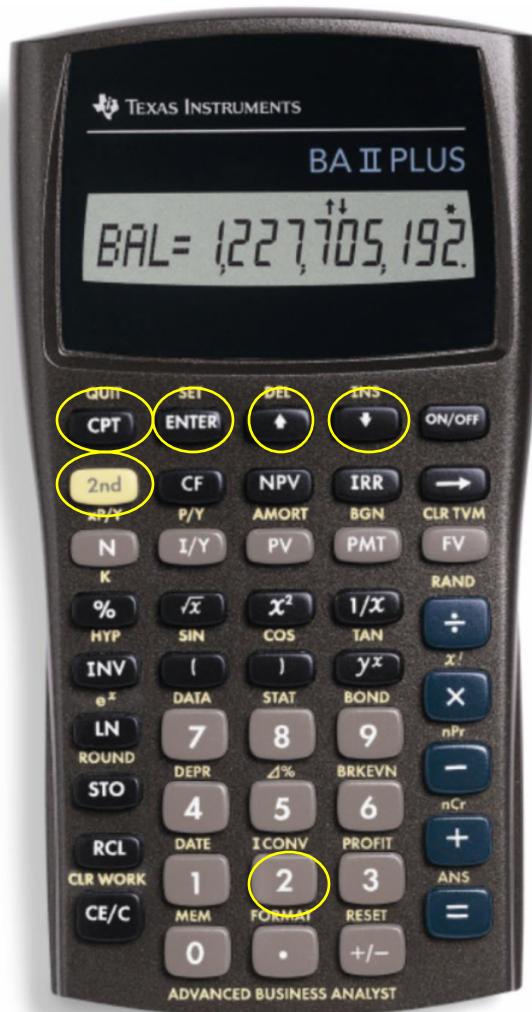
## ***BW's Effective Annual Interest Rate***

***Basket Wonders (BW) has a \$1,000 CD at the bank. The interest rate is 6% compounded quarterly for 1 year. What is the Effective Annual Interest Rate (EAR)?***

$$\begin{aligned}\text{EAR} &= (1 + 6\% / 4)^4 - 1 \\ &= 1.0614 - 1 = .0614 \text{ or } 6.14\%\end{aligned}$$



# Converting to an EAR



Press:

2<sup>nd</sup>

I Conv

6

ENTER

↓

↓

4

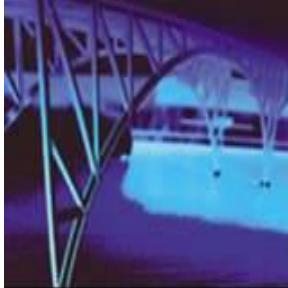
ENTER

↑

CPT

2<sup>nd</sup>

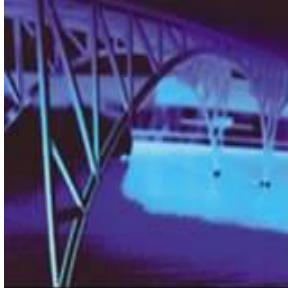
QUIT



# Steps to Amortizing a Loan

---

1. Calculate the **payment per period**.
2. Determine the **interest** in Period t.  
*(Loan Balance at t-1) x (i% / m)*
3. Compute **principal payment** in Period t.  
*(Payment - Interest from Step 2)*
4. Determine ending balance in Period t.  
*(Balance - principal payment from Step 3)*
5. Start again at Step 2 and repeat.



# ***Amortizing a Loan Example***

---

Julie Miller is borrowing \$10,000 at a compound annual interest rate of 12%.

Amortize the loan if annual payments are made for 5 years.

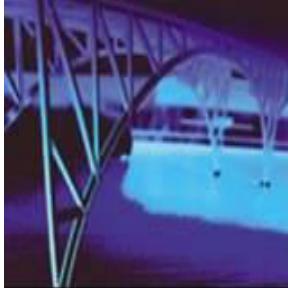
## **Step 1: Payment**

$$PV_0 = R \left( PVIFA_{i\%, n} \right)$$

$$\$10,000 = R \left( PVIFA_{12\%, 5} \right)$$

$$\$10,000 = R (3.605)$$

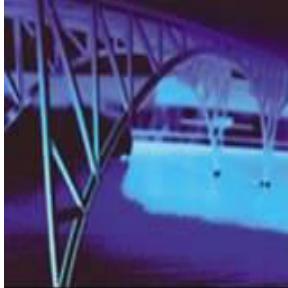
$$R = \$10,000 / 3.605 = \$2,774$$



# **Amortizing a Loan Example**

<b>End of Year</b>	<b>Payment</b>	<b>Interest</b>	<b>Principal</b>	<b>Ending Balance</b>
0	---	---	---	\$10,000
1	\$2,774	\$1,200	\$1,574	8,426
2	2,774	1,011	1,763	6,663
3	2,774	800	1,974	4,689
4	2,774	563	2,211	2,478
5	2,775	297	2,478	0
	<hr/> <b>\$13,871</b>	<hr/> <b>\$3,871</b>	<hr/> <b>\$10,000</b>	

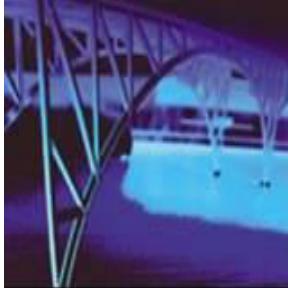
[Last Payment Slightly Higher Due to Rounding]



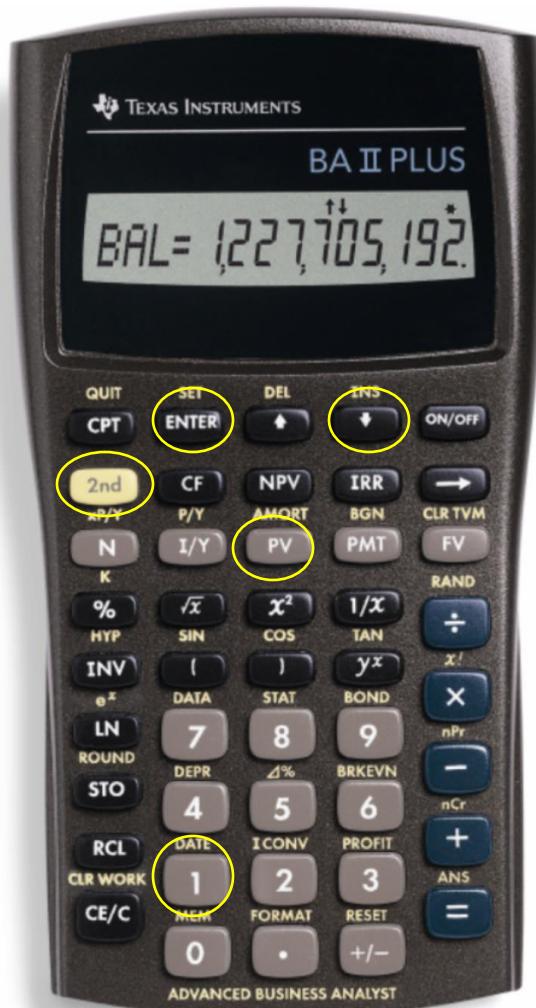
# **Solving for the Payment**

<b>Inputs</b>	5	12	10,000	0
	N	I/Y	PV	PMT FV
<b>Compute</b>	-2774.10			

The result indicates that a \$10,000 loan that costs 12% annually for 5 years and will be completely paid off at that time will require \$2,774.10 annual payments.



# Using the Amortization Functions of the Calculator



Press:

2<sup>nd</sup>

Amort

1

ENTER

1

ENTER

Results:

BAL = 8,425.90\*



PRN = -1,574.10\*

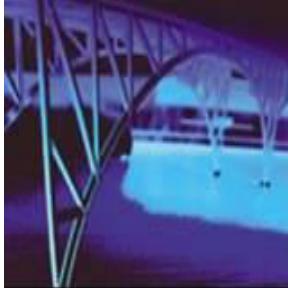


INT = -1,200.00\*

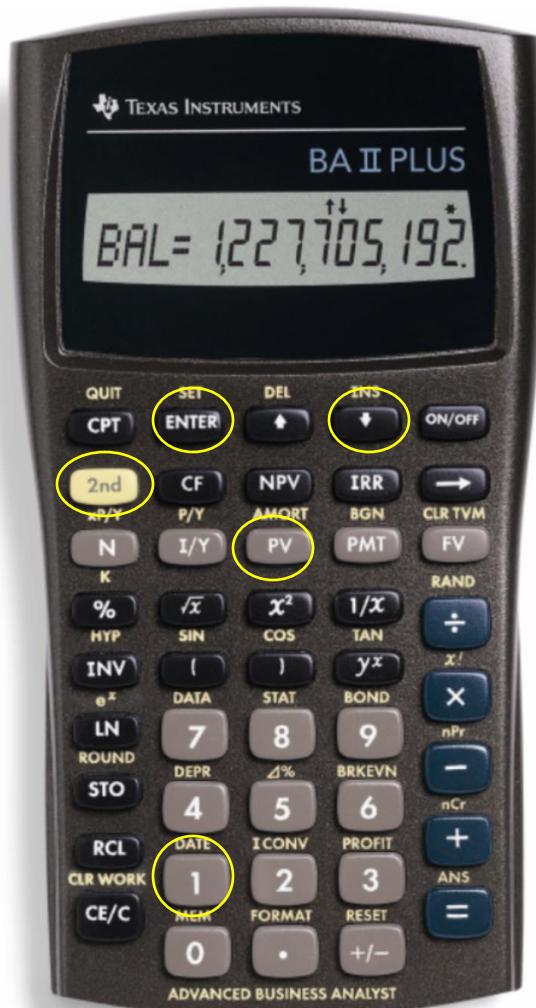


**Year 1 information only**

\*Note: Compare to 3-82



# Using the Amortization Functions of the Calculator



Press:

2<sup>nd</sup>

Amort

2

ENTER

2

ENTER

Results:

BAL = 6,662.91\*



PRN = -1,763.99\*

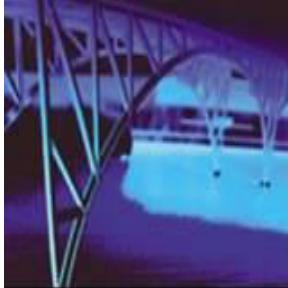


INT = -1,011.11\*

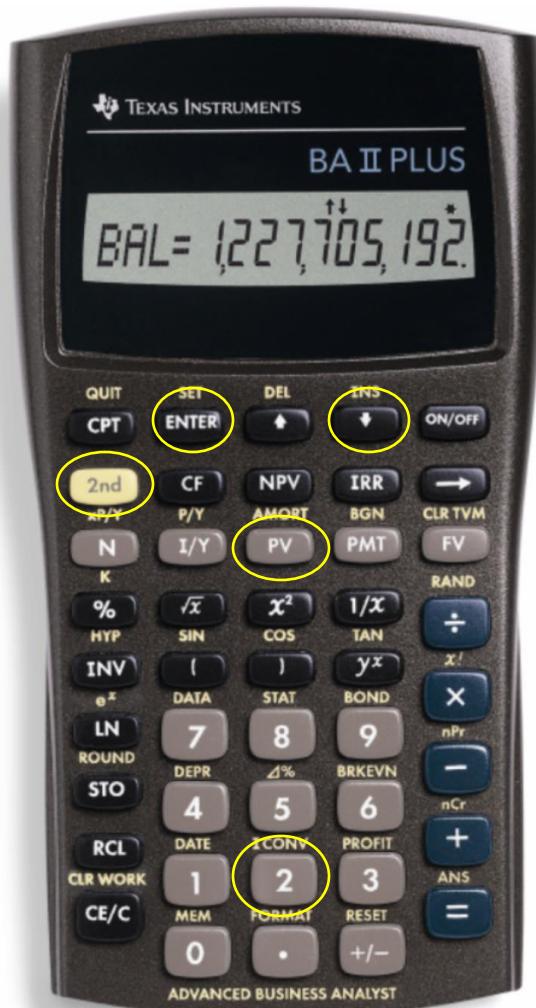


**Year 2 information only**

\*Note: Compare to 3-82



# Using the Amortization Functions of the Calculator



Press:

2<sup>nd</sup>

Amort

1

ENTER

5

ENTER

Results:

BAL = 0.00



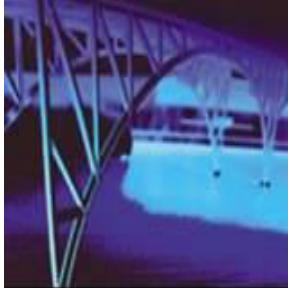
PRN = -10,000.00



INT = -3,870.49



Entire 5 Years of loan information  
(see the total line of 3-82)



# ***Usefulness of Amortization***

---

- 1. Determine Interest Expense --**  
Interest expenses may reduce taxable income of the firm.
  
- 2. Calculate Debt Outstanding --**  
The quantity of outstanding debt may be used in financing the day-to-day activities of the firm.

# Basics of Risk Management

Dr. Rakesh Kumar Sharma

# Risk

- Risk in a Traditional Sense Risk in holding securities is generally associated with possibility that realized returns will be less than the returns that were expected.

# Risk

- Risk is a state of Uncertainty where some of the possibilities involve a loss. Normally when the outcome of an event is not known and a probability or What if element is attached to it, then there is a risk.

# Systematic risk

- *Systematic risk* is due to risk factors that affect the entire market such as investment policy changes, foreign investment policy, change in taxation clauses, shift in socio-economic parameters, global security threats and measures etc.

# *Market Risk*

- Finding stock prices falling from time to time while a company's earnings are rising, and vice versa, is not uncommon.
- The price of a stock may fluctuate widely within a short span of time even though earnings remain unchanged.

## Contd.....

- The causes of this phenomenon are varied, but it is mainly due to a change in investors' attitudes toward equities in general, or toward certain types or groups of securities in particular.

# ***Interest-Rate Risk***

- Interest-rate risk refers to the uncertainty of future market values and of the size of future income, caused by fluctuations in the general level of interest rates.

## Contd.....

- The root cause of interest-rate risk lies in the fact that, as the rate of interest paid on U.S. government securities (USGs) rises or falls, the rates of return demanded on alternative investment vehicles such as stocks and bonds issued in the private sector, rise or fall.

# ***Purchasing-Power Risk***

- Purchasing-power risk is the uncertainty the purchasing power of the amounts to be received. In more everyday terms, purchasing-power risk refers to the impact of inflation or deflation on an investment.

## Contd....

- If we think of investment as the postponement of consumption, we can see that when a person purchases a stock, he has foregone the opportunity to buy some good or service for as long as he owns the stock.
- If, during the holding period, good or services rise, the investor actually loses purchasing power.

## Contd....

- Rising prices on goods and services are normally associated with what is referred to as inflation. Falling prices on goods and services are termed deflation.

# **Unsystematic Risk**

- Unsystematic risk is the portion of total risk that is unique or peculiar to a firm or an industry, above and beyond that affecting securities market in general.

## Contd....

- Factors such as management capability, consumer preferences, and labor strikes can cause unsystematic variability of returns for a company's stock.

# Techniques of Risk Measurement

- Following are the different types of statistical and financial techniques, which are used to measure the degree of financial risk:
- Range
- Standard Deviation
- Variance
- Coefficient of Variance



# ***THE CAPITAL ASSET PRICING MODEL (CAPM)***

Dr. Rakesh Kumar Sharma

# Efficient Frontier

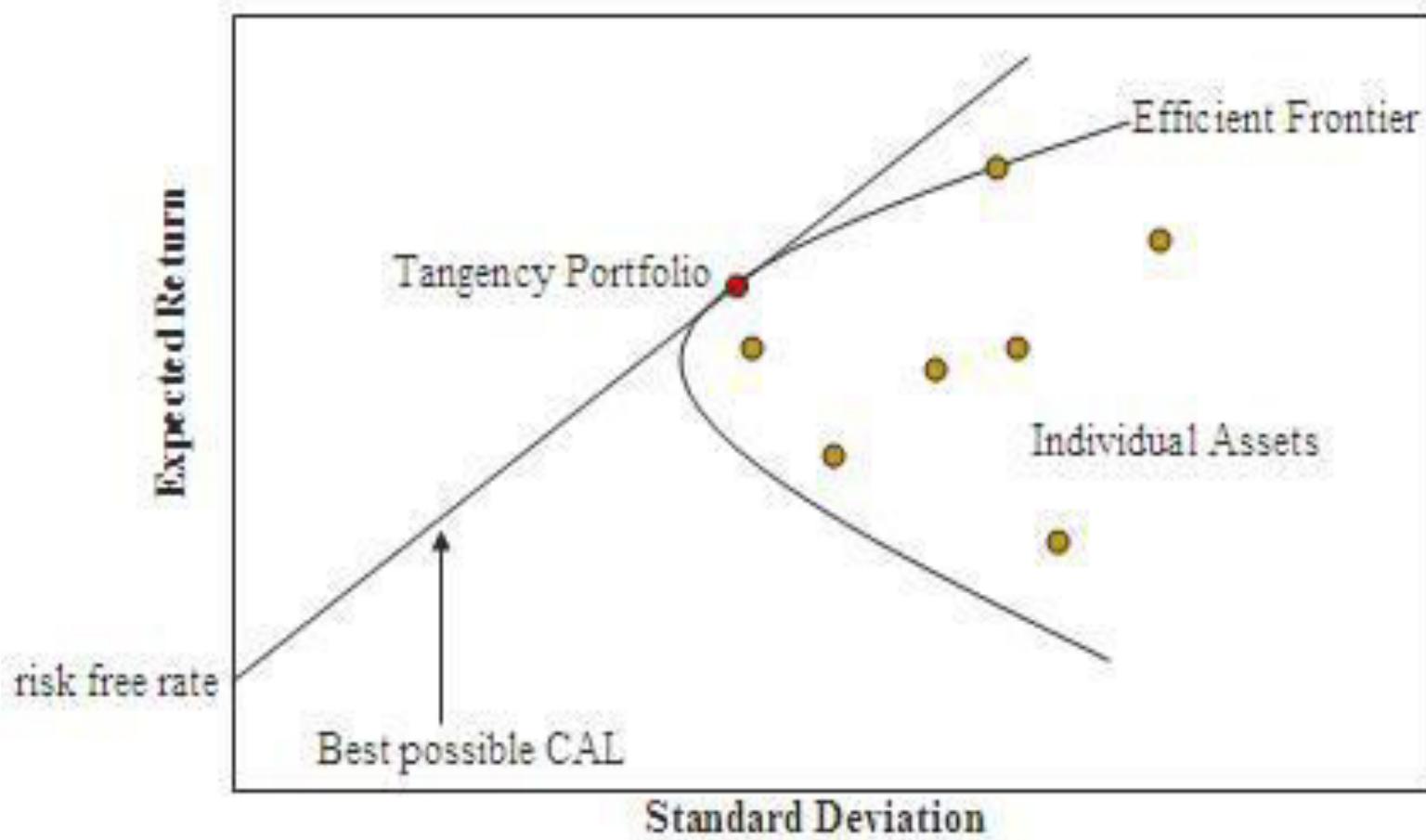
- The **efficient frontier** (or portfolio **frontier**) is a concept in modern portfolio theory introduced by Harry Markowitz and others in 1952. It is the set of portfolios each with the feature that no other portfolio exists with a higher expected return but with the same standard deviation of return.

# Cont.....

- The efficient frontier is the set of optimal portfolios that offers the highest expected return for a defined level of risk or the lowest risk for a given level of expected return.

# Cont.....

- Portfolios that lie below the efficient frontier are sub-optimal, because they do not provide enough return for the level of risk.
- Portfolios that cluster to the right of the efficient frontier are also sub-optimal, because they have a higher level of risk for the defined rate of return.



- The capital MARKET line (CML) is a line used in the capital asset pricing model to illustrate the rates of return for efficient portfolios depending on the risk-free rate of return and the level of risk (standard deviation) for a particular portfolio.

# The Capital Asset Pricing Model

## What is it?



- CAPM is a model that provides a framework to determine the required rate of return on an asset and indicates the relationship between return and risk of the asset.

# CAPM

- A model that describes the relationship between risk and expected return and that is used in the pricing of risky securities.
- The model was introduced by Jack Treynor, William Sharpe, John Lintner and Jan Mossin independently, building on the earlier work of Harry Markowitz on diversification and modern portfolio theory.
- The general idea behind CAPM is that investors need to be compensated in two ways: time value of money and risk

# Assumptions

- Can lend and borrow unlimited amounts under the risk free rate of interest
- Individuals seek to maximize the expected utility of their portfolios over a single period planning horizon.
- Assume all information is available at the same time to all investors
- The market is perfect: there are no taxes; there are no transaction costs; securities are completely divisible; the market is competitive.
- The quantity of risky securities in the market is given.

# Implications and relevance of CAPM

- Investors will always combine a risk free asset with a market portfolio of risky assets. Investors will invest in risky assets in proportion to their market value..
- Investors can expect returns from their investment according to the risk. This implies a liner relationship between the asset's expected return and its beta.
- Investors will be compensated only for that risk which they cannot diversify. This is the market related (systematic) risk

# CAPM EQUATION

$$E(r_i) = R_f + \beta_i(E(r_m) - R_f)$$

- $E(r_i)$  = return required on financial asset  $i$
- $R_f$  = risk-free rate of return
- $\beta_i$  = beta value for financial asset  $i$
- $E(r_m)$  = average return on the capital market

# BETA

- A measure of the volatility, or systematic risk, of a security or a portfolio in comparison to the market as a whole.
- Beta is used in the capital asset pricing model (CAPM), a model that calculates the expected return of an asset based on its beta and expected market returns.
- Also known as "beta coefficient."

# BETA

*Correlation coefficient, r computational formula:*

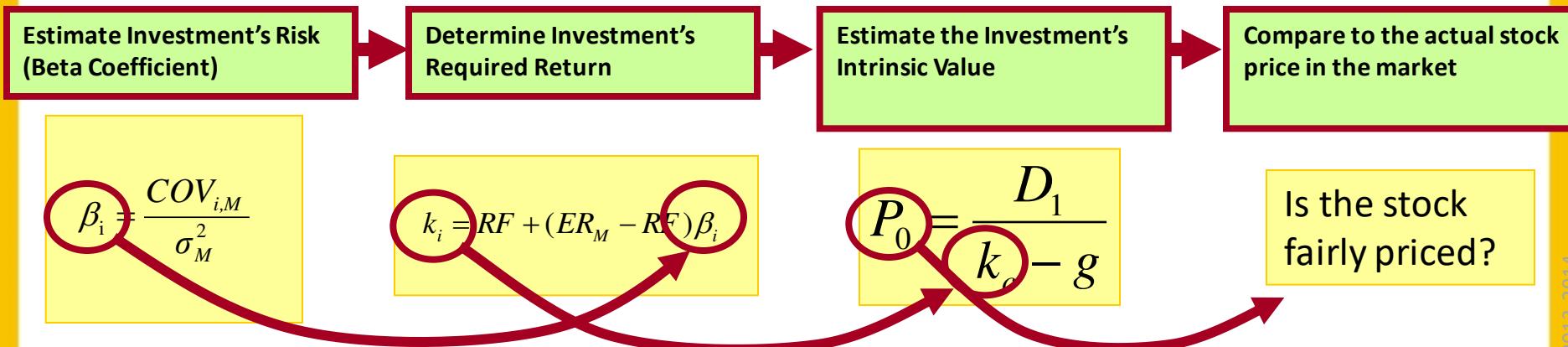
$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2} \cdot \sqrt{n(\sum y^2) - (\sum y)^2}} = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2} \cdot \sqrt{n(\sum y^2) - (\sum y)^2}}$$

- Hypothesizes that investors require higher rates of return for greater levels of relevant risk.
  - There are no prices on the model, instead it hypothesizes the relationship between risk and return for individual securities.
  - It is often used, however, the price securities and investments.

# The Capital Asset Pricing Model

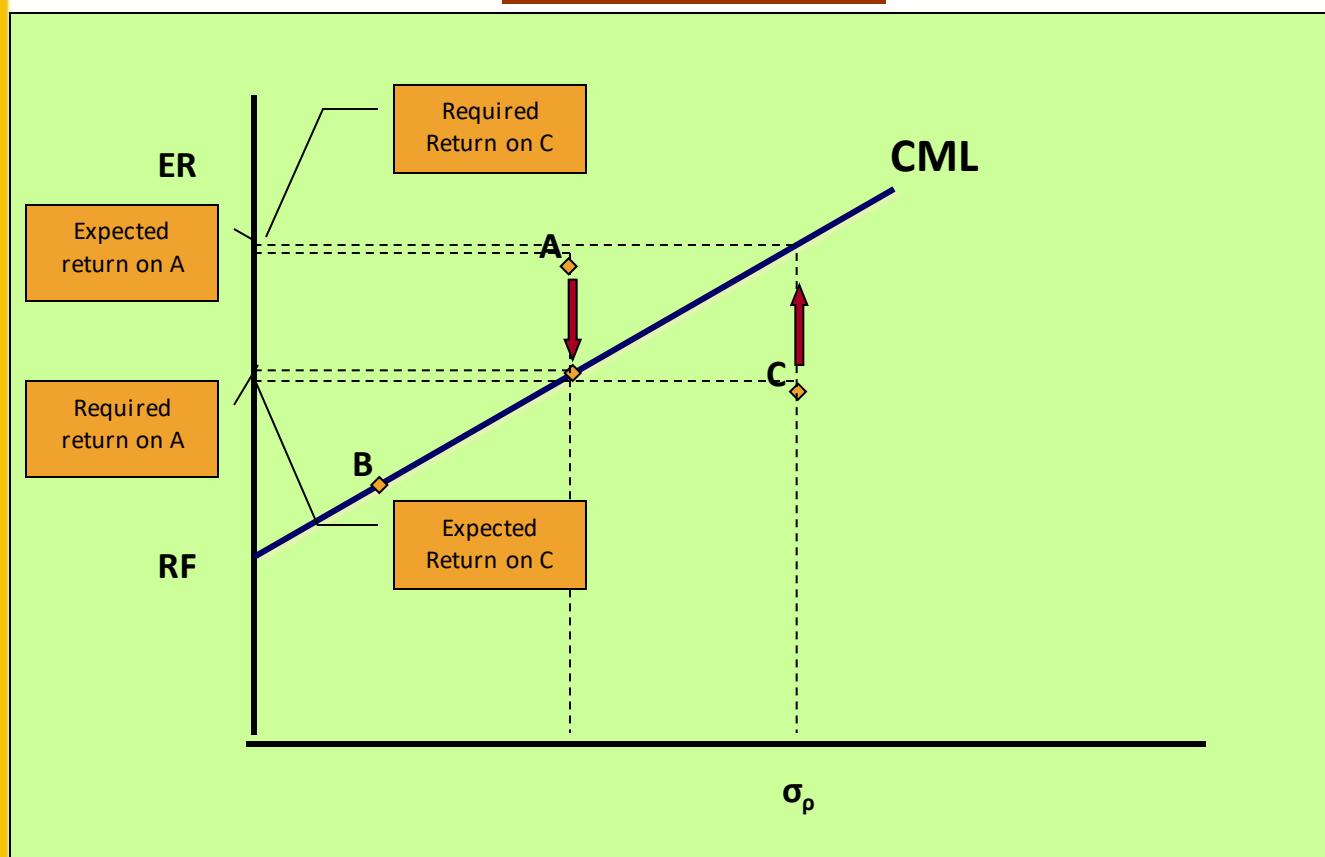
How is it Used?

- Uses include:
  - Determining the cost of equity capital.
  - The relevant risk in the dividend discount model to estimate a stock's intrinsic (inherent economic worth) value. (As illustrated below)



# The Capital Asset Pricing Model

## Expected and Required Rates of Return



**C** is an overvalued portfolio. Expected return is less than the required return.

Selling pressure will cause the price to fall and the yield to rise until expected equals the required return.

equals required (market equilibrium condition is achieved.)

# CAPM and Market Risk

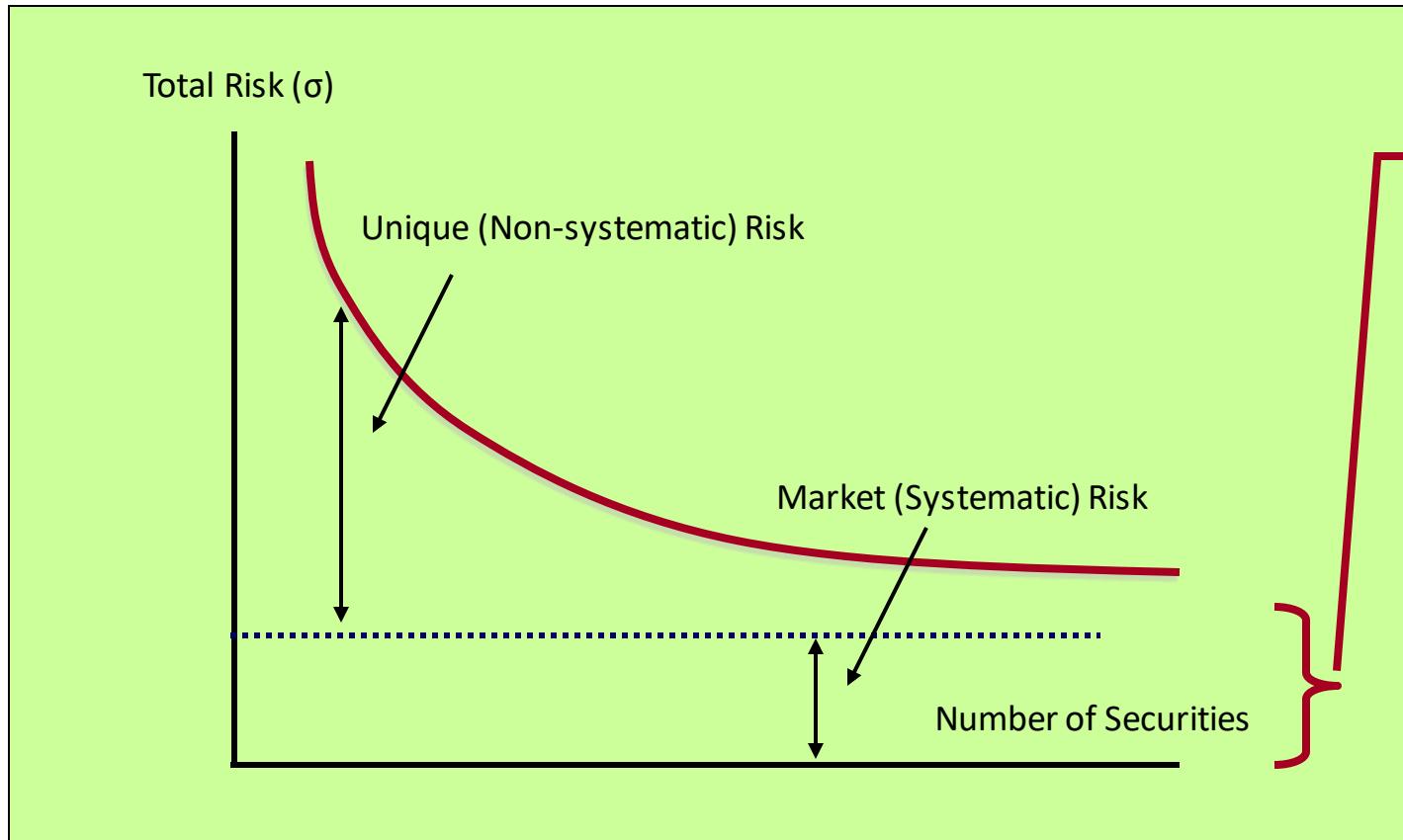
- The Capital Asset Pricing Model

# Diversifiable and Non-Diversifiable Risk

- CML applies to efficient portfolios
- Volatility (risk) of *individual security returns* are caused by two different factors:
  - Non-diversifiable risk (system wide changes in the economy and markets that affect all securities in varying degrees)
  - Diversifiable risk (company-specific factors that affect the returns of only one security)

# The CAPM and Market Risk

## Portfolio Risk and Diversification



Market or systematic risk is risk that cannot be eliminated from the portfolio by investing the portfolio into more and different securities.

# Relevant Risk

Drawing a Conclusion from Figure

- Figure demonstrates that an individual securities' volatility of return comes from two factors:
  - Systematic factors
  - Company-specific factors
- When combined into portfolios, company-specific risk is diversified away.
- Since all investors are 'diversified' then in an efficient market, no-one would be willing to pay a 'premium' for company-specific risk.
- Relevant risk to diversified investors then is systematic risk.
- Systematic risk is measured using the Beta Coefficient.

# Measuring Systematic Risk

## The Beta Coefficient

- The Capital Asset Pricing Model (CAPM)

# The Beta Coefficient

What is the Beta Coefficient?

- A measure of systematic (non-diversifiable) risk
- As a ‘coefficient’ the beta is a pure number and has no units of measure.

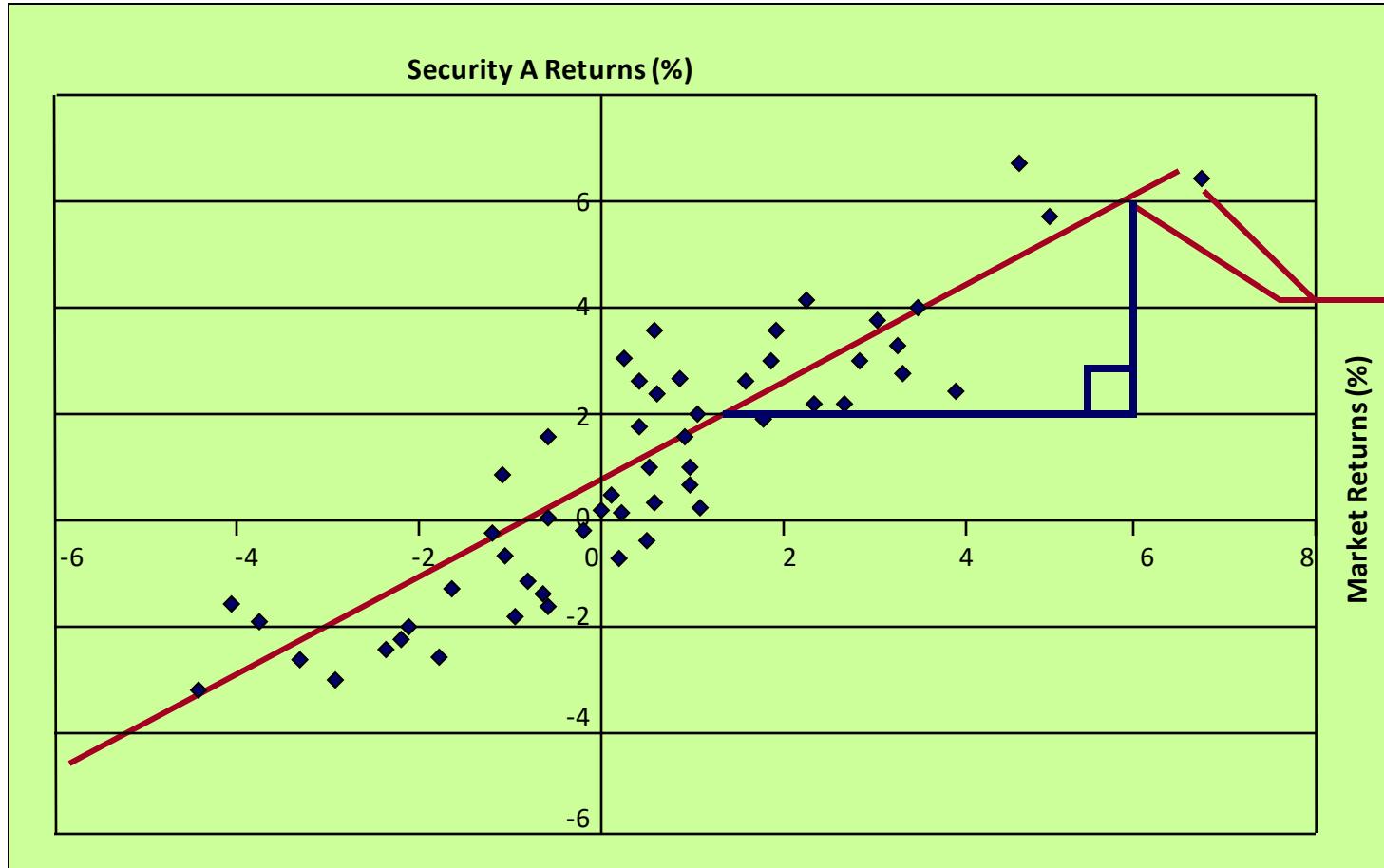
# The Beta Coefficient

How Can We Estimate the Value of the Beta Coefficient?

- There are two basic approaches to estimating the beta coefficient:
  1. Using a formula (and subjective forecasts)
  2. Use of regression (using past holding period returns)

# The CAPM and Market Risk

The Characteristic Line for Security A



The plotted points are the coincident rates of return earned on the investment and the market portfolio over past periods.

# The Formula for the Beta Coefficient

Beta is equal to the covariance of the returns of the stock with the returns of the market, divided by the variance of the returns of the market:

$$\beta_i = \frac{COV_{i,M}}{\sigma_M^2} = \frac{\rho_{i,M} \sigma_i}{\sigma_M}$$

# The Beta Coefficient

How is the Beta Coefficient Interpreted?

- The beta of the market portfolio is ALWAYS = 1.0
- The beta of a security compares the volatility of its returns to the volatility of the market returns:

$$\beta_s = 1.0$$

- the security has the same volatility as the market as a whole

$$\beta_s > 1.0$$

- aggressive investment with volatility of returns greater than the market

$$\beta_s < 1.0$$

- defensive investment with volatility of returns less than the market

$$\beta_s < 0.0$$

- an investment with returns that are negatively correlated with the returns of the market

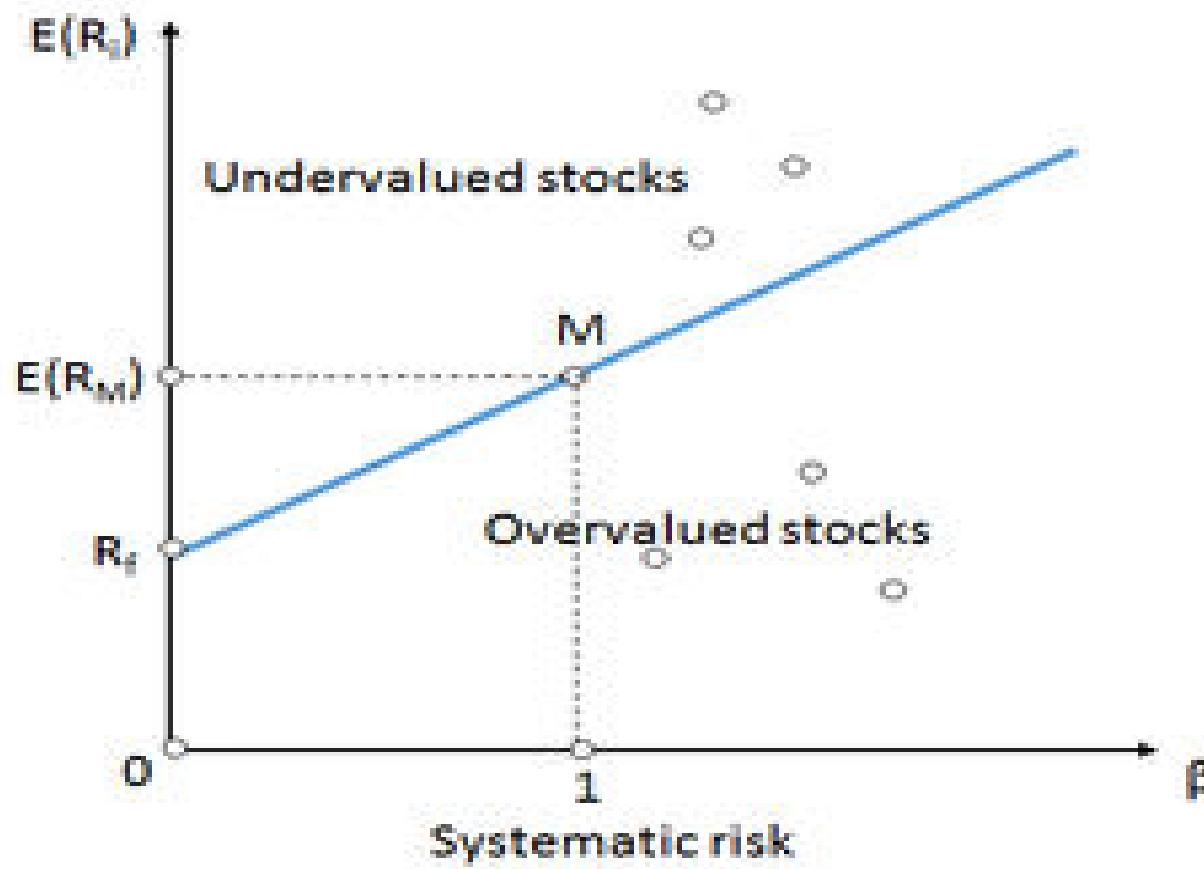
# The Security Market Line

- The Capital Asset Pricing Model (CAPM)

# Security Market Line

- The security market line (SML) is a visual representation of the capital asset pricing model or CAPM. It shows the relationship between the expected return of a security and its risk measured by its beta coefficient. In other words, the SML displays the expected return for any given beta or reflects the risk associated with any given expected return.
- $E(R_i) = RF + bi \times \{E(R_M) - RF\}$

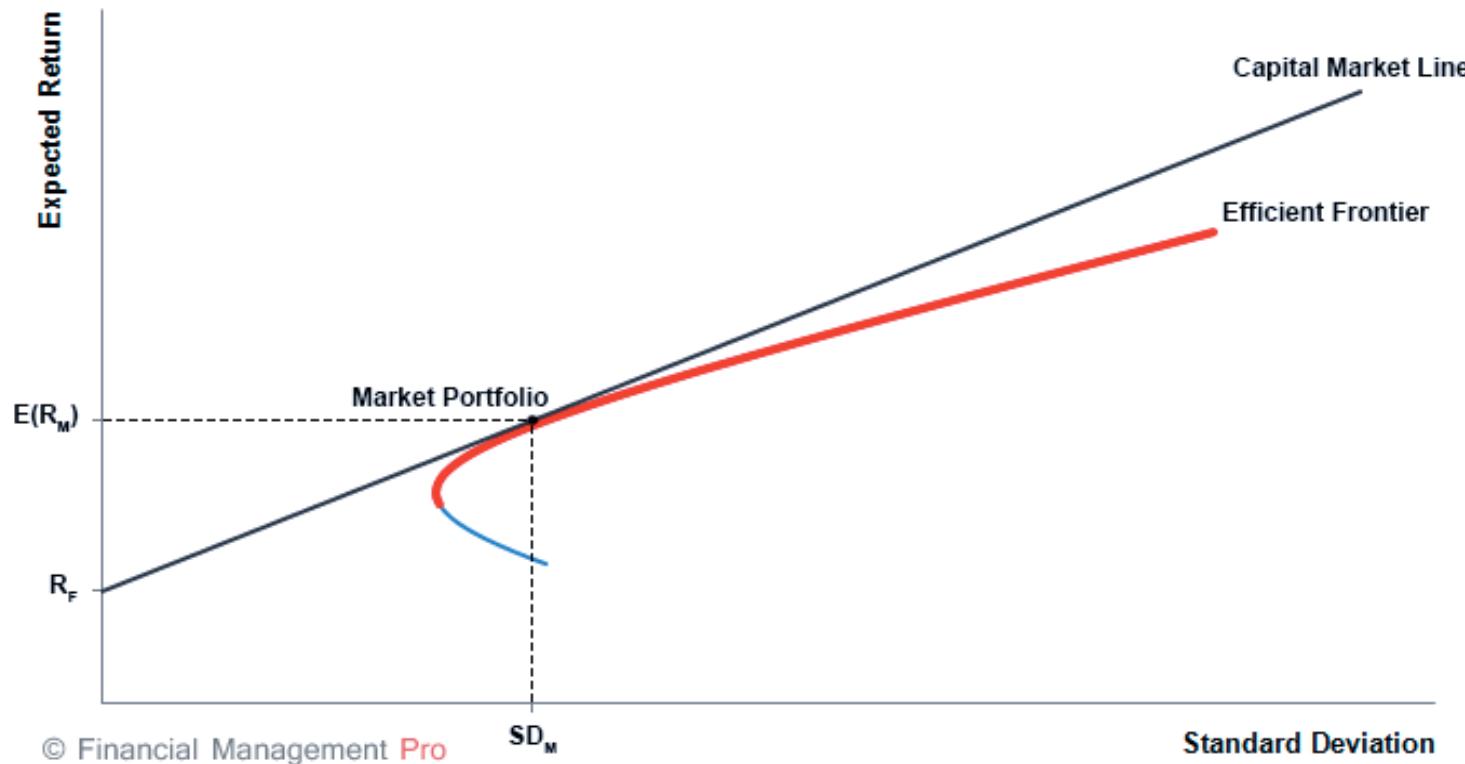
- Where  $E(R_i)$  is an expected return of a security,  $RF$  is a risk-free rate,  $b_i$  is a security's beta coefficient, and  $E(R_M)$  is an expected market return.



# Capital Market Line

- Capital market line (CML) is a graph that reflects the expected return of a portfolio consisting of all possible proportions between the market portfolio and a risk-free asset. The market portfolio is completely diversified, carries only systematic risk, and its expected return is equal to the expected market return as a whole.
- $E(R_i) = RF + SDc \times \{E(RM) - RF\} / SDm$
- where, SDC is a standard deviation of portfolio C return, SDM is a standard deviation of a market return.

# Capital Market Line



# Differences between CML and SML

- Following are the differences between CML and SML:
- 1. The CML is a line that is used to show the rates of return, which depends on risk-free rates of return and levels of risk for a specific portfolio. SML, which is also called a Characteristic Line, is a graphical representation of the market's risk and return at a given time.
- 2. While standard deviation is the measure of risk in CML, Beta coefficient determines the risk factors of the SML.

3. While the Capital Market Line graphs define efficient portfolios, the Security Market Line graphs define both efficient and non-efficient portfolios.
4. The Capital Market Line is considered to be superior when measuring the risk factors.
5. Where the market portfolio and risk free assets are determined by the CML, all security factors are determined by the SML.

# The CAPM and Market Risk

## The Security Market Line (SML)

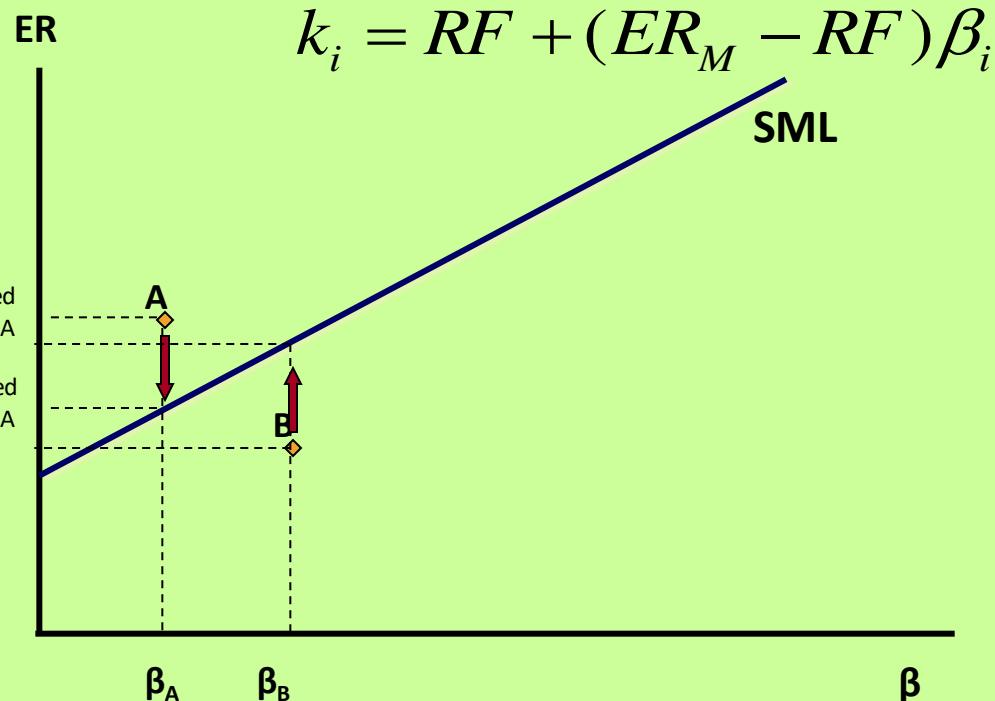
- The SML is the hypothesized relationship between return (the dependent variable) and systematic risk (the beta coefficient).
- It is a straight line relationship defined by the following formula:

$$k_i = RF + (ER_M - RF)\beta_i$$

- Where:
  - $k_i$  = the required return on security 'i'
  - $ER_M - RF$  = market premium for risk
  - $\beta_i$  = the beta coefficient for security 'i'

# The CAPM and Market Risk

## The SML and Security Valuation



Similarly, B is an overvalued security. Investor's will sell to lock in gains, but the selling pressure will cause the market price to fall, causing the expected return to rise until it equals the required return.

# The CAPM in Summary

The SML and CML

- The CAPM is well entrenched and widely used by investors, managers and financial institutions.
- It is a single factor model because it based on the hypothesis that required rate of return can be predicted using one factor – systematic risk
- The SML is used to price individual investments and uses the beta coefficient as the measure of risk.
- The CML is used with diversified portfolios and uses the standard deviation as the measure of

# Challenges to CAPM

- Empirical tests suggest:
  - CAPM does not hold well in practice:
    - Ex post SML is an upward sloping line
    - Ex ante  $y$  (*vertical*) – intercept is higher than RF
    - Slope is less than what is predicted by theory
  - Beta possesses no explanatory power for predicting stock returns (Fama and French, 1992)
- CAPM remains in widespread use despite the foregoing.
  - Advantages include – relative simplicity and intuitive logic.
- Because of the problems with CAPM, other models have been developed including:
  - Fama-French (FF) Model
  - Arbitrage Pricing Theory (APT)
  - Hamada Model

THANKS...••••••••

# Sources of Long-Term Financing

# Long-Term Financing

- Common Stock
- Corporate Long-Term Debt: The Basics
- Preferred Stock
- Patterns of Financing
- Recent Trends in Capital Structure
- Summary and Conclusions

# Common Stock

- Par and No-Par Stock
- Authorized versus Issued Common Stock
- Capital Surplus
- Retained Earnings
- Market Value, Book Value, and Replacement Value
- Shareholders' Rights
- Dividends
- Classes of Stock

# Par and No-Par Stock

- The stated value on a stock certificate is called the *par value*.
  - Par value is an accounting value, not a market value.
  - The total par value (the number of shares multiplied by the par value of each share) is sometimes called the *dedicated capital* of the corporation.
- Some stocks have no par value.

# Authorized vs. Issued Common Stock

- The articles of incorporation must state the number of shares of common stock the corporation is authorized to issue.
- The board of directors, after a vote of the shareholders, may amend the articles of incorporation to increase the number of shares.
  - Authorizing a large number of shares may worry investors about *dilution* because authorized shares can be issued later with the approval of the board of directors but without a vote of the shareholders.

# Capital Surplus

- Usually refers to amounts of directly contributed equity capital in excess of the par value.
  - For example, suppose 1,000 shares of common stock having a par value of \$1 each are sold to investors for \$8 per share. The capital surplus would be

$$(\$8 - \$1) \times 1,000 = \$7,000$$

# Retained Earnings

- Not many firms pay out 100 percent of their earnings as dividends.
- The earnings that are not paid out as dividends are referred to as *retained earnings*.

# Market Value, Book Value, and Replacement Value

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- Market Value is the price of the stock multiplied by the number of shares outstanding.
    - Also known as Market Capitalization
  - Book Value
    - The sum of par value, capital surplus, and accumulated retained earnings is the *common equity* of the firm, usually referred to as the book value of the firm.
  - Replacement Value
    - The current cost of replacing the assets of the firm.
  - At the time a firm purchases an asset, market value, book value, and replacement value are equal.
-

# Shareholders' Rights

- The right to elect the directors of the corporation by vote constitutes the most important control device of shareholders.
- Directors are elected each year at an annual meeting by a vote of the holders of a majority of shares who are present and entitled to vote.
  - The exact mechanism varies across companies.
- The important difference is whether shares are to be voted cumulatively or voted straight.

# Proxy Voting

- A proxy is the legal grant of authority by a shareholder to someone else to vote his or her shares.
- For convenience, the actual voting in large public corporations is usually done by proxy.

# Cumulative versus Straight Voting

- The effect of cumulative voting is to permit minority participation.
  - Under cumulative voting, the total number of votes that each shareholder may cast is determined first. Usually, the number of shares owned or controlled by a shareholder is multiplied by the number of directors to be elected. Each shareholder can distribute these votes as he wishes over one or more candidates.
- Straight voting works like a U.S. political election.
  - Shareholders have as many votes as shares and each position on the board has its own election.
  - A tendency to freeze out minority shareholders.

# Cumulative vs. Straight Voting: Example

- Imagine a firm with two shareholders: Mr. Smith and Ms. Wesson.
  - Mr. Smith owns 60% of the firm ( = 600 shares) and Ms. Wesson 40% ( = 400 shares).
  - There are three seats up for election on the board.
- Under straight voting, Mr. Smith gets to pick all three seats.
- Under cumulative voting, Ms. Wesson has 1,200 votes ( = 400 shares  $\times$  3 seats) and Mr. Smith 1,800 votes.
- Ms. Wesson can elect at least one board member.

# Dividends

- Unless a dividend is declared by the board of directors of a corporation, it is not a liability of the corporation.
  - A corporation cannot *default* on an undeclared dividend.
- The payment of dividends by the corporation is not a business expense.
  - Therefore, they are not tax-deductible.
- Dividends received by individual shareholders are for the most part considered ordinary income by the IRS and are fully taxable.
  - There is an intra-corporate dividend exclusion.

# Classes of Stock

- When more than one class of stock exists, they are usually created with unequal voting rights.
- Many companies issue dual classes of common stock. The reason has to do with control of the firm.
- Lease, McConnell, and Mikkelson found the market prices of stocks with superior voting rights to be about 5 percent higher than the prices of otherwise-identical stocks with inferior voting rights.

# Classified Stock

- Founders' Shares
- Ford
  - Class B shares held by the Ford family.
- Wang Laboratories
  - Class C (Founders) gets 1 vote per share.
  - Class B gets 1/10 vote per share.
- Coors
  - Public shares (class B) are nonvoting.
- General Motors

# Corporate Long-Term Debt: The Basics

- Interest versus Dividends
- Is It Debt or Equity?
- Basic Features of Long-Term Debt
- Different Types of Debt
- Repayment
- Seniority
- Security
- Indenture

# Interest versus Dividends

- Debt is not an ownership interest in the firm. Creditors do not usually have voting power.
- The corporation's payment of interest on debt is considered a cost of doing business and is fully tax-deductible. Dividends are paid out of after-tax dollars.
- Unpaid debt is a liability of the firm. If it is not paid, the creditors can legally claim the assets of the firm.

# Is It Debt or Equity?

- Some securities blur the line between debt and equity.
- Corporations are very adept at creating hybrid securities that look like equity but are called debt.
  - Obviously, the distinction is important at tax time.
  - A corporation that succeeds in creating a debt security that is really equity obtains the tax benefits of debt while eliminating its bankruptcy costs.

# Basic Features of Long-Term Debt

- The bond indenture usually lists
  - Amount of Issue, Date of Issue, Maturity
  - Denomination (Par value)
  - Annual Coupon, Dates of Coupon Payments
  - Security
  - Sinking Funds
  - Call Provisions
  - Covenants
- Features that may change over time
  - Rating
  - Yield-to-Maturity
  - Market price

# Different Types of Debt

- A *debenture* is an unsecured corporate debt, whereas a *bond* is secured by a mortgage on the corporate property.
- A *note* usually refers to an unsecured debt with a maturity shorter than that of a debenture, perhaps under 10 years.

# Repayment

- Long-term debt is typically repaid in regular amounts over the life of the debt. The payment of long-term debt by installments is called *amortization*.
- Amortization is usually arranged by a sinking fund. Each year the corporation places money into a sinking fund, and the money is used to buy back the bonds.

# Seniority

- Seniority indicates preference in position over other lenders.
- Some debt is *subordinated*. In the event of default, holders of subordinated debt must give preference other specified creditors who are paid first.

# Security

- Security is a form of attachment to property.
  - It provides that the property can be sold in event of default to satisfy the debt for which the security is given.
  - A mortgage is used for security in tangible property.
  - Debentures are not secured by a mortgage.

# Indenture

- The written agreement between the corporate debt issuer and the lender.
- Sets forth the terms of the loan:
  - Maturity
  - Interest rate
  - Protective covenants.

# Preferred Stock

- Represents equity of a corporation, but is different from common stock because it has preference over common in the payments of dividends and in the assets of the corporation in the event of bankruptcy.
- Preferred shares have a stated liquidating value, usually \$100 per share.
- Preferred dividends are either cumulative or noncumulative.

# Is Preferred Stock Really Debt?

- A good case can be made that preferred stock is really debt in disguise.
  - The preferred shareholders receive a stated dividend.
  - In the event of liquidation, the preferred shareholders are entitled to a fixed claim.
- Unlike debt, preferred stock dividends cannot be deducted as interest expense when determining taxable corporate income.
- Most preferred stock in the U.S. is held by corporate investors.
  - They get a 70-percent income tax exemption.

# The Preferred-Stock Puzzle

- There are two offsetting tax effects to consider in evaluating preferred stock:
  1. Dividends are not deducted from corporate income in computing the tax liability of the issuing corporation.
  2. When a corporation buys preferred stock, 70 percent of the dividends received are exempt from corporate taxation.
- Most agree that 2) does not fully offset 1). Given that preferred stock offers less flexibility to the issuer than common stock, some have argued that preferred stock should not exist.
- Yet it does.

# Patterns of Financing

- Internally generated cash flow dominates as a source of financing, typically between 70 and 90%.
- Firms usually spend more than they generate internally—the deficit is financed by new sales of debt and equity.
- Net new issues of equity are dwarfed by new sales of debt.
- This is consistent with the pecking order hypothesis.
- Firms in other countries rely to a greater extent than U.S. firms on external equity.

# Recent Trends in Capital Structure

- This important question is difficult to answer definitively.
- Which are best: book or market values?
  - In general, financial economists prefer market values.
  - However, many corporate treasurers may find book values more appealing due to the volatility of market values.
- Whether we use book or market values, debt ratios for U.S. non-financial firms have been below 50 percent of total financing.

# Summary and Conclusions

- The basic sources of long-term financing are:
  - Long-Term Debt
  - Common Stock
  - Preferred Stock
- Common shareholders have voting rights, limited liability, and a residual claim on the corporation.
- Bondholders have a contractual claim against the corporation.
- Preferred stock has some of the features of debt and equity.
- Firms need financing—most of it is generated internally.

# Projects

Cost of Capital

# Project – Cost of Capital

- Company should invest in a project if value of the firm and the wealth of the shareholders is maximized.
- The funds utilized for business investments and overall operations of the business can be derived from different sources like various type of debt available in the market, preferred stock (preference Shares) and common stock (equity shares).

# Project Finance Financing

- Optimal financing mix of any given firm is that ideal financing mix which maximizes the value of the firm and wealth of the shareholders.
- Value of the firm is the value of its total assets. Value of asset is measured by the future benefits generated by it.
- Value itself can be defined in many forms:
  - book value,
  - market value,
  - liquidating value,
  - fair reasonable value, and
  - going concern value.

# Cost of Capital - Meaning

- Capital is an essential input of production.
- Capital also bears a cost to the firm.
- Under capital expenditure decisions cost of capital assesses profitability of Long-term investments and justifies their adoption by the firm by comparing it to its cost.
- Thus after estimating the total funds required for operational activities and capital investments, the firm estimates the total cost of its total funds.
- Cost of capital is the minimum acceptable rate of return on funds or capital employed by the company.
- This minimum acceptable rate of return is the compensation for the time and risk in the use of the funds by the company.
- Cost of capital helps the company in evaluating its investment decisions, designing its debt structure, deciding its dividend decisions, investment in current assets and appraisal of financial performance of the firm.

# Cost of Debt

- Debts are the liabilities of firm and includes term loans, debentures and bonds.
- Term loans are loans taken from banks and financial institutions for a specified period of time at a certain rate of interest having maturity period of more than 3 years.
- Debentures and bonds are debt instruments issued by the corporate to the public or institutions at a specified interest rate for a specified period of time, creating creditors to the company.
- A debenture or bond may be issued at par or at a discount or premium.
- The rate of interest at which the debt is issued is the basis of calculating the cost of any type of debt.

The explicit cost of debt i.e.  $K_b$  is the discount rate which equates the present values of cash flows to the creditors (suppliers of debt) with the current market price of the new debt issue.  $K_b$  can be solved by the help of the following formula:

$$P_0 = \sum_{t=1}^n \frac{I_t + P_t}{(1 + K_b)t}$$

Where,

$\Sigma$  = summation for period 1 through n

$I_t$  = interest payment in period t on the principal

$P_t$  = payment of principal in period t (return of principal)

$P_0$  = Current Market Price of debt

$k_b$  = cost of debt (before tax)

- **After tax cost of debt:** It is denoted by  $K_d$  can be determined by the equation

$$K_d = K_b (1 - t)$$

- Where  $K_b$  is before tax cost of debt and  $K_d$  is after tax cost of debt.
- **Before tax cost of debt:** represented by  $K_b$  can be determined by simply considering the interest payable as follows

$$K_b = \text{Interest}/\text{Principal}$$

# Illustration – 1

- If a firm borrows Rs. 1,00,000 for one year at 10%. The cost of debt is Rs. 10,000/-which is the annual interest.  
$$= 10,000/1,00,000 = 10\%$$
- After tax cost of debt i.e.  $K_d$  is calculated by adjusting before tax cost for the tax rate  $M$  applicable. The formula for after tax cost of debt will be as follows  
$$K_d = K_b(1 - t)$$
- For example if before tax cost of debt is 12% and tax rate is 50% the after tax cost of debt will be calculated as follows :  $K_d = K_b(1 - t) = 12(1 - .5) = 6\%$

# Types of Debt

- **PERPETUAL DEBT:** It is the debt that has no maturity value. Such debts do not have any principal repayment as long as the company is operating. Cost of perpetual debt can be calculated as follows:

$$K_b = \frac{I}{SP} \quad K_d = \frac{I(1 - t)}{SP}$$

- Where,
- I is annual interest payments,
- SP is net sale proceeds of debt, and
- t is tax rate

# Types of Debt

- **REDEEMABLE DEBT:** It has a maturity value i.e. these debts are issued for specific time period. Cost of redeemable debt can be calculated as follows:

$$K_{Db} = \frac{I_t + \frac{M - P_b}{N}}{\frac{M + P_b}{2}}$$

$$K_d = \frac{I_t(1 - t) + \frac{M - P_b}{N}}{\frac{M + P_b}{2}}$$

Where,

$k_b$  = Before Tax cost of debt

$k_d$  = After tax cost of debt

$I_t$  = Periodic Interest Payment

$M$  = Par or maturity value of debt or Redemption value

$P_b$  = Debt's issue price or its purchase price or Net realised amount

$M - P_b$  = Share Premium

$N$  = Life of debt or no. of years to maturity.

**Illustration:** A Ltd issues a non-convertible debt for Rs. 400 lac. Each debt has a face value of Rs. 100 and carries a rate of interest of 14%. The interest is payable annually and the debenture is redeemable at a premium of 5% after 10 years. If A Ltd realizes Rs. 97 per debt and corporate tax rate is 50%, what is the cost of debt to the company?

$$K_d = \frac{\frac{14(1 - 0.5)}{10} + \frac{10.5 - 97}{10}}{\frac{105 + 97}{2}} = 7.7\%$$

**Illustration:** X Co. Ltd. issues bonds with par value of Rs. 2000 at 12% interest, on 8% discount for 10 years, calculate YTM.

$$YTM = \frac{\frac{240 + \frac{2000 - 1840}{10}}{2000 - 1840}}{2} = 20.8\%$$

# COST OF PREFERENCE SHARES

- Preferred stocks is a hybrid security i.e., a hybrid between debt and common/equity stock.
- Like debt preferred stock gets fixed, periodic payment (cash inflows in form of fixed dividends) and during liquidation they get 1st claim over those of common stockholders.
- Unlike debt it is neither bound by legal provisions of debt nor has voting rights (ownership privilege) of equity shares.
- To the firm preferred stock is more risky than common stock but less risky than debts.
- To the investor preferred stock is less risky than equity or common stock but more risky than debt.

# Formula – Preferred Stock

- Cost of preference shares is determined by the dividend paid to the preference stockholders i.e.,

$$(PY) \text{Preferred Yield} = \frac{\text{Preferred Dividend}}{\text{Price of Preferred Stock}} = \frac{D_p}{P_{P_s}}$$

- Illustration: A perpetuity selling for Rs. 80/- a share pays annual dividend of Rs. 8. Its yield is

$$PY = \frac{8}{80} = 10\%$$

- Thus,

$$K_p = \frac{D_p}{P_p}$$

Where

$D_p$  = Annual dividend of preference share

$P_p$  = Market Price/Sales Price of preference share

- If flotation costs are included then

Where

$$K_p = \frac{D_p}{P_p - f}$$

$f$  = floatation costs, (i.e., cost of selling the debt)

# ***REDEEMABLE PREFERENCE SHARES***

- These are Preference shares having maturity value. They are held for a specified time period.

$$K_p = \frac{D_p + \frac{M - P_b}{N}}{\frac{M + P_b}{2}}$$

$D_p$  = Dividend

$M$  = Redemption value

$P_b$  = Purchased price/Net realized amount

$N$  = Life of preference capital

**Illustration:** Excel Co. Ltd, each preference share has a face value of Rs. 100 and carries a rate of dividend of 14% p.a. Share is redeemable after 12 years at par. Net amount realised per share is Rs. 95. What is the cost of Preference Capital?

$$K_p = \frac{\frac{14 + \frac{100 - 95}{12}}{100 + 95}}{2} = 14.7\%$$

# COST OF EQUITY

- Estimation of the cost of equity is based upon forecasting of future earnings of equity shareholder in the form of dividends and capital gain and forecasting of stock value of equity shares.
- Among all the components of financing available to a firm the cost of equity is most difficult and complex to ascertain.
- One can easily forecast the expected interest payment of debt commensurate with its risk structure and preferred dividend rate as specified by the firm.
- This simplicity is due to the fact that interest on debt and preferred dividends remain fixed and constant over a period of time.
- But, equity dividends are expected to grow with time and hence do not remain constant.
- Further as already stated when it comes to estimating the cost of equity capital then one has to value the future forecasted cash inflows (earnings) associated with it.
- Due to the uncertainty of future earnings, the risk element of equity capital increases, thereby increasing the cost of equity capital.

# Approaches in estimation of cost of equity

- Dividend valuation approach: It states that expected return to investors from equity stock comprises of 2 components of benefit.
  - Dividend Receipts expected in each year till a particular time periods.
  - Capital gain associated with the equity stock at the end of a particular time period. In other words it is the value of stock (Selling price of stock—Purchase price of stock).

$$P_0 = \frac{\text{Expected Dividend Stream} + \text{Expected value of stock at time period } t}{1 + \text{required rate of return}} = \frac{D_1 + P_1}{1 + k_e}$$

Where

D = Dividend paid at the end of Period 1.

P = Market price of stock at end of Period 1.

$k_e$  = Required rate of return on equity shares  
(cost of equity).

$P_0$  = Current Market price of stock.

If future cash inflows are expected to grow at a growth rate ' $g$ ' then

$$P_o = \frac{D_1 + P_1(1 + g)}{1 + K_s} \quad P_o = \frac{D_1}{K_e - g}$$

$$k_e = \frac{D_1}{P_o} + g$$

$$K_e = \frac{\text{Expected Dividend}}{\text{Present Price}} + \frac{\text{Expected increase in price}}{\text{Present Price}}$$

# Cost of New Equity

- If fresh or new equity is issued then flotation cost is also considered while calculating cost of equity. Flotation cost is the cost incurred in issuing the equity shares to the investors, by the company.

$$k_e = \frac{D_1}{P_0(1-f)} + g$$

Where

f = floatation costs

**Illustration:** Dividend per share of a firm is Re 1. Cost of Equity and is expected to grow at 5% p.a. perpetually. Calculate the cost of equity capital, assuming the market price per share as Rs. 20.

$$k_e = \frac{\text{Rs } 1}{\text{Rs } 20} + 0.5 = 10\%$$

**Illustration:** From the given data calculate cost of equity shares of Co. X:

Current market price of share => Rs. 120

Cost of floatation/share on new shares =\* Rs.5

# Dividend paid on outstanding share for the past three years

**Year 1**                    **Rs. 10.5 per share**

**Year 2**                    **Rs. 12.5 per share**

**Year 3**                    **Rs. 14.5 per share**

Expected dividend on the new shares at the end of the current year is Rs. 15.0 per share.

- Solution: Over the three years the dividends have increased from Rs. 10.5 to Rs. 14.5 giving a compound factor of  $14.5/10.5 = 1.37$ . (We look for growth %age in compound factor table at 3 yr row for 10.5 a value of 1.37. At 11% we get 1.38). Thus the sum of Re. 1 would amount to Rs. 1.37 in 3 yrs @ 11% interest

$$k_e = \frac{15}{120 - 5} + 11.00\% = 24.04\%$$

# **CAPITAL ASSET PRICING MODEL APPROACH**

- CAPM calculates cost of capital of equity by considering risk free interest rate prevalent in the economy and the risk premium desired by the investor. It also considers  $\beta$  to specify the relationship between the market and the equity. Thus CAPM determines real value of equity in the market.

$$K_e = R_f + \beta(R_m - R_f)$$

$K_e$  = Cost of equity

$R_f$  = risk free interest rate in the market

$R_m$  = Market Return

$\beta$  = coefficient or sensitivity of security or relationship of security with the market

$R_m - R_f$  = Risk premium

- **Illustration:** Assume that  $R_f = 9\%$  and  $R_{I,,} = 18\%$ . If a security has a beta factor of (a) 1.4 (b) 1.0 (c) 2.3. Find out the expected return of the security.

$$K_e = R_f + \beta(R_m - R_f)$$

$$K_e = 9\% + (18\% - 9\%) 1.4 = 21.6\%$$

$$K_e = 9\% + (18\% - 9\%) 1.0 = 18\%$$

$$K_e = 9\% + (18\% - 9\%) 2.3 = 29.7\%$$

- Illustration: If  $R_f$  is 10% and  $P$  is 2 and market portfolio return is 14%. Calculate cost of equity capital.

$$k_e = R_f + \beta(R_m - R_f)$$

$$10\% + 2(14 - 10) = .1 + 2(.04) = 18\%.$$

Calculate market portfolio return and expected return on security using CAPM if the risk-free return 14%

Investment in equity shares	Initial Price	Dividends	Yr-end Price	Mkt B
A. Cement Ltd.	30	3	50	.8
Steel Ltd.	45	3	60	.7
Liquor Ltd.	55	3	135	.5
B. Govt of India Bonds	1000	150	1015	.99

Solution:

Investment in equity shares	Dividends	Capital Appreciation (3-1)	Total	Investment Return
A. Cement Ltd.	3	20	23	30
Steel Ltd.	3	15	18	45
Liquor Ltd.	3	80	83	55
B. Govt. of India Bonds	150	15	165	1000
	150	130	289	1130

$$\text{Return on Mkt. Portfolio} = \frac{289}{1130} = 25.57\%$$

Return on

Cement  $14\% + .8 (25.57 - 14) = 23\%$

Steel  $14\% + .7 (25.57 - 14) = 22.1\%$

Liquor  $14\% + .5 (25.57 - 14) = 19.78\%$

Govt of India Bonds  $= 14\% + .99 (25.57 - 14) = 25.45\%$

# COST OF RETAINED EARNINGS

- The cost of retained earnings (internal actual) is usually taken to be the same as cost of equity.

$$K_r(\text{cost of retained earnings}) = K_e$$

But when floatation costs are involved then

$$K_e = \frac{K_r}{(1 - f)} \quad (f = \text{floatation cost})$$

- For example say company issues fresh shares to raise its equity, Equity investors of return of 18%. The cost of issuing external equity is 6%. What is the cost of retained cost of external equity.

$$K_r = K_a = 18\%$$

- Cost of external equity raised by the company.

$$K_e = \frac{K_r}{1-f} = \frac{.18}{1-.06} = 19\%$$

# WEIGHTED AVERAGE COST OF CAPITAL

- After Assessing the cost of individual components of capital namely debt, equity
- we now ascertain the total or the overall cost of capital of the firm.
- Each source of capital has distinct/characteristic cost related to its funds.
- As different sources of capital have distinct and different costs, one has to ascertain a method to calculate the overall cost of capital.

# Steps in Overall Cost of Capital

- First determine (calculate) various costs of different sources of funds. (debt, equity, preference capital etc).
- Assign weight to each cost of different sources of funds.
- The weight assigned to each cost of capital is equal to the proportion investment in that capital divided by Total Investment or Total Capital of the firm.
- Add all the weighted components of cost of capital and arrive at the firm's weighted average cost the overall cost of capital is also K/a weighted average cost of capital.

$k_x$  = After Tax cost of  $x$ th method of financing

$w_x$  = weight of this specific method of financing ( $x$ ) = %age of Total capital of firm

$\sum$  = Summation of various financing methods 1 through n.

$$W.A.C.C. = \sum_{n=1}^{\textcolor{blue}{n}} K_x(\textcolor{red}{w}_x)$$

# Consider the following Capital Structure

	Amount (Rs.)	Proportion of Total Financing
Equity Capital	3,50,000	21.9
Preference Capital	2,00,000	12.5
Retained Earnings	7,00,000	43.7
Debt	3,50,000	21.9
	<hr/>	
	16,00,000	100.0

The firm computed the following after tax costs of different component sources of financing.

Source	Weight	CostM
Equity Capital	21.9	16
Retained Earnings	12.5	15
Preference Capital	49.7·12	12
Debt	21.9	10

# **How To Assign WEIGHTS?**

There are three types of weighing systems that can be adopted for determining the weighted average cost of capital (WACC) of the firm.

- Weights which are based upon the book value, of the different sources of finance used by the firm.
- Weights based upon the current market value of the different sources of finance used by the firm.
- Weights based upon the proportion of the financing of the different sources of finance used by the firm as compared to its total capital employed.

# Factors affecting cost of capital of a firm

- **Risk free rate of interest:** It is the minimum cost of capital that any firm encounters in the market. It is a benchmark for all industries to evaluate their individual cost of funds. When risk free rate of interest rises overall cost of funds increases in the economy. Vice versa when risk free rate of interest decreases, cost of funds in the economy is lowered and liquidity increases in the market.
- Risk free rate of interest is governed by the government. Thus we can state that cost of funds in any economy (where risk free rate of interest is regulated by government) depends on government policies and principles.

# Factors affecting cost of capital of a firm

- **Business risk:** The business risk, to which a firm is exposed to, also plays an important role in designing its cost of capital. If the business risk is high, its cost of capital increases and vice versa.
- **Financial risk:** Financial risk is the risk of debt financing. Higher the proportion of debt in the firm's capital structure, higher is its financial Risk. As financial risk increases bankruptcy risk also increases for a given firm. Higher the bankruptcy/Insolvency risk of an enterprise higher is its cost of capital.

# Factors affecting cost of capital of a firm

- **Decision of financing mix:** Depending upon the decision of the management about the proportion of different sources of funds, the overall cost of capital of the firm is decided. If the proportion of high cost fund is high the total cost of the firm increases. If proportion of low cost fund is high then total cost of fund for the firm decreases.
- **Attitude of management:** If management of the company is aggressive, it will require fewer amounts of liquid funds thereby decreasing its total cost. On the other hand conservative management keeps large amount of liquid funds thereby increasing its total cost of capital.

# Factors affecting cost of capital of a firm

- **Requirement of the firm:** Firms requiring large amount of funds consequently bear a higher cost compared to those firms which require less amount of funds, because large fund requirement leads to heavy external borrowing of funds.
- **Nature of Business:** Firm that requires heavy investment in fixed assets bears a high cost of funds in comparison with those firms which require low investment in fixed assets. Long term maturity funds are more expensive than short term maturity funds, and fixed assets are financed by long term funds.

**End of the Topic**  
**Cost of Capital**

# Financial and Operating Leverage

# Chapter Objectives

- Explain the concept of financial leverage.
- Discuss the alternative measures of financial leverage.
- Understand the risk and return implications of financial leverage.
- Analyse the combined effect of financial and operating leverage.
- Highlight the difference between operating risk and financial risk.

# Capital Structure Defined

- The term capital structure is used to represent the proportionate relationship between debt and equity.
- The various means of financing represent the financial structure of an enterprise. The left-hand side of the balance sheet (liabilities plus equity) represents the financial structure of a company. Traditionally, short-term borrowings are excluded from the list of methods of financing the firm's capital expenditure.

# Questions while Making the Financing Decision

- How should the investment project be financed?
- Does the way in which the investment projects are financed matter?
- How does financing affect the shareholders' risk, return and value?
- Does there exist an optimum financing mix in terms of the maximum value to the firm's shareholders?
- Can the optimum financing mix be determined in practice for a company?
- What factors in practice should a company consider in designing its financing policy?

# Meaning of Financial Leverage

- The use of the fixed-charges sources of funds, such as debt and preference capital along with the owners' equity in the capital structure, is described as **financial leverage** or **gearing** or **trading on equity**.
- The financial leverage employed by a company is intended to earn more return on the fixed-charge funds than their costs. The surplus (or deficit) will increase (or decrease) the return on the owners' equity. The rate of return on the owners' equity is levered above or below the rate of return on total assets.

# Measures of Financial Leverage

- *Debt ratio*
- *Debt-equity ratio*
- *Interest coverage*
- The first two measures of financial leverage can be expressed either in terms of book values or market values. These two measures are also known as measures of **capital gearing**.
- The third measure of financial leverage, commonly known as **coverage ratio**. The reciprocal of interest coverage is a measure of the firm's **income gearing**.

# Financial Leverage of Ten Largest Indian Companies, 2002

Company	Capital Gearing		Income Gearing	
	Debt ratio	Debt-equity ratio	Interest coverage	Interest to EBIT ratio
1. Indian Oil	0.556	1.25:1	4.00	0.250
2. HPCL	0.350	0.54:1	5.15	0.194
3. BPCL	0.490	0.96:1	5.38	0.186
4. SAIL	0.858	6.00:1	- ve	- ve
5. ONGC	0.106	0.12:1	53.49	0.019
6. TELCO	0.484	0.94:1	0.99	1.007
7. TISCO	0.577	1.37:1	1.62	0.616
8. BHEL	0.132	0.15:1	8.36	0.120
9. Reliance	0.430	0.75:1	3.46	0.289
10. L&T	0.522	1.09:1	2.31	0.433
11. HLL	0.027	0.03:1	264.92	0.004
12. Infosys	0.000	0.00:1	NA*	NA*
13. Voltas	0.430	0.72:1	2.64	0.378

# Financial Leverage and the Shareholders' Return

- The primary motive of a company in using financial leverage is to magnify the shareholders' return under favourable economic conditions. The role of financial leverage in magnifying the return of the shareholders' is based on the assumptions that the fixed-charges funds (such as the loan from financial institutions and banks or debentures) can be obtained at a cost lower than the firm's rate of return on net assets (RONA or ROI).
- EPS, ROE and ROI are the important figures for analysing the impact of financial leverage.

# EPS Calculations

$$\text{Earnings per share} = \frac{\text{Profit after tax}}{\text{Number of shares}}$$

$$\text{EPS} = \frac{\text{PAT}}{\text{N}} = \frac{(\text{EBIT} - \text{INT})(1 - \text{T})}{\text{N}}$$

# ROE Calculations

Return on equity =  $\frac{\text{Profit after tax}}{\text{Value of equity}}$

$$\text{ROE} = \frac{(EBIT - INT)(1 - T)}{S}$$

# Effect of Financial Plan on EPS and ROE: Constant EBIT

- The firm is considering two alternative financial plans:
  - (i) either to raise the entire funds by issuing 50,000 ordinary shares at Rs 10 per share, or
  - (ii) to raise Rs 250,000 by issuing 25,000 ordinary shares at Rs 10 per share and borrow Rs 250,000 at 15 per cent rate of interest.
- The tax rate is 50 per cent.

# Effect of Financial Plan on EPS and ROE: Constant EBIT

	<i>Financial Plan</i>	
	<i>Debt-equity (Rs)</i>	<i>All-equity (Rs)</i>
1. Earnings before interest and taxes, EBIT	120,000	120,000
2. Less: interest, INT	0	37,500
3. Profit before taxes, PBT = EBIT – INT	120,000	82,500
4. Less: Taxes, $T(EBIT - INT)$	60,000	41,250
5. Profit after taxes, PAT = $(EBIT - INT)(1 - T)$	60,000	41,250
6. Total earnings of investors, PAT + INT	60,000	78,750
7. Number of ordinary shares, $N$	50,000	25,000
8. EPS = $(EBIT - INT)(1 - T)/N$	1.20	1.65
9. ROE = $(EBIT - INT)(1 - T)/S$	12.0%	16.5%

# Effect of Leverage on ROE and EPS

**Favourable**

$ROI > i$

**Unfavourable**

$ROI < i$

**Neutral**

$ROI = i$

# Effect of Financial Plan on EPS and ROE: Varing EBIT

	<i>Economic Conditions</i>				
	<i>Very poor</i>	<i>Poor</i>	<i>Normal</i>	<i>Good</i>	
Probability	0.05	0.10	0.15	0.35	0.30
Sales (Rs)	510	660	710	800	880
Costs:					
Variable (Rs)	255	330	355	400	440
Fixed (Rs)	280	280	280	280	280
Total Costs (Rs)	535	610	635	680	720
EBIT (Rs)	-25	50	75	120	160
ROI ( $r$ )	-5%	10%	15%	24%	32%
					60%

<b>Plan I: No debt</b>						
EBIT	–25.00	50.00	75.00	120.00	160.00	300.00
Less: Interest	0.00	0.00	0.00	0.00	0.00	0.00
PBT	–25.00	50.00	75.00	120.00	160.00	300.00
Less: tax, 50%	–12.50*	25.00	37.50	60.00	80.00	150.00
PAT	–12.50	25.00	37.50	60.00	80.00	150.00
No. of shares (000)	50.00	50.00	50.00	50.00	50.00	50.00
<b>EPS (Rs)</b>	–0.25	0.50	0.75	1.20	1.60	3.00
<b>ROE (%)</b>	–2.50	5.00	7.50	12.00	16.00	30.00
<b>Plan II: 25% debt</b>						
EBIT	–25.00	50.00	75.00	120.00	160.00	300.00
Less: Interest	18.75	18.75	18.75	18.75	18.75	18.75
PBT	–43.75	31.25	56.25	101.25	141.25	281.25
Less: tax, 50%	–21.88*	15.63	28.13	50.63	70.63	140.63
PAT	–21.87	15.62	28.12	50.62	70.62	140.62
No. of share (000)	37.50	37.50	37.50	37.50	37.50	37.50
<b>EPS (Rs)</b>	–0.58	0.42	0.75	1.35	1.88	3.75
<b>ROE (%)</b>	–5.80	4.20	7.50	13.50	18.80	37.50
<b>Plan III: 50% debt</b>						
EBIT	–25.00	50.00	75.00	120.00	160.00	300.00
Less: Interest	37.50	37.50	37.50	37.50	37.50	37.50
PBT	–62.50	12.50	37.50	82.50	122.50	262.50
Less: tax, 50%	–31.25*	6.25	18.75	41.25	61.25	131.25
PAT	–31.25	6.25	18.75	41.25	61.25	131.25
No. of shares (000)	25.00	25.00	25.00	25.00	25.00	25.00
<b>EPS (Rs)</b>	–1.25	0.25	0.75	1.65	2.45	5.25
<b>ROE (%)</b>	–12.50	2.50	7.50	16.50	24.50	52.50

# Operating Leverage

- **Operating leverage** affects a firm's operating profit (EBIT).
- The **degree of operating leverage (DOL)** is defined as the percentage change in the earnings before interest and taxes relative to a given percentage change in sales.

# Operating Leverage

$$DOL = \frac{\% \text{ Change in EBIT}}{\% \text{ Change in Sales}}$$

$$DOL = \frac{\Delta \text{ EBIT}/\text{EBIT}}{\Delta \text{ Sales}/\text{Sales}}$$

# Combining Financial and Operating Leverages

- **Operating leverage** affects a firm's operating profit (EBIT), while **financial leverage** affects profit after tax or the earnings per share.
- The degrees of operating and financial leverages is combined to see the effect of total leverage on EPS associated with a given change in sales.

# Combining Financial and Operating Leverages

- The **degree of combined leverage** (DCL) is given by the following equation:

$$= \frac{\% \text{ Change in EBIT}}{\% \text{ Change in Sales}} \times \frac{\% \text{ Change in EPS}}{\% \text{ Change in EBIT}} = \frac{\% \text{ Change in EPS}}{\% \text{ Change in Sales}}$$

# Combining Financial and Operating Leverages

- another way of expressing the degree of combined leverage is as follows:

$$DCL = \frac{Q(s-v)}{Q(s-v)-F} \times \frac{Q(s-v)-F}{Q(s-v)-F - INT} = \frac{Q(s-v)}{Q(s-v)-F - INT}$$

# Financial Leverage and the Shareholders' Risk

- The variability of EBIT and EPS distinguish between two types of risk—**operating risk** and **financial risk**.
- **Operating risk** can be defined as the variability of EBIT (or return on total assets). The environment—internal and external—in which a firm operates determines the variability of EBIT
  - The variability of EBIT has two components:
  - variability of sales
  - variability of expenses
- The variability of EPS caused by the use of financial leverage is called **financial risk**.

# **Capital Structure Theory and Policy**

# Debt-equity Mix and the Value of the Firm

- Capital structure theories:
  - Net operating income (NOI) approach.
  - Traditional approach and Net income (NI) approach.
  - MM hypothesis with and without corporate tax.
  - Miller's hypothesis with corporate and personal taxes.
  - Trade-off theory: costs and benefits of leverage.

## **Net Income (NI) Approach**

**According to NI approach both the cost of debt and the cost of equity are independent of the capital structure; they remain constant regardless of how much debt the firm uses. As a result, the overall cost of capital declines and the firm value increases with debt. This approach has no basis in reality; the optimum capital structure would be 100 per cent debt financing under NI approach.**

# Assumptions

- (i) There are no corporate taxes.
- (ii) The cost of debt is less than the cost of equity i.e. the capitalization rate of debt is less than the rate of equity capitalization. This prompts the firm to borrow.
- (iii) The debt capitalization rate and the equity capitalization rate remain constant.
- (iv) The proportion of the debt does not affect the risk perception of the investors. Investors are only concerned with their desired return.

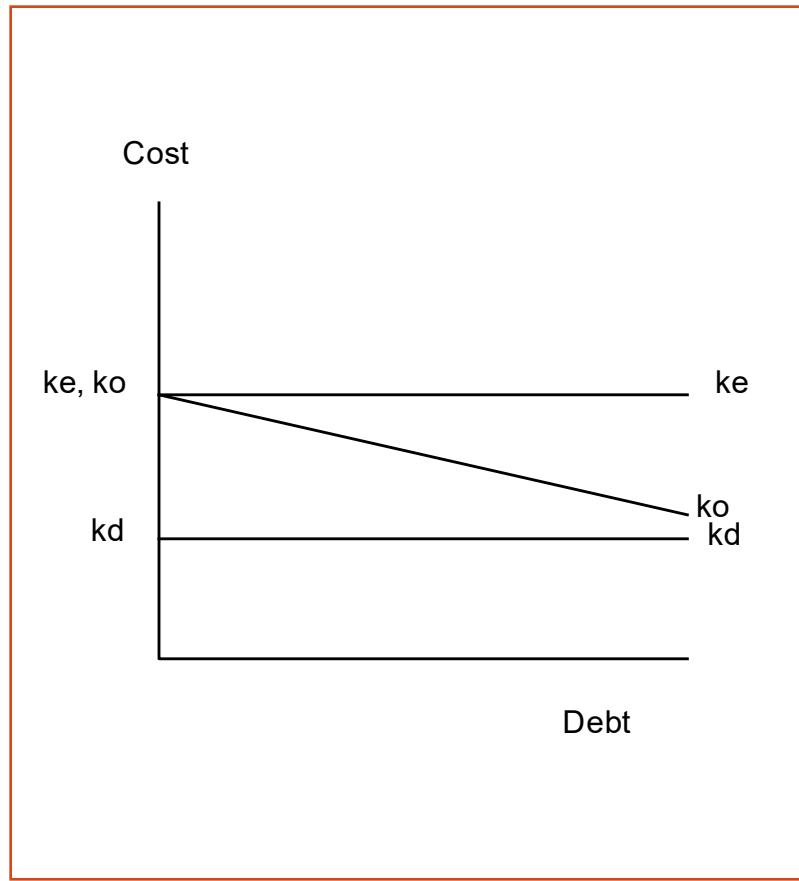
# Assumptions

- (v) The cost of debt remains constant at any level of debt.
- (vi) Dividend pay out ratio is 100%.

- Market Value of the firm ( $V$ ) = Market value of equity ( $E$ ) + Market value of debt ( $D$ )
- Market value of Equity =  $NI/Ke$
- Market Value of Debt ( $D$ ) =  $I/Kd$

- $NI = \text{Net income available for equity share holders i.e. NOI} - I$
- $NOI = \text{Net Operating Income}$
- $I = \text{Interest on debt}$
- $Ke = \text{Rate of equity capitalization (Cost of Equity)}$
- $Kd = \text{Rate of debt capitalization (Cost of Debt)}$
- Cost of Capital ( $Ko$ ) or Weighted Average Cost of Capital (WACC)

## Net Income (NI) Approach



# Example case 1

Equity = Rs. 10,00,000

Debt = Rs. 5,00,000

Total = Rs. 15,00,000

EBIT = Rs. 150,000

Cost of Debt = 10%

Cost of Equity = 15%

# Example Case 2

Equity = Rs. 7,00,000

Debt = Rs. 8,00,000

Total = Rs. 15,00,000

EBIT = Rs. 150,000

Cost of Debt = 10%

Cost of Equity = 15%

# Solution

	Case 1	Case 2
EBIT	Rs. 150,000	Rs. 150,000
Less interest	Rs. 50,000	Rs. 80,000
Net income	Rs. 1,00,000	Rs. 70,000
S=	NI/Ke = 100000/0.15 Rs. 6,66,667	Rs. 70,000/0.15 Rs. 4,66,667
D=	I/Kd = 50,000/0.10 Rs. 500,000	80,000/0.10 Rs. 8,00,000
V = S+D	Rs. 11,66,667	Rs. 12, 66, 667

## **Net Operating Income (NOI) Approach**

- According to NOI approach the value of the firm and the weighted average cost of capital are independent of the firm's capital structure. In the absence of taxes, an individual holding all the debt and equity securities will receive the same cash flows regardless of the capital structure and therefore, value of the company is the same.

# Assumptions

- a) there are no taxes
- b) risk is same at all the levels of debt equity mix.
- c)  $k_o$  remains constant.
- d)  $k_o = k_d$

$$V = EBIT / K_o$$

- This theory has been criticized on the grounds that  $k_o$  and  $k_d$  cannot remain constant at all the levels.

# Assumptions

- (i) There are no corporate taxes.
- (ii) Cost of debt remains constant at all level of debt.
- (iii) Overall cost of capital remains constant.
- (iv) Value of the firm depends on expected net operating income and overall capitalization rate or the opportunity cost of capital.
- (v) Net operating income of the firm is not affected by the degree of financial leverage

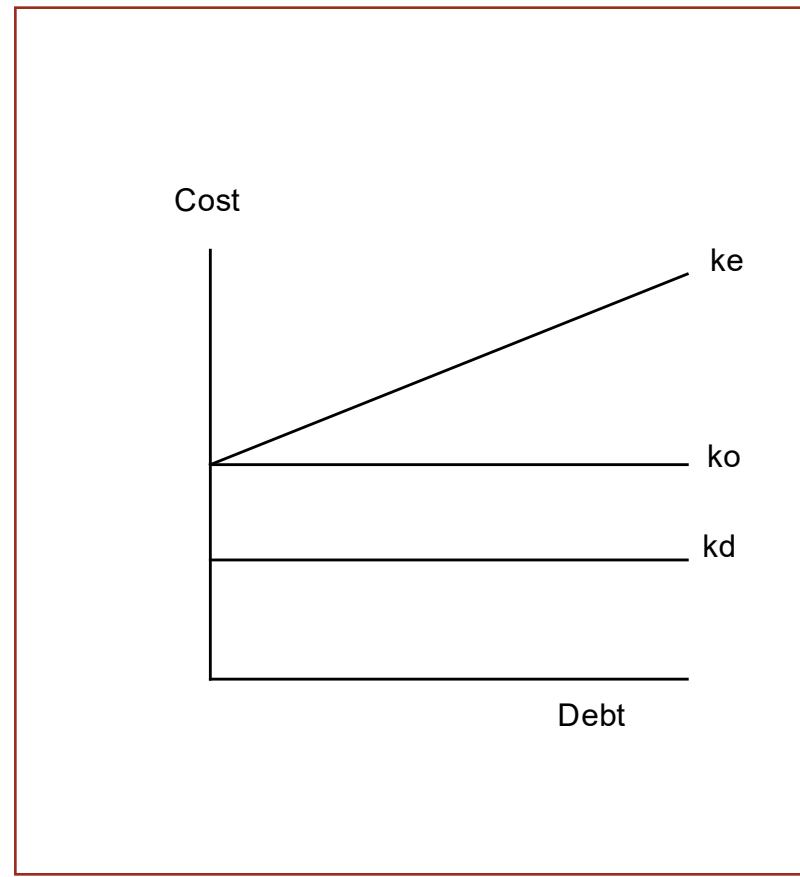
# Assumptions

- (vi) The operating risk or business risk does not change with the change in debt equity mix.
- (vii) WACC does not change with the change in financial leverage.

# EXAMPLE NOI

	Case 1	Case 2
EBIT	Rs. 1,50,000	Rs. 1,50,000
WACC or Ko	12 % or 0.12	12 % or 0.12
V= EBIT/Ko	$150000/0.12=12,50,000$	$150000/0.12=12,50,000$
D or Debt	Rs. 5,00,000	Rs. 8,00,000
S=V-D	7,50,000	4,50,000

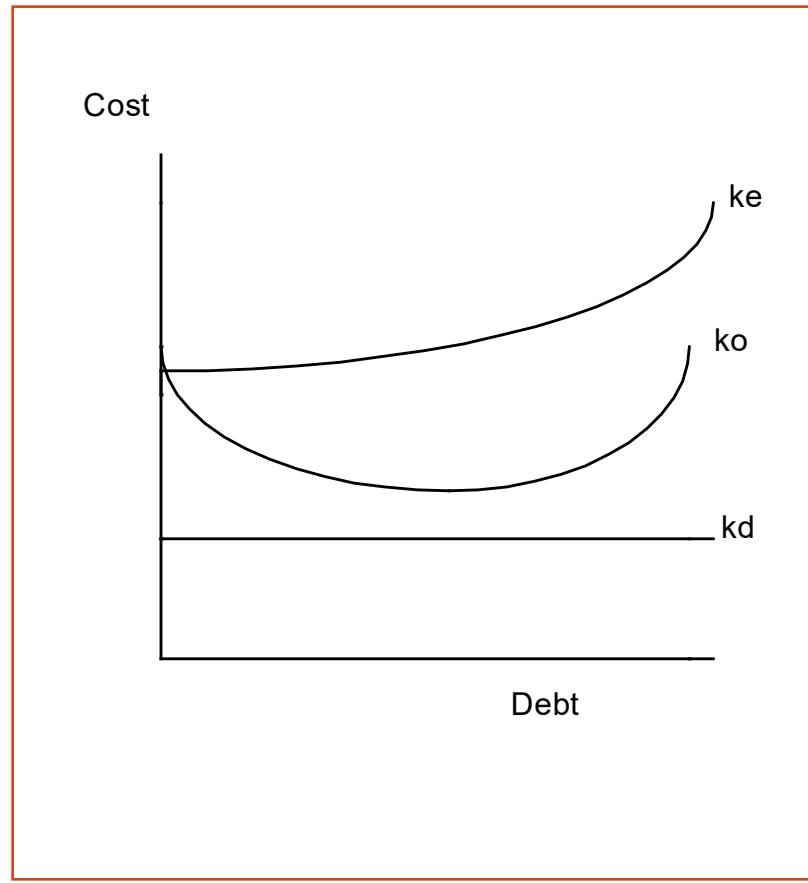
# Net Operating Income (NOI) Approach



## Traditional Approach

- The traditional approach argues that moderate degree of debt can lower the firm's overall cost of capital and thereby, increase the firm value. The initial increase in the cost of equity is more than offset by the lower cost of debt. But as debt increases, shareholders perceive higher risk and the cost of equity rises until a point is reached at which the advantage of lower cost of debt is more than offset by more expensive equity.

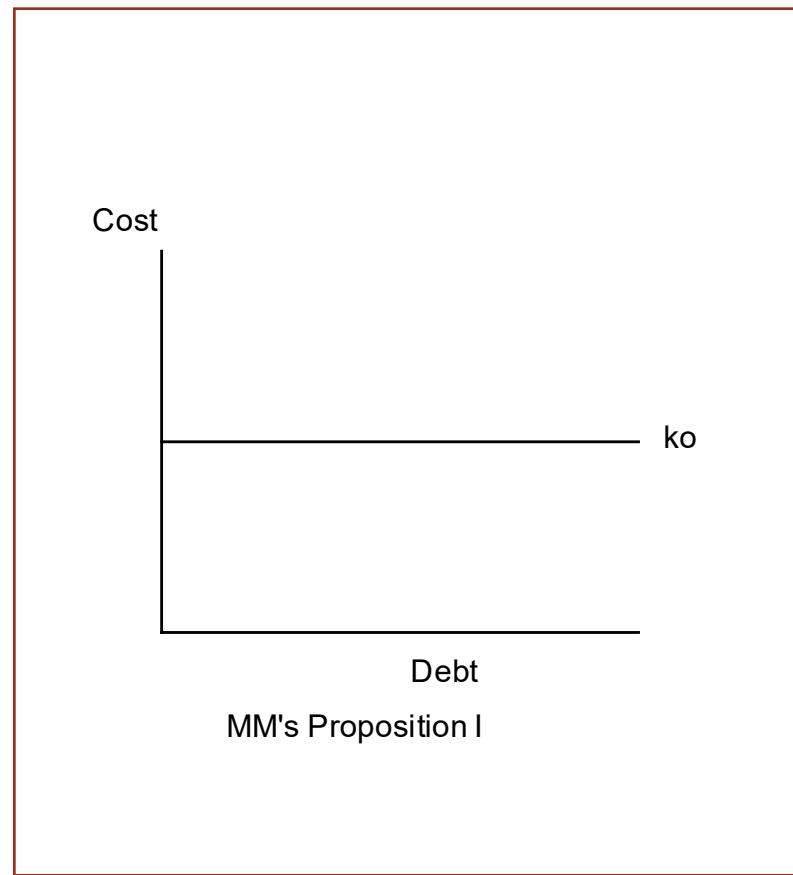
# Traditional Approach



# MM Approach Without Tax: Proposition I

- MM's Proposition I states that the firm's value is independent of its capital structure.
- With personal leverage, shareholders can receive exactly the same return, with the same risk, from a levered firm and an unlevered firm.
- Thus, they will sell shares of the over-priced firm and buy shares of the under-priced firm until the two values equate. This is called *arbitrage*.

# MM Approach Without Tax: Proposition I



# Arbitrage

Levered Firm ( $L$ ):

$$V_l = S_l + D_l = 60,000 + 50,000 = 110,000$$

$k_d$  = interest rate = 6%; NOI =  $\overline{X}$  = 10,000

$\alpha_l$  = shares held by an investor in  $L$  = 10%

Unlevered Firm ( $U$ ):

$$V_u = S_u = 100,000$$

NOI =  $\overline{X}$  = 10,000

# Arbitrage

Return from Levered Firm:

$$Investment = 10\% (110,000 - 50,000) = 10\% (60,000) = 6,000$$

$$Return = 10\% [10,000 - (6\% \times 50,000)] = 1,000 - 300 = 700$$

Alternate Strategy:

1. Sell shares in  $L$ :  $10\% \times 60,000 = 6,000$
2. Borrow (personal leverage):  $10\% \times 50,000 = 5,000$
3. Buy shares in  $U$ :  $10\% \times 100,000 = 10,000$

Return from Alternate Strategy:

$$Investment = 10,000$$

$$Return = 10\% \times 10,000 = 1,000$$

$$Less: Interest on personal borrowing = 6\% \times 5,000 = 300$$

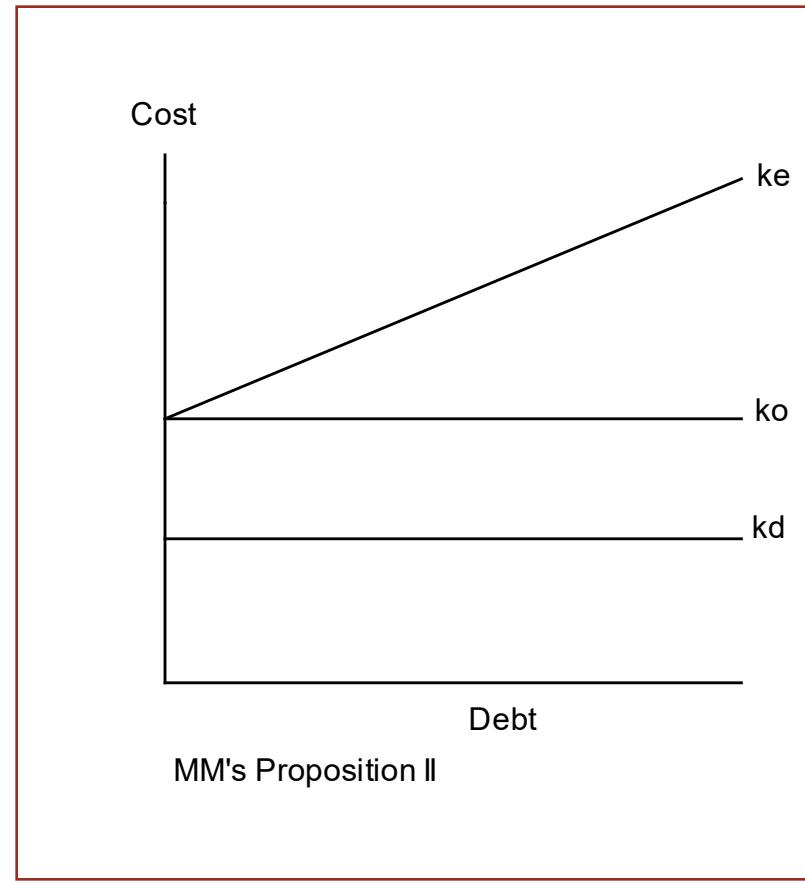
$$\text{Net return} = 1,000 - 300 = 700$$

$$\text{Cash available} = 11,000 - 10,000 = 1,000$$

## MM's Proposition II

- The cost of equity for a levered firm equals the constant overall cost of capital plus a risk premium that equals the spread between the overall cost of capital and the cost of debt multiplied by the firm's debt-equity ratio. For financial leverage to be irrelevant, the overall cost of capital must remain constant, regardless of the amount of debt employed. This implies that the cost of equity must rise as financial risk increases.

# MM's Proposition II



# MM Propositions I and II

*MM Proposition I :*

$$V = \frac{\bar{X}}{k_o}$$

$$k_o = \frac{\bar{X}}{V}$$

*MM Proposition II :*

$$k_e = \frac{\bar{X} - k_d D}{S}$$

$$k_e = k_o + (k_o - k_d)D/S$$

# MM Hypothesis With Corporate Tax

- Under current laws in most countries, debt has an important advantage over equity: interest payments on debt are tax deductible, whereas dividend payments and retained earnings are not. Investors in a levered firm receive in the aggregate the unlevered cash flow plus an amount equal to the tax deduction on interest. Capitalizing the first component of cash flow at the all-equity rate and the second at the cost of debt shows that the value of the levered firm is equal to the value of the unlevered firm plus the interest tax shield which is tax rate times the debt (if the shield is fully usable).

## MM Hypothesis With Corporate Tax

- It is assumed that the firm will borrow the same amount of debt in perpetuity and will always be able to use the tax shield. Also, it ignores bankruptcy and agency costs.

## LEVERAGE BENEFIT UNDER CORPORATE AND PERSONAL TAXES

# MM Hypothesis with Corporate Tax

After-tax earnings of Unlevered Firm:

$$\overline{X}^T = \overline{X}(1 - T)$$

Value of Unlevered Firm:

$$V_u = \frac{\overline{X}(1 - T)}{k_u}$$

After-tax earnings of Levered Firm:

$$\begin{aligned}\overline{X}^T &= (\overline{X} - k_d D)(1 - T) + k_d D \\ &= \overline{X}(1 - T) + T k_d D\end{aligned}$$

Value of Levered Firm:

$$\begin{aligned}V_l &= \frac{\overline{X}(1 - T)}{k_u} + \frac{T k_d D}{k_d} \\ &= V_u + TD\end{aligned}$$

# Miller's Approach WITH Corporate and Personal Taxes

- To establish an optimum capital structure both corporate and personal taxes paid on operating income should be minimised. The personal tax rate is difficult to determine because of the differing tax status of investors, and that capital gains are only taxed when shares are sold.
- Merton Miller proposed that the original MM proposition I holds in a world with both corporate and personal taxes because he assumes the personal tax rate on equity income is zero. Companies will issue debt up to a point at which the tax bracket of the marginal bondholder just equals the corporate tax rate. At this point, there will be no net tax advantage to companies from issuing additional debt.
- It is now widely accepted that the effect of personal taxes is to lower the estimate of the interest tax shield

LEVERAGE BENEFIT UNDER CORPORATE AND PERSONAL TAXES										
	Unlev	Lev	Unlev	Lev	Unlev	Lev	Unlev	Lev	Unlev	Lev
Corp tax	0%	0%	35%	35%	35%	35%	35%	35%	35%	35%
Corp tax on div	0%	0%	10%	10%	10%	10%	10%	10%	10%	10%
Pers tax on div	0%	0%	0%	0%	20%	20%	20%	20%	20%	20%
Pers tax on int	0%	0%	0%	0%	0%	0%	20%	20%	30%	30%
PBIT	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500
Int	0	700	0	700	0	700	0	700	0	700
PBT	2500	1800	2500	1800	2500	1800	2500	1800	2500	1800
Corp tax	0	0	875	630	875	630	875	630	875	630
PAT	2500	1800	1625	1170	1625	1170	1625	1170	1625	1170
Div	2500	1800	1477	1064	1477	1064	1477	1064	1407	1064
Div tax	0	0	148	106	148	106	148	106	148	106
Tol corp tax	0	0	1023	736	1023	736	1023	736	1023	736
Div income	2500	1800	1477	1064	1477	1064	1477	1064	1407	1064
Pers tax on div	0	0	0	0	295	213	295	213	281	213
AT div income	2500	1800	1477	1064	1182	851.2	1182	851.2	1126	851.2
Int income	0	700	0	700	0	700	0	700	0	700
Pers tax on int	0	0	0	0	0	0	0	140	0	210
AT int income	0	700	0	700	0	700	0	560	0	490
AT total income	2500	2500	1477	1764	1182	1551	1182	1411	1126	1341
Net leverage benefit	0		287		370		230		216	

# Practical Considerations in Determining Capital Structure

- **Control**
- *Nature and Size of a firm*
- *Requirements of investors*
- **Flexibility**
- *Capital Market conditions*
- *Early Repay ability*
- *Reserve Capacity*
- **Marketability**
- *Assets Structure*
- *Flotation Costs*
- **Capacity of Raising Funds**
- **Agency Costs**

# Practical Considerations in Determining Capital Structure

- Purpose of Financing
- Legal requirements
- Corporate tax rate
- Period of finance
- Personal considerations

THANKS



# Fundamentals of Capital Market



# What is a share / stock?

- A type of security that signifies ownership in a corporation and represents a claim on part of the corporation's assets and earnings
- There are two main types of stock:
  - common and preferred.
- Common stock usually entitles the owner to vote at shareholders' meetings and to receive dividends.
- Preferred stock generally does not have voting rights, but has a higher claim on assets and earnings than the common shares.

# What is a stock exchange?

- A specialised marketplace that facilitates the exchange of securities that already exists
- A stock exchange constitutes any body of individuals, whether incorporated or not , constituted for the purpose of assisting, regulating or controlling the business of buying , selling or dealing in securities
- According to HASTINGS Stock Exchanges or security market comprises all the places where buyers and sellers of stocks and bonds or their representatives undertake transactions involving the sale of securities

- What is full form of SENSEX?
- The Sensex is a "securities index".
- What is an index?
- An index is basically an indicator.
- It gives you a general idea about whether most of the stocks have gone up or most of the stocks have gone down.
- The Sensex is an indicator of all the major companies of the BSE.
- The Nifty is an indicator of all the major companies of the NSE.

# Who used the word SENSEX?



- **Mr. Deepak Mohani**
- CEO of Trendwatchindia
- An IIT and IIM pass-out
- 1989

- What is share / stock trading?
- Trading is buying and selling of shares or securities
- What is normal trading?
- A normal trading is nothing but trading in permitted lots (bunch)
- What is odd lot trading?
- Odd lot is a securities trade in which fewer trading units exchange hands when compared to the "normal" amount for that particular security.
- In stock trading, an odd lot is an order for anything less than 100 shares (which is called a "round lot"). However, thinly traded stocks sometimes trade in 10-share increments.
- This concept is not in vogue in our country at present

- Short selling.
- The selling of a security that the seller does not own, or any sale that is completed by the delivery of a security borrowed by the seller
- Long position
- The buying of a security such as a stock, commodity or currency, with the expectation that the asset will rise in value.

# Mechanics of Trading



- Trading on stock exchanges takes place either on the basis of the Auction system or Trading floor or Hybrid Trading
- Floor Trading
- The floor where trading activities are conducted
- Trading floors are found in the buildings of various exchanges
- This may be a Open outcry or Online Trading system
- BSE has moved from Outcry to BOLT in the year 1995

# Membership



- The trading platform of the exchange is accessible to the investors only through the members
- The members are admitted or terminated as per the SCRA(1956)
- Corporate Structure
- Paidup capital – Rs. 30 lakh
- Net Worth – Rs. 200 lakh
- Interest free security deposit Rs.150 lakh
- Collateral Security Deposit Rs. 25 lakh
- Annual Subscription Rs.1 lakh
- Capital Adequacy
- Track Record
- Education
- Experience

# Benefits



- Access to the market
- Wide trading facilities – Equities, Debt, Derivatives
- State of the art technology
- Standards of trading
- Demutualised Exchanges

- What is an IPO?
- What is FPO?



- What is a Rights Issue?
- What is a Bonus Issue?
- What is sweat Equity?
- What is a Mutual Fund?
- What is FDI?
- What is FII?
- What is Market Capitalization?
- What is Dalal Street?

# Type of Markets



- **Exchanges**
- **OTC trading of**
  - unlisted stocks & listed stocks
- **Direct trading**

# Exchanges

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- Physical location for trading
- Trading by members
  - own a seat on the exchange
- Stock traded on exchange are listed stocks

# OTC markets



- **Electronic network of dealers all over the world**
- ECNs
  - **electronic communication networks**
- **More than one dealer per stock**
  - **not obligated to make a market**

# Trading Mechanics



- **Types of orders**
- **Short selling**
- **Buying on the margin**
- **Institutional trading**

# Types of orders



- instructions from investors to brokers
- market order
  - buy/sell order to be executed at best price
    - get lowest price for buy order
    - get highest price for sell order

# Types Of Orders



- instructions from investors to brokers
- market order
  - buy/sell order to be executed at best price
    - get lowest price for buy order
    - get highest price for sell order
  - market orders given priority in trading
  - no guarantee of execution price
    - price could rise/fall from time order is placed to time it is executed



- **limit order**

- buy/sell order where investor specifies price range
- “buy at \$50 or less”
- “sell at \$52 or more”
- specialist records orders in  
limit order book



- investor sets reservation price  
**BUT**
  - no guarantee that limit order will be executed

# Types Of order



- stop order
  - order lies dormant
  - turns into market order when certain price (“the stop”) is reached
  - “buy if price rises to \$60”
  - “sell if price falls to \$58”
    - stop loss order

# Types Of order



- investor does not have to watch market
  - but in a volatile market stop could be triggered prematurely-- end up trading unnecessarily

# Types Of order



- stop limit order
  - turns into limit order when stop is reached
  - “buy if price rises to \$60, but only is executed at \$65 or less”

# Types Of order



- market if touched order
  - turns into market order if certain price is reached
  - “buy if price falls to \$55”
  - “sell if price rises to \$62”

# How long is an order good?



- fill or kill order
  - executed when reaches trading floor, or canceled
- good until canceled/open order
  - is good indefinitely

# Order size



- round lots
  - lots of 100 shares
- odd lots
  - less than 100 shares
  - more difficult to trade
- block trades
  - 10,000 shares or \$200,000 value

# short selling



- sale of borrowed stock
- profit from belief that stock price is too high will fall soon
- how?
  - borrow stock through broker
  - sell stock
  - buy and return later

# Auction trading



- In the Auction Market “Auctions” are initiated by the Exchange on behalf of trading members
- This is an order driven trading system where customers “buy and sell” orders are matched at a central point
- This system allows the buyer and the seller to find a mutually agreeable price with no intervention of broker dealers
- In India except BSE all other exchanges are auction based

# Hybrid Trading



- Hybrid trading system is an auction type of trading with bids and offers being made by open outcry and at the same time it is quote driven system too

# Transaction Cycle



- A Seller / Buyer
- A Broker
- Through an exchange
- Order to Trade
- Settlement Schedule
- Funds Settlement

# National Exchange for Automated Trading (NEAT)



- NSE introduced for the first time in India, fully automated screen based trading.
- It uses a modern, fully computerised trading system designed to offer investors across the length and breadth of the country a safe and easy way to invest
- The NSE trading system called 'National Exchange for Automated Trading' (NEAT) is a fully automated screen based trading system, which adopts the principle of an order driven market
- VSAT = Very Small Aperture Terminal



# BSE's On Line Trading System (BOLT)

- To facilitate smooth transaction, BSE had replaced its open outcry system with BSE On-line Trading (BOLT) facility in 1995
- This totally automated screen based trading in securities was put into practice nation-wide within a record time of just 50 days
- The BOLT platform capacity has been enhanced to 40 lakh orders per day by upgrading the hardware.
- BOLT has been certified by DNV for conforming to BS7799 security standards. With this, BSE is the second stock exchange in the world to have this certification
- Exchange has also introduced the world's first centralized exchange based Internet trading system, BSEWEBx.com.
- The initiative enables investors anywhere in the world to trade on the BSE platform



Rest tomorrow



# Indian Economy and Capital Market at a Glance



- With Sensex crossing 20000 mark – ahead of most of the emerging economies with a P/E ratio of 22.01
- NSE (India's National Stock Exchange) is the third largest in the world in the number of trades after NYSE and NASDAQ

# Indian Economy and Capital Market at a Glance



- India has 23 small and 2 big stock exchanges
- The 2 big stock exchanges (National Stock Exchange and Bombay Stock Exchange) account for 90 per cent of trade
- Over 7000 listed companies on the stock exchanges – largest in the world

# Indian Economy and Capital Market at a Glance



- 9040 brokers in cash segment and 1064 in derivative segment of the market
- 122 investment bankers in the market
- 58 under writers to support primary issues
- 40 foreign venture capital funds
- 120 Portfolio managers

# Indian Economy and Capital Market at a Glance



- 11 custodian banks
- 2 depositories with over 9 million beneficiary owner accounts
- 120 Portfolio managers
- Number of traders at 20 million
- Number of internet trading clients at 1.44 million
- Internet trading at 12 per cent of total trading

# Indian Economy and Capital Market at a Glance



- Rise in index during the last TWELVE months over 100 per cent
- Year on year return during the last year at 74 per cent
- Daily volatility of the market 0.76 per cent to 1.29 per cent
- 39 mutual funds with over 700 schemes for investment

# Indian Economy and Capital Market at a Glance



- Cumulative assets of mutual funds over US\$68 billion
- India launches Capital Protection Fund and Gold Exchange Traded Funds
- About 1000 foreign institutional investors

# Indian Economy and Capital Market at a Glance



- Investors by foreign institutional investors at over \$50 billion
- At current prices, it is around 15 per cent of the total market capitalization
- Only broad based entities established and incorporated abroad are eligible to be registered as Foreign Institutional investors in India

# Indian Economy and Capital Market at a Glance



- FIIs can invest on behalf of their clients through sub-accounts
- For normal FIIs, limit for investment in equity is at least 70 per cent while the rest could be invested in debt up to a maximum limit of 30 per cent

# Indian Economy and Capital Market at a Glance



- FIIs could also be dedicated debt funds who can invest up to 100 per cent in debt
- FIIs can issue overseas derivative instruments like Participatory Notes (PNs) to the entities registered in the country of origin.
- There are 86 venture capital funds and 54 foreign venture capital investors
- Most Foreign venture capital funds provide seed capital to firms with enormous growth potential

# Why invest in Indian capital markets?



- Business Week says that of 100 emerging market firms which are rapidly globalising 21 are Indian firms
- Economists project India to become the third largest economy in the world by 2040
- Indian capital market regulator has acquired international credibility in the least possible time

# Why invest in Indian capital markets?



- India has a disclosure based regime of regulation
- Disclosure and Investor Protection guidelines available
- India's accounting standards are closer to international standards
- India has a well laid down legal framework

# Why invest in Indian capital markets?



- India has T+2 rolling settlement as opposed to T+3 in NYSE.
- In India the transactions are totally electronic on a real time basis.
- India has several protective safeguards for the retail investor such as grading system of public offering, retail quota at 25 per cent etc.

# Why invest in Indian capital markets?



- SEBI has made corporate governance guidelines mandatory for listed companies
- Mutual funds are permitted to invest overseas up to \$3 billion
- Margin trading is in vogue
- Corporatisation and demutualization of stock exchanges on card - foreign participation in bourses permitted.

# Why invest in Indian capital markets?



- As an integral part of risk management trading and exposure limits, var margins and mark to market margins are in vogue
- Clearing houses and corporations with novation in place
- Almost 100 per cent risk free electronic settlement through depository system
- SEBI has a surveillance and enforcement system in place

# Why invest in Indian capital markets?



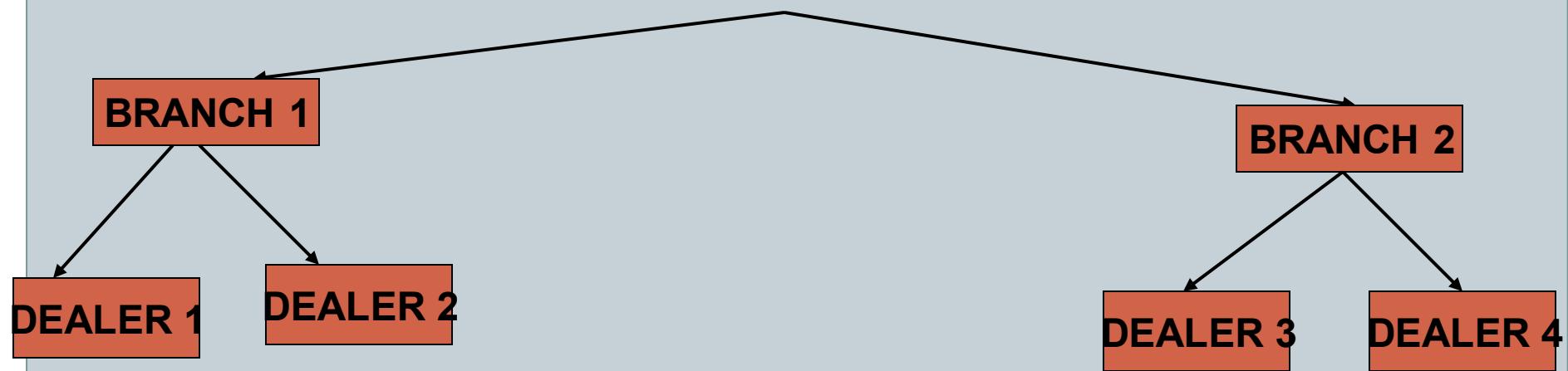
- India to become a regional hub for bond trading once a free financial zone is set up
- India to set up a world class National Institute for Securities Markets with 7 business schools under its fold

# Corporate Hierarchy



- The trading member has the facility of defining a hierarchy amongst its users of the NEAT system.

Corporate Manager



# Market Makers



- Dealers who are responsible for creating and maintaining market in a security market is called “ Market Makers”
- A broker-dealer firm that accepts the risk of holding a certain number of shares of a particular security in order to facilitate trading in that security.
- Each market maker competes for customer order flow by displaying buy and sell quotations for a guaranteed number of shares.
- Once an order is received, the market maker immediately sells from its own inventory or seeks an offsetting order. This process takes place in mere seconds

# Market Phase



- Bull Phase
- Bear Phase
- Open
- Close

# Bull



- An investor who thinks the market, a specific security or an industry will rise
- Bulls are optimistic investors who are presently predicting good things for the market, and are attempting to profit from this upward movement.
- For example if you are bullish on the S&P 500 you will attempt to profit from a rise in the index by going long on it.

# Bear



- An investor who believes that a particular security or market is headed downward.
- Bears attempt to profit from a decline in prices.
- Bears are generally pessimistic about the state of a given market.

# Open



- An unexecuted order that is still valid.
- The start of trading on a securities exchange
- Orders that are entered by investors but not yet transacted are deemed to be open until they expire or are filled.

# Close



- The end of a trading session.
- The closing price is quoted in the newspaper

# Jobbers & Brokers



- A Jobber is a dealer in securities
- A Broker is an agent of a buyer or seller of securities
- Remisiers are the sub-brokers or agents appointed by the brokers

# Trading Mechanism



- It was open outcry
- Replaced with Screen Based Trading System (SBTS)
- Punching of orders through a remote computer
- Price Time priority
- Wireless application Protocol (WAP) helps in bringing equal access to all the investors across the country
- The data is transmitted through VSAT / Leased Line / Modem
- It is transparent , objective and fair
- Complete Market Information On-line

# Trading



- Basket Trading
- Index Trading
- Buyback Trading

# Index Trading

- The purpose of Index Trading is to provide a facility to NEAT user with a facility of buying and selling of Indices , in terms of securities that comprises of Index
- Currently it available only for NIFTY securities
- The index trade provides user with the choice of gaining with the rise / decline of the index values either by buying / selling

# *CAPITAL MARKET*

## *Primary and Secondary Market*

# CAPITAL MARKET

- *The market where investment instruments like bonds, equities and mortgages are traded is known as the capital market.*
- *The primal role of this market is to make investment from investors who have surplus funds to the ones who are running a deficit.*

- *The capital market offers long term funds.*
- *The different types of financial instruments that are traded in the capital markets are:*
  - > *equity instruments*
  - > *credit market instruments,*
  - > *insurance instruments,*
  - > *hybrid instruments and*

# *Nature of capital market*

*The nature of capital market is brought out by the following facts:*

- *It Has Two Segments*
- *It Deals In Long-Term Securities*
- *It Creates Dispersion In Business Ownership*
- *It Helps In Capital Formation*
- *It Helps In Creating Liquidity*

# *Types of capital market*

*There are two types of capital market:*

- *Primary market,*
- *Secondary market*

# *Primary Market*

- *It is that market in which shares, debentures and other securities are sold for the first time for collecting long-term capital.*
- *This market is concerned with new issues. Therefore, the primary market is also called NEW ISSUE MARKET.*

- In this market, the flow of funds is from savers to borrowers (industries), hence, it helps directly in the capital formation of the country.
- The money collected from this market is generally used by the companies to modernize the plant, machinery and buildings, for extending business, and for setting up new business unit.

# *Features of Primary Market*

- *It Is Related With New Issues*
- *It Has No Particular Place*
- *It Has Various Methods Of Float Capital:* Following are the methods of raising capital in the primary market:
  - i) *Public Issue*
  - ii) *Offer For Sale*
  - iii) *Private Placement*
  - iv) *Right Issue*
  - v) *Electronic-Initial Public Offer*
- *It comes before Secondary Market*

# Parties Involved in Primary Market

- Managers to the Issue
- Registrars to the issue
- Underwriters
- Bankers to the issue
- Advertising agencies
- The Financial Institutions

# Allotment of Shares

- Allotment in the case of under subscription or normal Subscription
- Allotment in the case of Over subscription
  - (a) Proportionate allotment method

# Factors to be considered by Investors

- Promoters Credibility
- Efficiency Of management
- Project Details
- Product
- Financial data
- Litigation
- Risk factors
- Auditors report
- Statutory Clearance

## *Secondary Market*

- *The secondary market is that market in which the buying and selling of the previously issued securities is done.*
- *The transactions of the secondary market are generally done through the medium of stock exchange.*
- *The chief purpose of the secondary market is to create liquidity in securities.*

➤ If an individual has bought some security and he now wants to sell it, he can do so through the medium of stock exchange to sell or purchase through the medium of stock exchange requires the services of the broker presently, there are 24 stock exchange in India.

# *Features of Secondary Market*

- *It Creates Liquidity*
- *It Comes After Primary Market*
- *It Has A Particular Place*
- *It Encourage New Investments*
- *Fixation of prices*
- *Maintain active trading*
- *Self regulatory organisation*
- *Aids in financing the industry*
- *Ensures safe & fair Dealing*

# Regulatory framework

- Ministry of finance
- The SEBI
- The Governing Board

# Members Of Stock Exchange

- Minimum age prescribed for the members is 21 years
- He should be an Indian Citizen
- He should neither a bankrupt nor compounded with creditors
- He should not be convicted for fraud or dishonesty
- He should not be engaged with any other business connected with company
- He should not be defaulter of any other stock Exchange

# Securities Group

- Group A: Shares in this category have a high Liquidity, Market Capitalization and Capital Appreciation.

Grop B1 and B2: Similar to A, but with a slightly lower Market Capitalization and Appreciation but good liquidity. There are financially healthy stocks.

Group C: It includes the odd lots of Catgories of A, B1 and B2. As u may be aware, Shares/Stocks are sold in Lots, any ODD lot remaining among the A, B1,B2 Groups ,are put under C Category.

# Securities Group

- Group F:It is a Debt Market Segment (Note A. B1.B2 are all only Equities)

Group T: Their settlement needs to be done by DELIVERY only.Trading under "T", means , actual delivery of Scrips is warranted.

Group Z: Suspended Lots of Shares. They are Suspended due to non-compliance of SEBI Norms.

- Definition of 'Settlement Period'
- The period of time between the settlement date and the transaction date that is allotted to the parties of a transaction to satisfy the transaction's obligations. The buyer must make payment within the settlement period, while the seller must

# 'Settlement Period'

- Definition of 'Settlement Period'
- The period of time between the settlement date and the transaction date that is allotted to the parties of a transaction to satisfy the transaction's obligations. The buyer must make payment within the settlement period, while the seller must deliver the purchased security within this period.

# 'Settlement Period

- Depending on the type of security traded, the exact length of the settlement period will differ. The settlement period is often quoted as T+1, T+2 or T+3; which means the transaction date plus one, two or three days.

# *Risk in the Stock Market*

- *Stock prices keep fluctuating over a wide range unlike the bank deposits or government bonds.*
- *The efficient market hypothesis shows the effect of fundamental factors in changing the price of the stock market.*

# *CAPITAL MARKET RISK*

- *Investment in long term financial instruments is accompanied by high capital market risks. Since there are two types of capital markets- the stock market and the bond market.*
- *So risks are present in both the market.*

- *The Efficient Market Hypothesis shows that all price movements are random whereas there are plenty of studies that reflect the fact that there is a specific trend in the stock market prices over a period of time.*
- *Research has shown that there are certain psychological factors that shape the stock market prices.*

- *Sometimes the market behaves illogically to any economic news.*
- *The stock market prices can be diverted in any direction in response to press releases, rumors and mass panic.*
- *The stock market prices are also subject to speculation. In the short run the stock market prices may be very volatile due to the occurrences of the fast market changing events.*

# *Risk in the Bond Market*

- *Capital market risk in the bond market arises due to interest rate changes. There is an inverse relationship existing between the interest rate and the price of the bond. Hence the bond prices are sensitive to the monetary policy of the country as well as economic changes.*

## Capital Market Investments in the Bond Market

- *The bond market is a financial market where the participants buy and sell debt securities.*
- *The bond market is also differently known as the debt, credit or fixed income market.*
- *There are different types of bond markets based on the different types of bonds that are traded. They are:*
  - *Corporate,*
  - *Government and agency,*
  - *Municipal,*
  - *Bonds backed by mortgages & assets,*
  - *Collateralized Debt Obligation.*

- *The bonds, except for the corporate bonds do not have formal exchanges but are traded over-the-counter.*
- *Individual investors are attracted to the bond market and make investments through the bond funds, closed-end-funds or the unit investment trusts.*
- *Another way of investing directly in the bond issue is the Exchange-traded-funds.*
- *The capital market investment in the bond market is done by:*
  - *Institutional investors*
  - *Governments, traders and*
  - *Individuals.*



# Capital Budgeting

Dr. Rakesh Sharma

# Capital Budget



**Capital budget is the budget of capital expenditures.**

**Capital Expenditures are those expenditures whose benefit spread in number of years e.g., purchase of Plant and Machinery , Land and building and starting a new factory plant etc.**

# CAPITAL BUDGETING



Capital budgeting: is the planning process for allocating all expenditures that will have an expected benefit to the firm for more than one year.

# Investment Appraisal



Firms normally place projects in the following categories:

- Replacement and maintenance of old or damaged equipment.
- Investments to upgrade or replace existing equipment
- Marketing investments to expand product lines or distribution facilities.
- Investments for complying with government or

# **OVERALL AIM**



**To maximise shareholders wealth..**

**Projects should give a return over and above the marginal weighted average cost of capital.**

**Projects can be;**

**Mutually exclusive**

**Independent**

# IDEAL SELECTION METHOD



- Select the project that maximises shareholders wealth
- Consider all cash flows
- Discount the cash flows at the appropriate market determined opportunity cost of capital

# Need for Investment Appraisal



- Large amount of resources are involved and wrong decisions could be costly
- Difficult and expensive to reverse
- Investment decisions can have a direct impact on the ability of the organisation to meet its objectives

# Investment Appraisal Process



## Stages:

- **identify objectives. What is it? Within the corporate objectives?**
- **Identify alternatives.**
- **Collect and analyse data. Examine the technical and economic feasibility of the project, cash flows etc.**

# Investment Appraisal Process



## Stages:

- decide which one to undertake
- authorisation and implementation
- review and monitor: learn from its experience and try to improve future decision - making

# Capital Budgeting - Methods



- 1. Accounting Rate of return**
- 2. Payback**
- 3. Net Present Value**
- 4. Internal Rate of Return**

# Accounting Rate of Return (ARR)



Accounting Rate of Return method relates average annual profit to either the amount initially invested or the average investment, as a percentage.

Formulae:

$$\text{ARR} = \frac{\text{Average annual accounting profit}}{\text{Average investment}} \times 100$$

Where:

- Average annual profit = Total profit/Number of years
- Average investment =  $(\text{initial capital investment} + \text{scrap value}) / 2$

# Accounting Rate of Return (ARR)



$$\text{ARR} = \frac{\text{Avg. Net Income Per Year}}{\text{Avg. Investment}}$$

# Average Return on Investment



*Example:*

<u>Year</u>	<u>Net Income</u>	<u>Cost</u>
1	6,000	100,000 Initial
2	8,000	0 Salvage Value
3	11,000	
4	13,000	
5	16,000	
6	18,000	

# Average Return on Investment



Avg. Net Income       $\frac{\underline{72,000}}{6} = 12,000$

Avg. Investment       $\frac{\underline{100,000}}{2} = 50,000$

AROI       $\frac{\underline{12,000}}{50,000} = 24\%$

# Average Return on Investment



Advantages

Disadvantages

# Payback Period Method



**Payback method - length of time it takes to repay the cost of initial investment**

## Example

LBS Ltd uses the payback period as its sole investment appraisal method. LBS invests £30,000 to replace its computers and this investment returns £9,000 annually for the five years. From the information above evaluate the investment using the payback. Assume that £9,000 accrues evenly throughout the year.

**Answer : Payback Period : 3.33 Years**

# Payback Method



# Years required to recover the original investment

*Example:*

CFO: 100,000

<u>Year</u>	<u>Net Income</u>	<u>Cash Flow</u>	<u>Cumulative CF</u>
1	6,000	26,000	26,000
2	8,000	28,000	54,000
3	11,000	31,000	85,000
4	13,000	33,000	118,000
5	16,000	36,000	154,000
6	18,000	18,000	172,000

$$\text{Payback} = \frac{3 + 100,000 - 85,000}{118,000 - 85,000}$$

# Payback Method



Advantages

Disadvantages

# Time Value of Money



$$FV = PV (1 + r)^n$$

**Compounding:**      **Finding FV**

**Discounting:**      **Finding PV:**     $PV = FV/(1 + r)^n$

**Internal Rate  
of Return:**      **Finding r**

# Definitions



- **Present value:-** the amount of money you must invest or lend at the present time so as to end up with a particular amount of money in the future.
- **Discounting:** -finding the present value of a future cash flow

# Net Present Value



- Net Present Value (NPV) - the difference between the present values of cash inflows and outflows of an investment
- Opportunity cost of undertaking the investment is the alternative of earning interest rate in the financial market.

# Net Present Value



Net Present Value of an Investment is the present value of all its present and future cash flows, discounted at the opportunity cost of those cash flows. NPV is mathematically represented as:

$$NPV = CF_0 + \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \dots + \frac{CF_n}{(1+r)^n}$$

Where:  $CF_0$  = Cash flow at time zero ( $t_0$ )

$CF_1$  = Cash flow at time one ( $t_1$ ), one year after time zero

# Net Present Value



**NPV = Present Value of All Future Cash Flows less Initial Cost**

$$= \frac{\underline{CF}_1}{1+r} + \frac{\underline{CF}_2}{(1+r)^2} + \frac{\underline{CF}_3}{(1+r)^3} + \dots + \frac{\underline{CF}_n}{(1+r)^n} - I_0$$

# Example-1



A company can purchase a machine at the price of £2200. The machine has a productive life of three years and the net additions to cash inflows at the end of each of the three years are £770, £968 and £1331. The company can buy the machine without having to borrow and the best alternative is investment elsewhere at an interest rate of 10%.

Evaluate the project using the

- a) Net present value method.
- b) Internal rate of return

# Example-1



$$NPV = \frac{770}{(1.1)} + \frac{968}{(1.1)^2} + \frac{1331}{(1.1)^3} - 2,200 = 300$$

OR

Year	Cash flow	Discount Factor (10%)	PV
0	(2200)	1.000	(2200)
1	770	0.9091	700
2	968	0.8264	800
3	1331	0.7513	<u>1000</u>
NPV			<b>300</b>

**Comments:**

<sup>25</sup> The project is worthwhile and the machine should be bought (can you suggest why?)

# NPV-Example-2



A firm invest £180,000 in a project that will give a net cash inflow of 50,000 in real terms in each of the next six years. Its real pre-tax cost of capital is 13%.

**Required:**

**Calculate NPV**

# Example-2

## Solution

Year	Cash Flow	PV factor 13%	Present
0	(180,000)	1.00	(180,000)
1	50,000	0.885	44,250
2	50,000	0.783	39,150
3	50,000	0.693	34,650
4	50,000	0.613	30,650
5	50,000	0.543	27,150
6	50,000	0.480	<u>24,000</u>
NPV			19,850

Positive NPV indicates viability of the project.

Negative NPV indicates non-viability of the project.

# Net Present Value – Example-3



<u>Year</u>	<u>CF</u>	<u>Disc. Factor</u>	<u>PV</u>
0	-100000	1	-100000
1	26000	$1/1.1 = .9091$	23637
2	28000	$1/(1.1)^2 = .8264$	23139
3	31000	$1/(1.1)^3 = .7573$	23290
4	33000	$1/(1.1)^4 = .6830$	22539
5	36000	$1/(1.1)^5 = .6209$	22352
6	18000	$1/(1.1)^6 = .5645$	<u>10161</u>

$$\text{NPV} = \underline{\underline{25121}}$$

# Net Present Value



Advantages

Disadvantages

# Internal Rate of Return



- Internal Rate of Return - is the discount rate that equates the present values of an investment's cash inflows and outflows.
- Internal Rate of Return (IRR) - is the discount rate that causes an investment's NPV to be zero

# Internal Rate of Return



Use interpolation method to calculate the IRR. The formula is as follows:

$$IRR = L + \frac{N_L}{N_L - N_H} \times (H - L)$$

Where:

L = Lower rate of interest

H = Higher rate of interest

N<sub>L</sub> = NPV at lower rate of interest

N<sub>H</sub> = NPV at higher rate of interest

# Internal Rate of Return



Discount rate that makes NPV Zero  
(i.e., that equates PV of benefits with the cost).

$$\text{IRR: } I_o = \frac{\underline{CF}_1}{1+r} + \frac{\underline{CF}_2}{(1+r)^2} + \dots + \frac{\underline{CF}_n}{(1+r)^n}$$

Solve for r.

*Example:*

$$100,000 = \frac{26000}{1+r} + \frac{28000}{(1+r)^2} + \frac{31000}{(1+r)^3} + \dots + \frac{18000}{(1+r)^6}$$

$$r = 18.2\%$$

# Internal Rate of Return



Advantages

Disadvantages

# Example-IRR



**Using Lecture example 1(above), calculate the internal rate of return for the project.**

# Example-IRR



## Solution

IRR Try 15%

Year	Cash flow	Discount Factor (15%)	
	PV		
0	(2200)	1.000	(2200)
1	770	0.8696	669.59
2	968	0.7561	731.90
3	1331	0.6575	<u>875.13</u>
NPV			76.62

# Internal Rate of Return



Year	Cash flow	DC (16%)	PV
0	(2200)	1.000	(2200)
1	770	0.8621	663.83
2	968	0.7432	719.42
3	1331	0.6407	<u>852.77</u>
<b>NPV</b>			<b>36.01</b>

# Internal Rate of Return



Year	Cash flow	DCF (17%)	PV
0	(2200)	1.000	(2200)
1	770	0.8475	652.58
2	968	0.7305	711.48
3	1331	0.6244	<u>831.08</u>
NPV			(4.86)

Interpolation

$$16 + \frac{36.01}{40.87} = \underline{\underline{16.88\%}}$$

# Profitability Index



**What Does *Profitability Index* Mean?**

**An index that attempts to identify the relationship between the costs and benefits of a proposed project through the use of a ratio calculated as:**

# Profitability Index



$$PI = \frac{\text{PV of all Benefits}}{\text{PV of all Cost}}$$

Example:

$$\begin{aligned} \text{PV (Benefits)} &= \frac{26000}{1.1} + \frac{28000}{(1.1)^2} + \dots + \frac{18000}{(1.1)^6} \\ &= 125121 \end{aligned}$$

$$\text{PV (Cost)} = 100000$$

$$PI = \frac{125121}{100000} = 1.25$$

# Profitability Index



Advantages:

Disadvantages:

# NPV Profile



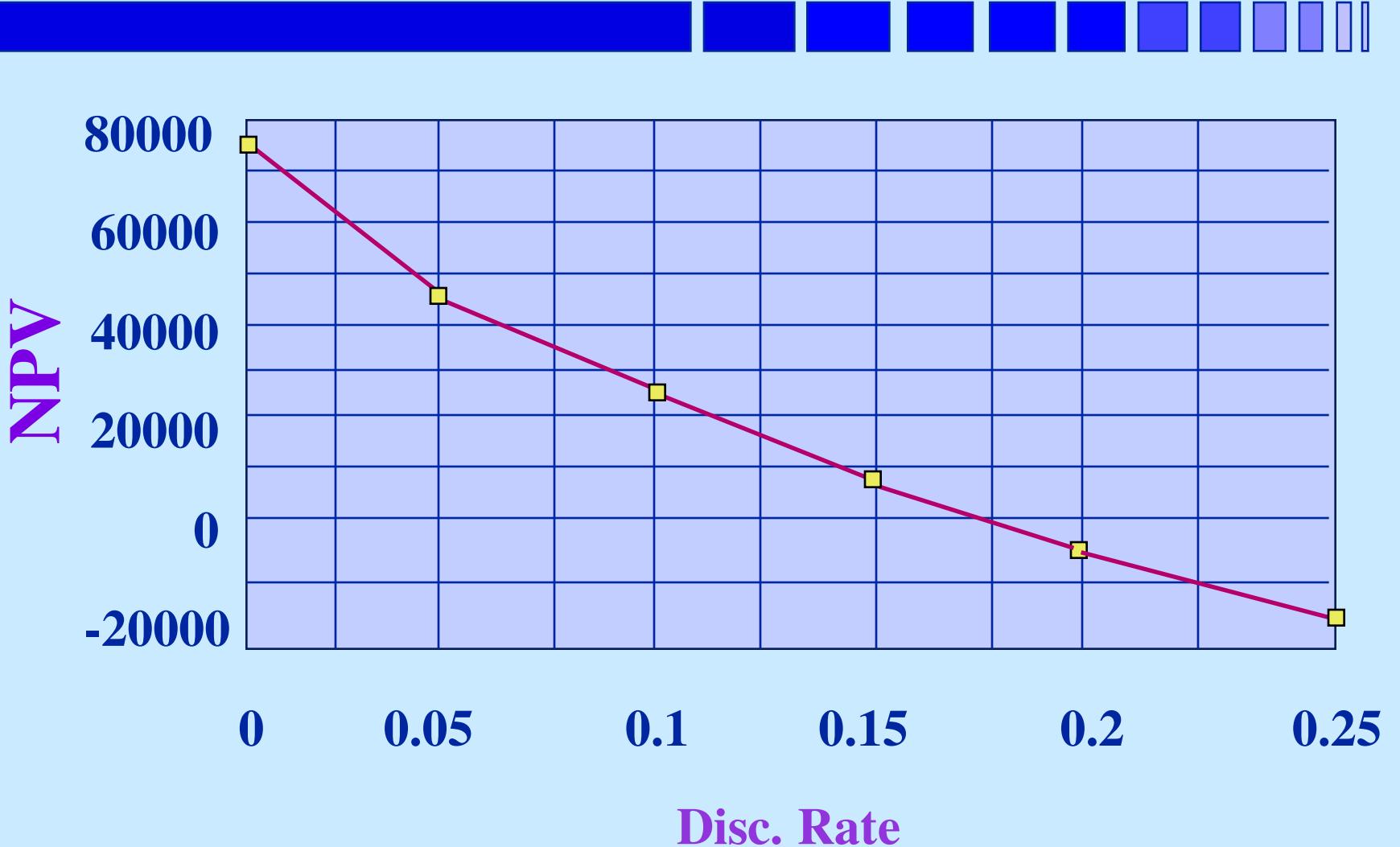
<u>Year</u>	<u>CF</u>	<u>Disc. Factor</u>	<u>PV</u>
0	-100,000	1	-100,000
1	26,000	0.91	23,636
2	28,000	0.83	23,140
3	31,000	$1/(1.1)^3 = .7573$	23,291
4	33,000	$1/(1.1)^4 = .6830$	22,539
5	36,000	$1/(1.1)^5 = .6209$	22,352
6	18,000	$1/(1.1)^6 = .5645$	<u>10,161</u>
			<u>NPV = 25,121</u>

# NPV Profile



<u>Dis. Rate</u>	<u>NPV</u>
0%	7200
5%	45725.7
10%	25120.76
15%	8711.838
20%	-4538.97
25%	-15376.1

# NPV Profile

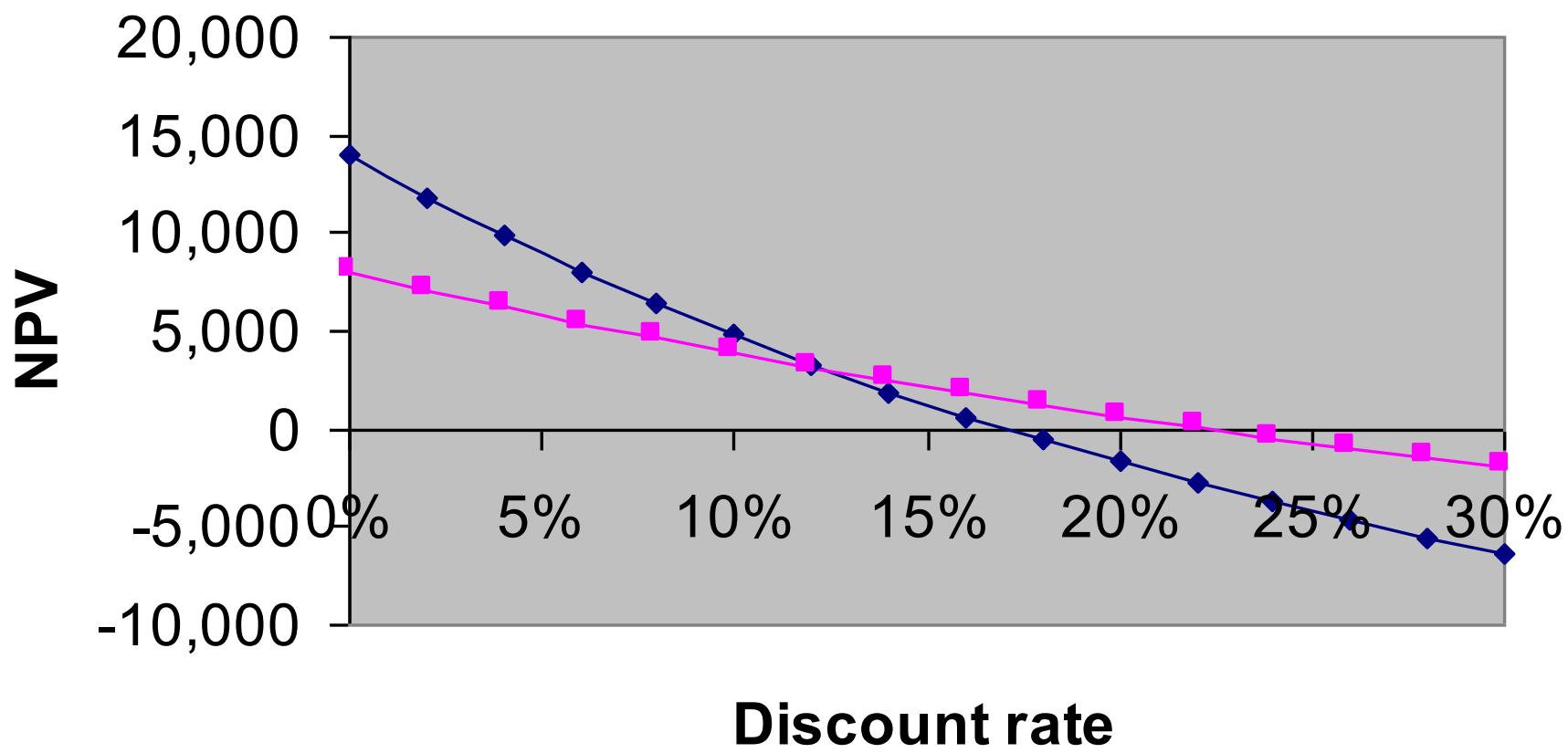


# Choosing Between Projects



<u>Year</u>	<u>CF(A)</u>	<u>CF(B)</u>
0	-25000	-25000
1	2000	21000
2	2000	10000
3	35000	2000
<b>NPV</b>	<b>6351</b>	<b>4606</b>
<b>IRR</b>	<b>17%</b>	<b>22%</b>

# NPV Profile



# Modified IRR



The regular IRR may not always yield a value and in some cases a solution may not exist for IRR. To overcome this shortcomings of IRR we extend it to define a modified internal rate of return. MIRR value is always unique given that we have at least one negative and one positive net cash flow. The modified internal rate of return is a geometric average of the compounded future value of positive cash flows over the discounted present value of negative cash flows. Here we compound each positive cash flow at the reinvestment rate aka WACC or discount rate to find future value, and we discount each negative cash flow at the finance rate to find the present value. We then find the geometric average of this ratio of net future value over the net present value to come up with MIRR value

# MIRR Formula

$$\text{MIRR} = \left( \frac{-FV}{PV} \right)^{\frac{1}{n-1}} - 1$$

# MIRR Example



Let us show you MIRR Calculation with an example investment proposal. Let us assume we set out on an investment that requires an initial outlay of \$100,000 and we expect to receive benefits and incur costs as \$40,000 35,000 -20,000 40,000 38,000 40,000. We further assume that our reinvestment rate (WACC or simply the discount rate) is 11% and finance rate is 13%.

# MIRR Calculation



I will now show you step by step MIRR calculation for the net cash flows from our example. As you can see we compound each of the positive net cash flows at the reinvestment rate and get a net future value. We also discount each of the negative net cash flows to get a net present value. Finally we find the geometric average of these two values to get the required MIRR value

# Net Cash Flows



## Net Cash Flows

**CF<sub>0</sub> = -100000**

**CF<sub>1</sub> = 40000**

**CF<sub>2</sub> = 35000**

**CF<sub>3</sub> = -20000**

**CF<sub>4</sub> = 40000**

**CF<sub>5</sub> = 38000**

**CF<sub>6</sub> = 40000.**

# Compounded Net Cash Flows at 11%



## Compounded Net Cash Flows at 11%

$$\text{CCF1} = 40000 \times (1+11\%)^5 = 40000 \times 1.68506 = 67402.33$$

$$\text{CCF2} = 35000 \times (1+11\%)^4 = 35000 \times 1.51807 = 53132.46$$

$$\text{CCF4} = 40000 \times (1+11\%)^2 = 40000 \times 1.2321 = 49284$$

$$\text{CCF5} = 38000 \times (1+11\%)^1 = 38000 \times 1.11 = 42180$$

$$\text{CCF6} = 40000. \times (1+11\%)^0 = 40000. \times 1 = 40000$$

$$\text{FV} = 251998.79$$

# Discounted Net Cash Flows at 13%



## Discounted Net Cash Flows at 13%

$$DCF_0 = -100000 / (1+13\%)^0 = -100000 \times 1 = -100000$$

$$DCF_3 = -20000 / (1+13\%)^3 = -20000 \times 1.4429 = -13861$$

$$PV = -113861$$

# MIRR Calculation



## MIRR Calculation

$$\text{MIRR} = (-FV/PV)^{1/n}-1$$

$$\text{MIRR} = (-251998.79/-113861)^{1/6}-1$$

$$\text{MIRR} = 1.1415735830404 - 1$$

$$\text{MIRR} = 0.14157358304039$$

$$\text{MIRR} = 14.16\%$$

# Estimating Cash Flows



$$NPV = \frac{CF_1}{l+r} + \frac{CF_2}{(l+r)^2} + \dots + \frac{CF_n}{(l+r)^n} - I_0$$

Cash Flows      Incremental  
                        After Tax  
                        Net Working Capital  
                        Sunk Costs

# Procedure



## 1. Initial Costs:

New CAPEX

Additional W. Cap

Sale of Old Assets

## 2. Annual Costs:

Revenue Less Costs

After Tax

## 3. Terminal Cash Flows:

Salvage Value

Recoupmment of NWC

# Cash Flow Estimates



## Sale of Existing Plant

$$CF = \text{Selling Price} + T(B.V. - S.P.)$$

## Annual Cash Flows

$$OCF = (\text{Sales} - \text{Cost})(1 - T) + T, \text{DEPREC}$$

or

$$OCF = \text{Net Inc} + \text{Depreciation}$$

# New Product Proposal



<b>Annual Sales</b>	\$20m
<b>Annual Costs</b>	\$16m
<b>Net Working Capital</b>	\$2m
<b>Plant Site</b>	\$0.5m
<b>Plant and Equipment</b>	\$10m
<b>Depreciation</b>	<b>Straight Line over 20 years</b>
<b>Salvage Value</b>	nil
<b>Tax Rate</b>	40%
<b>Required Return</b>	8%

# New Product Proposal



**INITIAL CASH FLOWS**

**ANNUAL CASH FLOWS**

# New Product Proposal



**TERMINAL CASH FLOWS**

**CALCULATION**

# Evaluating Capital Projects



- 1) Focus on Cash Flow, Not Profits.**
  - Cash Flow = Economic Reality.
  - Profits Can Be Managed.
- 2) Carefully Estimate Expected Future Cash Flows.**
- 3) Select a Discount Rate Consistent with the Risk of Those Future Cash Flows.**
- 4) Account for the Time Value of Money.**
- 5) Compute a “Base-Case” NPV.**

# Evaluating Capital Projects



**6) Net Present Value = Value Created or Destroyed by the Project.**

- **NPV is the Amount by which the Value of the Firm Will Change if you Undertake the Project.**

**7) Identify Risks and Uncertainties. Run a Sensitivity Analysis.**

- **Identify “Key Value Drivers.”**
- **Identify Breakeven Assumptions.**
- **Estimate Scenario Values.**
- ***Bound the Range of Value***

# Evaluating Capital Projects



## 8) Identify Qualitative Issues.

- Flexibility
- Quality
- Know-How
- Learning

## 9) Decide