

Chapter 7: Ecological Limits and Economic Development

- ▶ Economic Theory and Ecological Limits
 - ▶ Concepts of Sustainable Development
 - ▶ Ecological Footprint
 - ▶ Overcoming Ecological Limit
-
- ▶ ***Why do we spend so much for a better future world at the cost of present?"***
 - ▶ Professor Ramprasad Sengupta formerly the Sukhamay Chakraborti Chair Professor in Centre for Economic Studies and Planning, Jawaharlal Nehru University, New Delhi has made a deeply significant contribution in economics and ecological economics through writing book: *Ecological Limits and Economic Development*.



Ecological Limits and Economic Development

- ▶ Ram Prasad Sengupta explain 'the environmental pressure on resources and ecosystem capacity as created by (a) growth of population and (b) the scale of an economy is really threatening.'
- ▶ As a result of international trade, instead of being an 'engine of growth' as often claimed in different literatures, turned out to be a vanguard of depletion of nature at the same time.
- ▶ This is due to the incessant non-satiety of profit-hungry aspect of capitalism (classical and neo-classical economics).
- ▶ This is due to the microeconomic and macroeconomic visions of large scale growth which look rather thin for comprehending the problem of sustainability.
- ▶ Thus, he claimed that, emphasizing the role of ecology economics interdisciplinary inquiry is most important and urgent need for a paradigm shift.
- ▶ So before making any economic decisions, analytical investigations on ecology-environment-economy interaction should be done.

Economic Theory and Ecological Limits

- ▶ Micro and the macroeconomic theory focuses on resource scarcity and allocation of resources. They neglect different environmental aspects.
- ▶ Economic development has traditionally required a growth in the [gross domestic product](#). This model focused on unlimited personal and GDP growth rate.
- ▶ But, environmental resources should be treated as important economic assets, called [natural capital](#).
- ▶ Ecological constraints are limiting the availability of natural resources.
- ▶ In response to classical and neoclassical economics, the approaches of the two schools of thought - environmental economics and ecological economics –emerged.
- ▶ These two schools of thoughts are emerged in response to the challenges posed by the ecological limits on economic development.
- ▶ The environmental economics treats the natural environment as a separate sector for internalizing the externalities.
- ▶ The ecological economics takes a more interdisciplinary approach of integrating the ecological factors governing resource regeneration and waste absorption into the economic models.

Concepts of Sustainable Development

- ▶ "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."
- ▶ **Sustainable development** is a process for meeting human development goals while sustaining the ability of natural systems to continue to provide the natural resources and ecosystem services upon which the economy and society depend.
- ▶ While the modern concept of sustainable development is derived most strongly from the 1987 Brundtland Report, it is rooted in earlier ideas about sustainable forest management and twentieth century environmental concerns.
- ▶ As the concept developed, it has shifted to focus more on economic development, social development and environmental protection.
- ▶ Sustainable development ties together concern for the carrying capacity of natural systems with the social, political, and economic challenges faced by humanity.
- ▶ There is an additional focus on the present generations' responsibility to regenerate, maintain and improve planetary resources for use by future generations

Concepts of Sustainable Development

- ▶ In 1980 the [International Union for the Conservation of Nature](#) published a world conservation strategy that included one of the first references to sustainable development as a global priority and introduced the term "sustainable development".
- ▶ In 1987 the [United Nations World Commission on Environment and Development](#) released the report *Our Common Future*, commonly called the Brundtland Report stated widely recognized definitions of Sustainable Development:
 - ▶ Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:
 - The concept of 'needs', in particular, the essential needs of the world's poor, to which overriding priority should be given; and
 - The idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

Concepts of Sustainable Development

- ▶ An unsustainable situation occurs when [natural capital](#) (the sum total of nature's resources) is used up faster than it can be replenished.
- ▶ Sustainability requires that human activity only uses nature's resources at a rate at which they can be replenished naturally.
- ▶ Inherently the concept of sustainable development is intertwined with the concept of carrying capacity.
- ▶ Theoretically, the long-term result of [environmental degradation](#) is the inability to sustain human life.
- ▶ Such degradation on a global scale should imply an increase in human death rate until population falls to what the degraded environment can support.
- ▶ If the degradation continues beyond a certain [tipping point](#) or critical threshold it would lead to eventual [extinction](#) for humanity.
- ▶ Sustainable development is about improving the standard of living by protecting human health, conserving the environment, using resources efficiently and advancing long-term economic competitiveness.
- ▶ It requires the integration of environmental, economic and social priorities into policies and programs and requires action at all levels--citizens, industry, and governments.

Sustainable Development



- ▶ There are three dimensions to sustainable development: economic, social and environmental. These dimensions give rise to the need for the planning system to perform a number of roles:
- ▶ **an economic role** – contributing to building a strong, responsive and competitive economy, by ensuring that sufficient land of the right type is available in the right places and at the right time to support growth and innovation; and by identifying and coordinating development requirements, including the provision of infrastructure;
- ▶ **a social role** – supporting strong, vibrant and healthy communities, by providing the supply of housing required to meet the needs of present and future generations; and by creating a high quality built environment, with accessible local services that reflect the community's needs and support its health, social and cultural well-being; and
- ▶ **an environmental role** – contributing to protecting and enhancing our natural, built and historic environment; and, as part of this, helping to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate and adapt to climate change including moving to a low carbon economy.

Ecological Footprint

- ▶ Human activities consume resources and produce waste. As our populations grow and global consumption increases, it is essential that we measure nature's capacity to meet these demands on our planet. The **Ecological Footprint** has emerged as one of the world's leading measures of human demand on nature. It allows us to calculate human pressure on the planet and come up with facts such as: If everyone lived the lifestyle of the average American, we would need 5 planets.
- ▶ The **Ecological Footprint** is a resource accounting tool that measures how much biologically productive land and sea is used by a given population or activity, and compares this to how much land and sea is available. Productive land and sea areas support human demands for food, fiber, timber, energy, and space for infrastructure. These areas also absorb the waste products from the human economy.
- ▶ The Ecological Footprint measures the sum of these areas, wherever they physically occur on the planet. The Ecological Footprint is used widely as a management and communication tool by governments, businesses, educational institutions, and non-governmental organizations.

Ecological Footprint

- ▶ Ecological Footprint measures the amount of biologically productive land and water area an individual, a city, a country, a region, or all of humanity uses to produce the resources it consumes and to absorb the waste it generates with today's technology and resource management practices. This demand on the biosphere can be compared to biocapacity, a measure of the amount of biologically productive land and water available for human use. Biologically productive land includes areas such as cropland, forest, and fishing grounds, and excludes deserts, glaciers, and the open ocean.
- ▶ An **ecological footprint** is a measure of human impact on Earth's ecosystems.
- ▶ Global hectares are hectares with world-average productivity for all productive land and water areas in a given year. Studies that are compliant with current **Ecological Footprint Standards use global hectares as a measurement unit**. This makes Ecological Footprint results globally comparable, just as financial assessments use one currency, such as dollars or Euros, to compare transactions and financial flows
- ▶ At a global scale, it is used to estimate how rapidly we are depleting natural capital. The Global Footprint Network calculates the global ecological footprint from UN and other data. They estimate that as of 2007 our planet has been using natural capital 1.5 times as fast as nature can renew it.

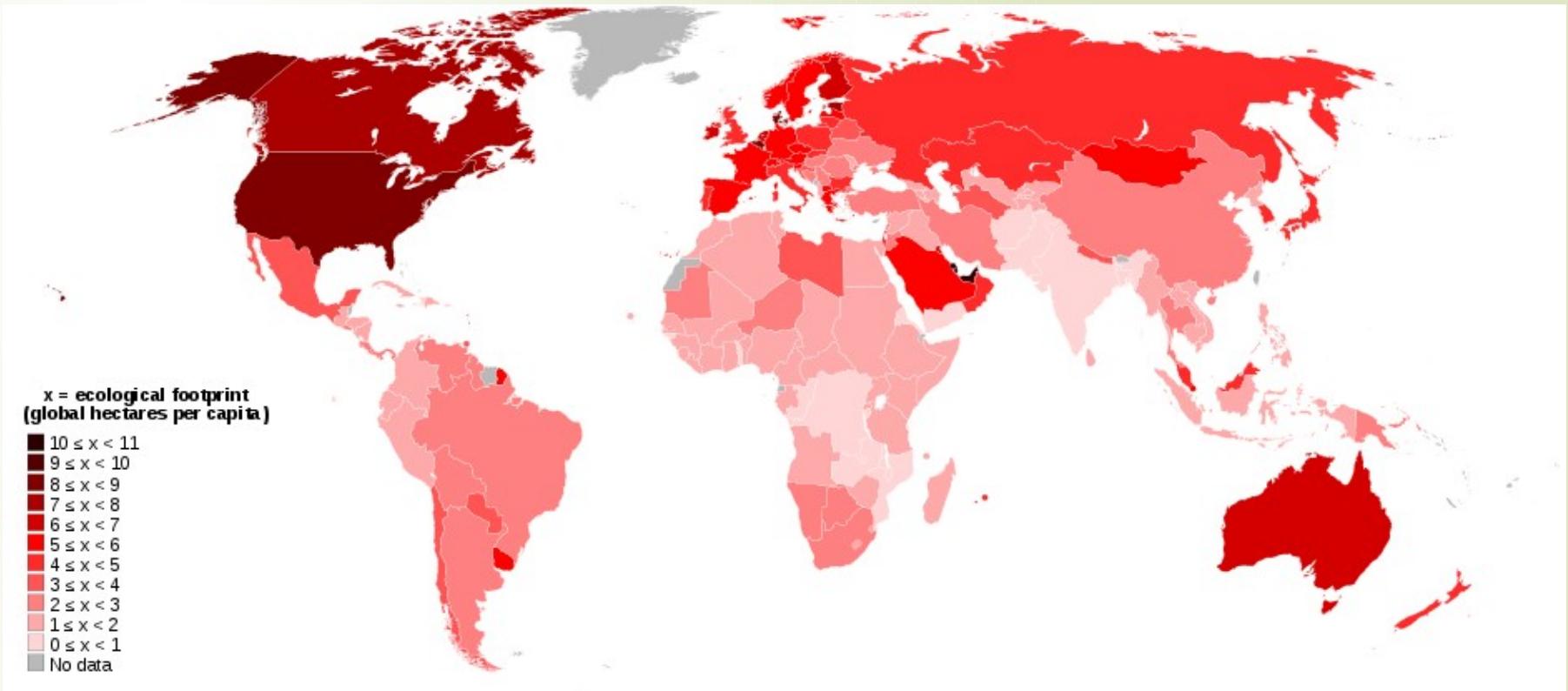


Ecological Footprint

- ▶ The world-average ecological footprint in 2012 was 1.8 global hectares per person. The average per country ranges from over 10 to under 1 hectares per person.
- ▶ There is also a high variation within countries, based on individual lifestyle and economic situation. The world-average [ecological footprint](#) in 2007 was 2.7 global hectares per person (18.0 billion in total).
- ▶ The [U.S.](#) footprint per capita was 9.0 gha, and that of [Switzerland](#) was 5.6 gha, while [China](#)'s was 1.8 gha. The [WWF](#) claims that the human footprint has exceeded the [biocapacity](#) (the available supply of natural resources) of the planet by 20%.
- ▶ If a country does not have enough ecological resources within its own territory, then there is a local ecological deficit and it is called an ecological debtor country. Otherwise, it has an ecological remainder and it is called an ecological creditor country.

Ecological Footprint

https://en.wikipedia.org/wiki/List_of_countries_by_ecological_footprint



Overcoming Ecological Limit

- If sustainable development is considered possible as per the **holistic approach** which takes account of the interactive relation between the human system and the ecosystem, overcoming ecological limit is possible.
- **Technology and human values** can also play a significant role in creating space for economic development by relaxing the ecological constraints.
- Also, delinking economic growth and the environment through dematerialization of development, de-carbonisation of energy, development of the renewables as alternative energy sources, recycling of wastes, etc. **taking an organic view of technology and resource development** also help on overcoming ecological limit.
- Finally, the **role of institutions** in shaping the character and implementation of sustainable development by realizing the potential of such delinking of economic growth and the natural environment is important for overcoming ecological limit.
- Also, to overcome ecological limit, the **integration of the concerned ecological factors into primarily economic models** of development should be done.
- Further, the framework and the **methodological approach of neoclassical economics should be amended** to appropriate modifications required for addressing such issues.

Chapter 7: Assignments

- ▶ Define ecological footprint. Explain the concept of sustainable development.
- ▶ Define ecological limit. Explain the ways to overcome ecological limits.
- ▶ Write on short notes:
 - ▶ Economic Theory
 - ▶ Ecological Footprint
 - ▶ Sustainable Development
 - ▶ Ecological Limits
 - ▶ Overcoming ecological limit

Chapter 8: Depreciation and Corporate income taxes

- ▶ Depreciation and its causes, Asset Depreciation and Accounting Depreciation
- ▶ Basic Method of Depreciation, Straight Line Method, Declining Balance Method, Sinking Fund Method, Sum of Year Digit Method, Unit of Production Method, Modified Accelerated Cost Recovery System (MACRS)
- ▶ Introduction to Corporate Income Tax, Taxation Law, Depreciation Rate, Personal Tax, VAT
- ▶ After Tax Cash Flow Estimate, General Procedure for Making After Tax Economic Analysis

Depreciation

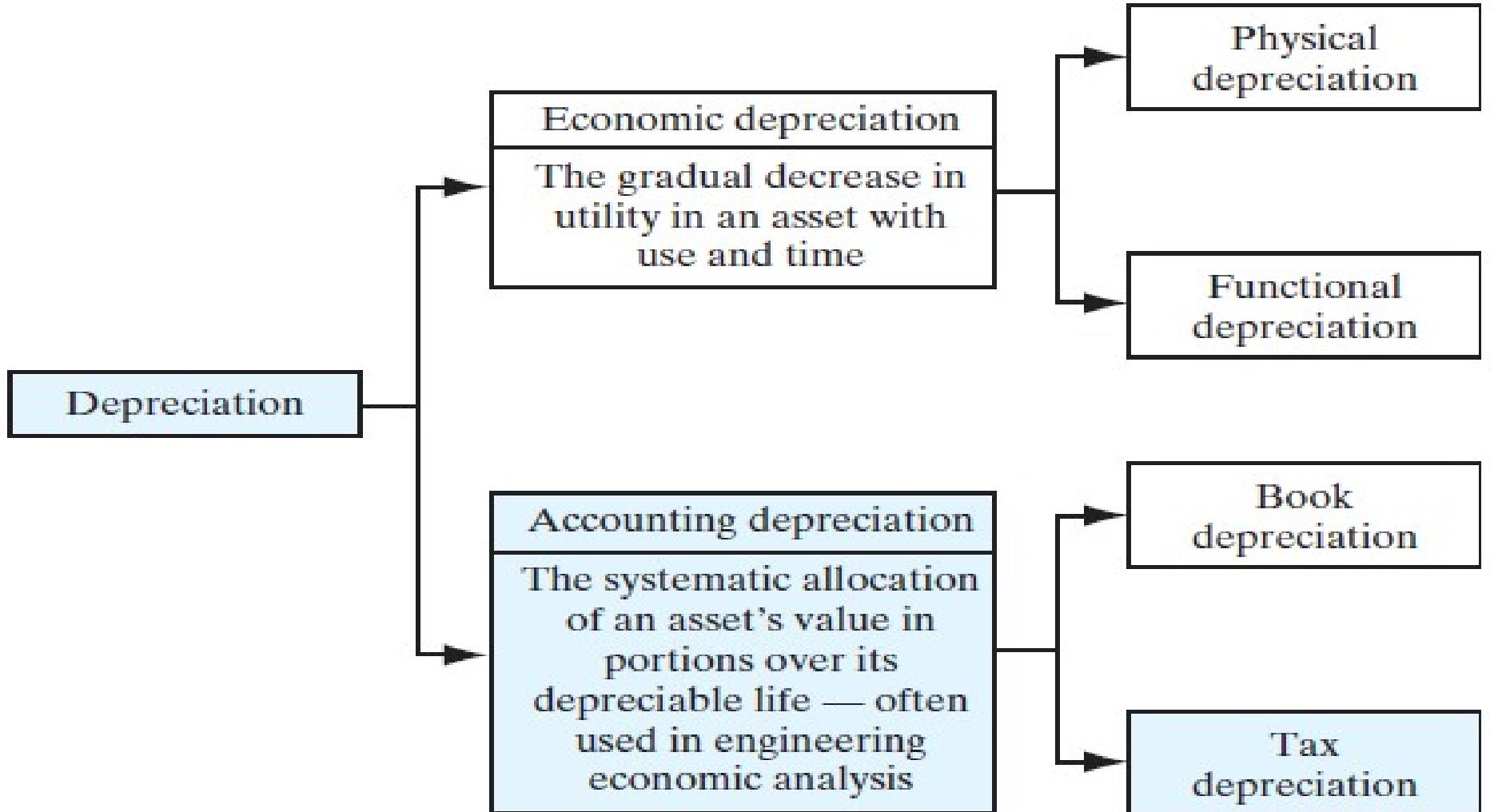
- ▶ Organization must deal with and account for different types of fixed assets like plant and machinery, buildings, equipment, furniture, vehicles etc.
- ▶ These assets lose their value due to use and the lapse of time. This loss of value is called as **depreciation**.
- ▶ “**Depreciation** can be defined as a gradual decrease in the utility of fixed assets with use and time.”- Chan S. Park
- ▶ Depreciation is the gradual and permanent decrease in the value of an asset from any causes.
- ▶ The reduction in value of such capital assets is known as depreciation.
- ▶ Organization consider those decreased value of capital assets for accounting purpose.
- ▶ This non cash expense (loss) will be collected as depreciation fund for replacement of assets and get fair financial position of firm.



Depreciation

- ▶ **Depreciation accounting** is to account for the cost of fixed assets in a pattern that matches their decline in value over time.
- ▶ On a project level, engineers must be able to assess how the practice of depreciating fixed assets influences the investment value of a given project.
- ▶ To do this, the engineers need to estimate the allocation of capital costs over the life of the project, which requires an understanding of the conventions and techniques that accountants use to depreciate assets.

Depreciation



Causes of Depreciation

- We can define **economic depreciation** as follows:
 - **Economic depreciation = Purchase price - market value**
 - **Causes of Depreciation**

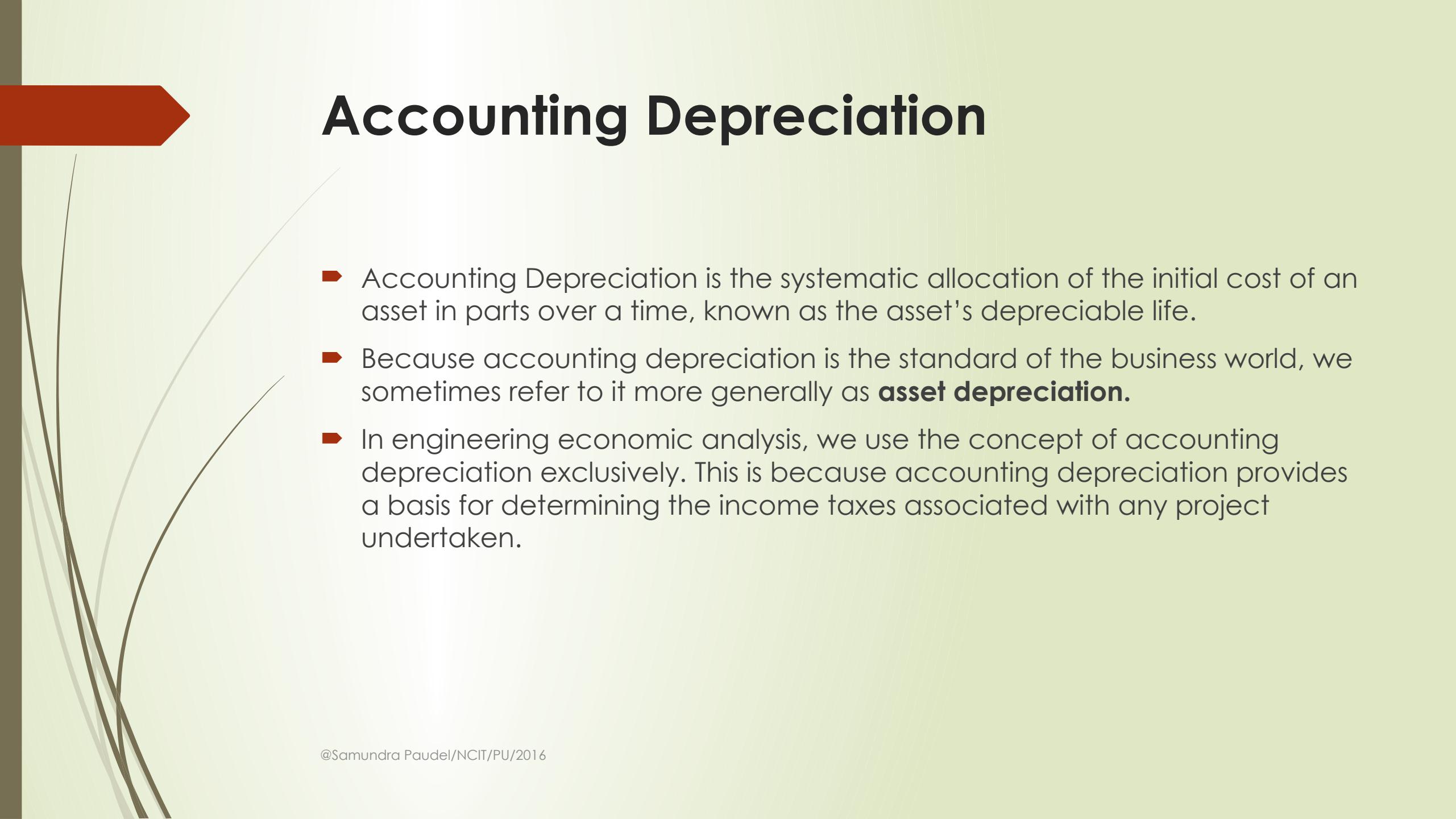
1. **Physical depreciation** can be defined as a reduction in an asset's capacity to perform its intended service due to physical impairment. Physical depreciation can occur in any fixed asset in the form of

- a. **deterioration from interaction with the environment**, including such agents as corrosion, rotting, and other chemical changes, and
- b. **wear and tear** from use.
- c. **Accidental causes** due to natural disaster or by man made disaster

Physical depreciation leads to a decline in performance and high maintenance costs.

2. **Functional depreciation** occurs as a result of changes in the organization or in technology that decrease or eliminate the need for an asset.

- d. **obsolescence** attributable to advances in technology,
- e. a **declining need for the services** performed by an asset, and
- f. the **inability to meet increased quantity or quality** demands.
- g. Time: Decline in market value due to **passage of time**



Accounting Depreciation

- ▶ Accounting Depreciation is the systematic allocation of the initial cost of an asset in parts over a time, known as the asset's depreciable life.
- ▶ Because accounting depreciation is the standard of the business world, we sometimes refer to it more generally as **asset depreciation**.
- ▶ In engineering economic analysis, we use the concept of accounting depreciation exclusively. This is because accounting depreciation provides a basis for determining the income taxes associated with any project undertaken.

Factors affecting Depreciation amount

1. Depreciable Property: Properties with following features:

1. It must be used in business or must be held for the production of income.
2. It must have a definite service life, and that life must be longer than 1 year.
3. It must be something that wears out, decays, gets used up, becomes obsolete, or loses value from natural causes.
 - ▶ Depreciable property includes buildings, machinery, equipment, and vehicles.
 - ▶ Inventories are not depreciable property, because they are held primarily for sale to customers in the ordinary course of business.
 - ▶ If an asset has no definite service life, the asset cannot be depreciated. For example, you can never depreciate land.

Factors affecting Depreciation amount

2. Total cost of property (Cost basis):

- ▶ The **cost basis** of an asset represents the total cost that is claimed as an expense over the asset's life (i.e., the sum of the annual depreciation expenses).
- ▶ The cost basis generally includes the actual cost of the asset and all other incidental expenses, such as freight, site preparation, and installation.
- ▶ This total cost, rather than the cost of the asset only, must be the depreciation basis charged as an expense over the asset's life.

3. Useful life:

- ▶ Historically, depreciation accounting included choosing a depreciable life that was based on the service life of an asset.

Factors affecting Depreciation amount

4. Salvage value:

- ▶ The **salvage value** is an asset's estimated value at the end of its life—the amount eventually recovered through sale, trade-in, or salvage.
- ▶ The eventual salvage value of an asset must be estimated when the depreciation schedule for the asset is established.
- ▶ If this estimate subsequently proves to be inaccurate, then an adjustment must be made.

5. Depreciation Methods: Book and Tax Depreciation:

- ▶ Most firms calculate depreciation in two different ways, depending on whether the calculation is:
 - (1) intended for financial reports (the **book depreciation method**), such as for the balance sheet or income statement, or
 - (2) for the Internal Revenue Service (IRS), for the purpose of determining taxes (the **tax depreciation method**).

Basic Methods of Depreciation

► Book Depreciation Methods

1. Straight Line Method,
2. Accelerated Method
 1. Double Rate (200%) Declining balance method,
 2. 150% Declining balance method
 3. Prescribed Depreciation Percentage
3. Declining Balance with Conversion to Straight-Line Depreciation
4. Sinking Fund Method
5. Sum of the year Digit (SOYD) Method
6. Unit of Production Method (Service Output Method)

► Tax depreciation Methods

1. As per MACRS Depreciation Rules(In USA)
2. As per Income Tax Act 2058 (In Nepal)

Book Depreciation Method: Straight Line Method

- ▶ The **straight-line (SL) method** of depreciation assumes that the asset provides an equal amount of service in each year of its useful life.
- ▶ Thus, this method charges an equal fraction or same or fixed amount expenses as depreciation each year.
- ▶ It is also known as fixed installment method and simplest method for charging depreciation.

Annual Depreciation= $\frac{\text{Original cost of asset} - \text{Estimated salvage value}}{\text{Estimated life of assets}}$

If rate is given,

Annual Depreciation= Total depreciable value * (Rate %)/100

Rate of depreciation=(1/N)* 100 , (Where, N= Life of asset)

Example: Straight Line Method

- ▶ Consider the following data on an automobile: Cost basis of the asset, $I = \$10,000$; Useful life, $N = 5$ years; Estimated salvage value, $S = \$2,000$. Use the straight-line depreciation method to compute the annual depreciation and the resulting book values.
- ▶ **Solution:**
- ▶ Given: $I = \$10,000$, $S = \$2,000$, and $N = 5$ years
- ▶ Find: Annual depreciation and book value for 1 to 5 years
- ▶ Depreciation $= (I-S)/N = (10,000-2,000)/5 = \$ 1,600$
- ▶ The asset would then have the following book values during its useful life:

Year	Book Value at B	Depreciation	Book Value at E
0	-	-	10,000
1	10,000	1,600	8,400
2	8,400	1,600	6,800
3	6,800	1,600	5,200
4	5,200	1,600	3,600
5	3,600	1,600	2,000

Book Depreciation Method: Declining Balance Method

- ▶ Some assets value may decrease greatest in the first year of an asset's service life and least in its last year.
- ▶ This pattern may occur because the mechanical efficiency of an asset tends to decline with age, because of the increasing likelihood that better equipment will become available and make the original asset obsolete or higher maintenance cost of original asset.
- ▶ For this type of assets, accelerated methods are used which charges a larger fraction of the cost as an expense of the early years than of the later years.
- ▶ A depreciation method, in which double the straight-line depreciation amount is taken the first year, and then that same percentage is applied to the undepreciated amount in subsequent years.

Book Depreciation Method: Declining Balance Method

- ▶ The most commonly used multipliers are:
 - ▶ 1.5 (called **150% DB**) and
 - ▶ 2.0 (called 200%, or **double-declining balance**, DDB).
 - ▶ **Then, Declining Balance Rate (R)=(1/N)*100* 2 or 1.5**
 - ▶ As N increases, depreciation expenses decreases, resulting in a situation in which depreciation is highest in the first year and then decreases over the asset's depreciable life.
 - ▶ If question asked to calculate declining balance method without giving any rate, then, calculate rate of depreciation first using following formula:
 - ▶ $\text{Rate of Depreciation (R)}= 1 - \sqrt[N]{(S/I)}$,
- where, N=Useful life; S=Salvage Value; I= Initial Cost

Example: Declining Balance Method

- ▶ Use the double-declining-depreciation method to compute the annual depreciation allowances and the resulting book values of following information: Cost basis of the asset(I) = \$10,000; Useful life (N) = 5 years; Estimated salvage value, $S = \$778$. (CS Park, 9.4) **(Salvage Value=Book Value)**
- ▶ Given, $I = \$10,000$, $S = \$778$, $N = 5$ years; Depreciation and book value=?

Declining Balance Rate (R)= $(1/N)*100*2=(1/5)*100*2=40\%$

Year	Book Value at B (2)	Depreciation (40% of 2)	Book Value at E
0	-	-	10,000
1	10,000	4,000	6,000
2	6,000	2,400	3,600
3	3,600	1,440	2,160
4	2,160	864	1,296
5	1,296	518	778

Example: Declining Balance Method

- ▶ Use the double-declining-depreciation method to compute the annual depreciation allowances and the resulting book values of following information: Cost basis of the asset(I) = \$10,000; Useful life (N) = 5 years; Estimated salvage value, $S = \$500$. (CS Park, 9.4) **(Salvage Value < Book Value)**
- ▶ Given, $I = \$10,000$, $S = \$500$, $N = 5$ years; Depreciation and book value=?

Declining Balance Rate (R)= $(1/N)*100*2=(1/5)*100*2=40\%$

Year	Book Value at B (2)	Depreciation (40% of 2)	Book Value at E
0	-	-	10,000
1	10,000	4,000	6,000
2	6,000	2,400	3,600
3	3,600	1,440	2,160
4	2,160	864	1,296
5	1,296	1,296-500=796	500

Example: Declining Balance Method

- ▶ Use the double-declining-depreciation method to compute the annual depreciation allowances and the resulting book values of following information:
Cost basis of the asset(I) = \$10,000; Useful life (N) = 5 years; Estimated salvage value, **S = \$1000**. (CS Park, 9.4) (**Salvage Value > Book Value**)
- ▶ Given, I = \$10,000, **S = \$1000**, N = 5 years; Depreciation and book value=?

Declining Balance Rate (R)=(1/N)*100*2=(1/5)*100*2=40%

Year	Book Value at B (2)	Depreciation (40% of 2)	Book Value at E
0	-	-	10,000
1	10,000	4,000	6,000
2	6,000	2,400	3,600
3	3,600	1,440	2,160
4	2,160	864	1,296
5	1,296	1,296-1000=296	1000

Example: Declining Balance Method

- ▶ Use the **declining-depreciation method** to compute the annual depreciation allowances and the resulting book values of following information: Cost basis of the asset(I) = \$10,000; Useful life (N) = 5 years; Estimated salvage value, $S = \$1000$. (CS Park, 9.4) **(Rate of depreciation not given)**
- ▶ Given, $I = \$10,000$, $S = \$1000$, $N = 5$ years; Depreciation and book value=?

$$\text{Rate of Depreciation (R)} = 1 - \sqrt[N]{(S/I)}, = 1 - \sqrt[5]{(1000/10000)} = 37\%$$

Year	Book Value at B (2)	Depreciation (37% of 2)	Book Value at E
0	-	-	10,000
1	10,000	3700	6300
2	6300	2331	3969
3	3969	1469	2500
4	2500	925	1575
5	1575	575 (adjusted)	1000

Book Depreciation Method: Declining Balance with Conversion to Straight-Line Depreciation

- ▶ As declining balance method do not reach zero salvage value, declining balance with conversion to Straight line depreciation is used in such condition. This conversion will lead to asset value become to zero.
- ▶ According to this method, the switchover occurs in the year when, larger or equal depreciation amount is obtained from the straight line method in comparison to declining balance method.

Example: Declining Balance with Conversion to Straight-Line Depreciation

- ▶ Use the double-declining-depreciation method switchover to SL depreciation method to compute the annual depreciation allowances and the resulting book values of following information: Cost basis of the asset(I) = \$10,000; Useful life (N) = 5 years; Estimated salvage value, $S = 0$. (**Salvage Value = 0**)
 - ▶ Given, $I = \$10,000$, $S = 0$, $N = 5$ years; Depreciation and book value=?

Declining Balance Rate (R)= $(1/N)*100*2=(1/5)*100*2=40\%$

Ye ar	Book Value at B (2)	DB Depreciation	Switchover Decision	SL Dep.	Selected Dep.	Book Value at E
0	-	-			-	10,000
1	10,000	4,000	>	2,000	4,000	6,000
2	6,000	2,400	>	1,500	2,400	3,600
3	3,600	1,440	>	1,200	1,440	2,160
4	2,160	864	<	1,080	1,080	1,080
5	1,080	432	<	1,080	1,080	-

Example: Declining Balance with Conversion to Straight-Line Depreciation

- ▶ Use the double-declining-depreciation method switchover to SL depreciation method to compute the annual depreciation allowances and the resulting book values of following information: Cost basis of the asset(I) = \$10,000; Useful life (N) = 5 years; Estimated salvage value, **$S = 200$** . (**Salvage Value = 200**)
- ▶ Given, $I = \$10,000$, **$S = 200$** , $N = 5$ years; Depreciation and book value=?

Declining Balance Rate (R)= $(1/N)*100*2=(1/5)*100*2=40\%$

Ye ar	Book Value at B (2)	DB Depreciation	Switchover Decision	SL Dep.	Selected Dep.	Book Value at E
0	-	-			-	10,000
1	10,000	4,000	>	1,960	4,000	6,000
2	6,000	2,400	>	1,450	2,400	3,600
3	3,600	1,440	>	1133.33	1,440	2,160
4	2,160	864	<	980	980	1,180
5	1,180	432	<	980	980	200

Book Depreciation Method: Sinking Fund Method

- ▶ This methods consider time value of money principle while calculating depreciation amount of certain assets.
- ▶ This method calculate fixed annual depreciation amount (fixed installment=annuity; considering time value of money) for each year as well as net depreciation amount based on compound interest rate.
- ▶ The amount with compound interest earned over the life will be equal to original cost of assets.
- ▶ This method shows, the book value of assets decreases at increasing rate with respect to the life of the asset.
- ▶ Fixed annual depreciation amount(A)= $(I-S) * (A/F, i\%, n)$
- ▶ Net Depreciation Charges in year K = $A * (F/P, i\%, K-1)$
- ▶ Book value at the end of the year K = $I - (A * (F/A, i\%, K))$

Example: Sinking Fund Method

- Compute depreciation charge and book value of each year by using sinking fund method with following information: Salvage Value=Rs. 20,000, Initial cost of Asset=Rs. 100,000, Useful life of asset= 8 years, Interest Rate= 12%.

Solution:

$$\text{Fixed Annual Depreciation } (A) = (I-S) * (A/F, 12\%, N) = (100,000 - 20,000) * 0.0813 = 6,504.22$$

Year (1)	Book Value at the beginning of year (2)	Fixed Dep.	Int. Factor (F/P, 12%, K-1)	Net Dep. (5)	Book Value at the end of year (2-5)
0	-	-	-	-	100,000
1	100,000	6,504	1	6,504	93,496
2	93,496	6,504	1.12	7,284.48	86,211.52
3	86,211.52	6,504	1.2544	8,158.62	78,052.90
4	78,052.90	6,504	1.4049	9,137.65	68,915.25
5	68,915.25	6,504	1.5735	10,234.17	58,681.08
6	58,681.08	6,504	1.7623	11,462.27	47,218.81
7	47,218.81	6,504	1.9738	12,837.74	34,381.07
8	34,381.07	6,504	2.2107	14,378.27	20,002.80

Book Depreciation Method: Sum of Year Digit Method

- ▶ According to this method, per year depreciation charge is calculated from the ratio of the sum of the years digit for the total useful life and remaining useful life at the beginning of the particular year.
 - ▶ SOYD Depreciation=
- $$\frac{\text{Remaining useful life at the beginning of the particular year}^* (I-S)}{\text{SOYD for the total useful life}}$$
- ▶ This methods gives larger depreciation amount during the beginning years of assets and smaller depreciation amount as assets getting old.

Example: SOYD Method

- We have just purchased a minicomputer at a cost of Rs. 20,000 with salvage value of Rs. 1,000 and a projected useful life of 6 years. Determine SOYD depreciation. (PU, 2013).
- **Solution:** Given,

Initial Investment (I)=Rs. 20,000; Salvage Value (S)=Rs. 1,000; Useful life (N)= 6 years

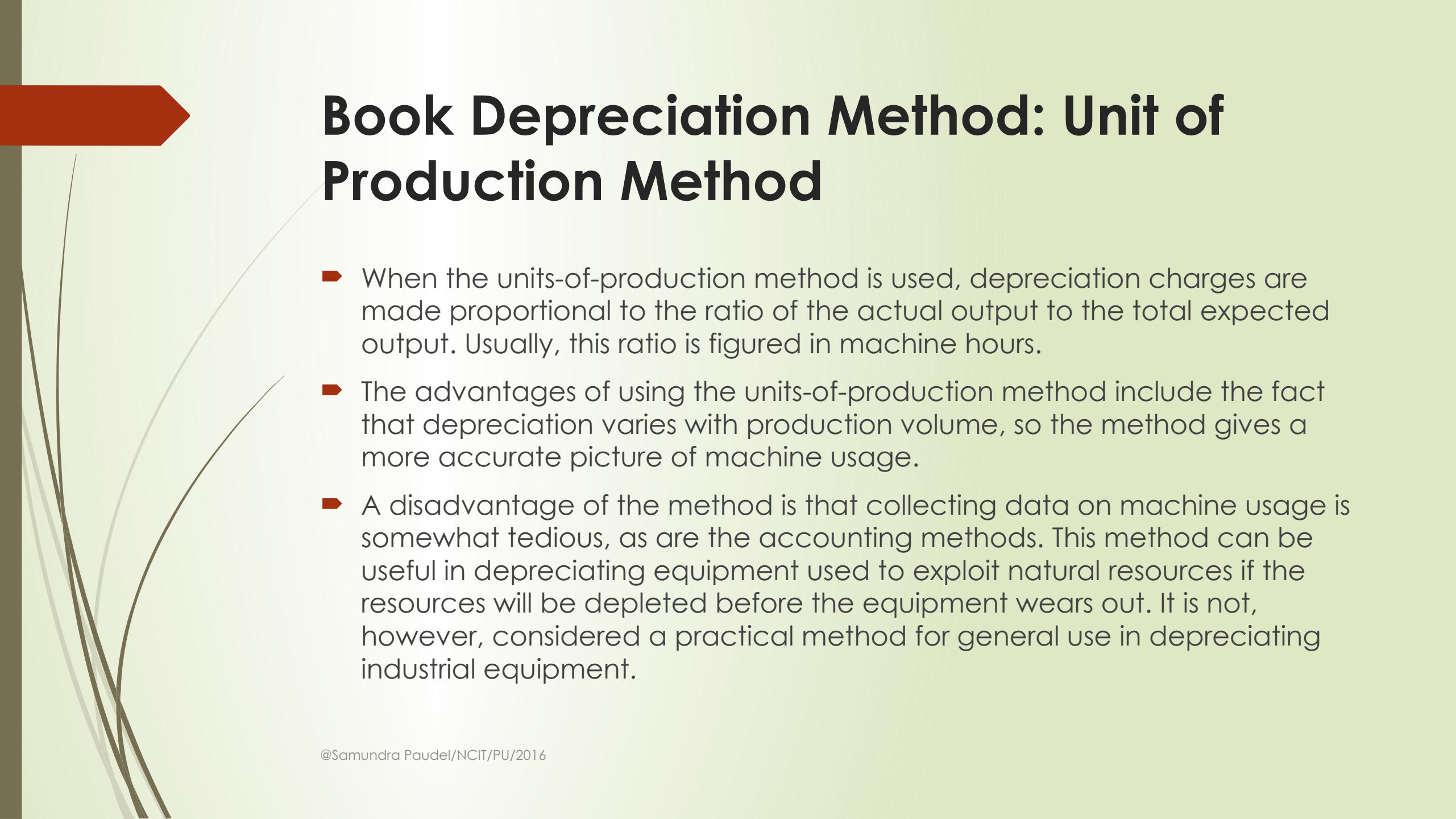
Sum Of Year Digit (SOYD)= $6+5+4+3+2+1= 21$

Depreciation Proportion for each year: 6:5:4:3:2:1

Year	Dep. Prop.	SOYD Calculation	Depreciation	Book Value at E
0	-	-	-	20,000
1	6	$(6/21) * (20,000 - 1,000)$	5428.57	
2	5	$(5/21) * (20,000 - 1,000)$	4523.81	
3	4	$(4/21) * (20,000 - 1,000)$	3619.04	
4	3	$(3/21) * (20,000 - 1,000)$	2714.28	
5	2	$(2/21) * (20,000 - 1,000)$	1809.53	
6	1	$(1/21) * (20,000 - 1,000)$	904.76	1,000
21		Total	Rs. 19,000	

Book Depreciation Method: Unit of Production Method

- ▶ Straight-line depreciation can be defended only if the machine is used for exactly the same amount of time each year.
- ▶ What happens when a punch press machine runs 1,670 hours one year and 780 the next or when some of its output is shifted to a new machining center?
- ▶ This leads us to a consideration of another depreciation method that views the asset as consisting of a bundle of service units; unlike the SL and accelerated methods, however, this one does not assume that the service units will be consumed in a time-phased pattern. Rather, the cost of each service unit is the net cost of the asset divided by the total number of such units.
- ▶ The depreciation charge for a period is then related to the number of service units consumed in that period. The result is the **units-of-production method**, according to which the depreciation in any year is given by
- ▶
$$\text{Depreciation} = \frac{\text{Units of production (used)}}{\text{Total working hours or production unit}} * (\text{Initial Value} - \text{Salvage Value})$$



Book Depreciation Method: Unit of Production Method

- ▶ When the units-of-production method is used, depreciation charges are made proportional to the ratio of the actual output to the total expected output. Usually, this ratio is figured in machine hours.
- ▶ The advantages of using the units-of-production method include the fact that depreciation varies with production volume, so the method gives a more accurate picture of machine usage.
- ▶ A disadvantage of the method is that collecting data on machine usage is somewhat tedious, as are the accounting methods. This method can be useful in depreciating equipment used to exploit natural resources if the resources will be depleted before the equipment wears out. It is not, however, considered a practical method for general use in depreciating industrial equipment.

Example: Unit of Production Method

- ▶ A truck for hauling coal has an estimated net cost of \$55,000 and is expected to give service for 250,000 miles, resulting in a \$5,000 salvage value. Compute the allowed depreciation amount for a truck usage of 30,000 miles.

SOLUTION

- ▶ Given: $I = \$55,000$, $S = \$5,000$, total service units = 250,000 miles and usage year = 30,000 miles.
- ▶ Depreciation amount in this year=?,

We have,

$$\text{Depreciation} = \frac{\text{Units of production (used)}}{\text{Total working hours or production unit}} * (\text{Initial Value} - \text{Salvage Value})$$

$$\text{Depreciation} = 30,000 \text{ miles} * (55,000 - 5,000) / 250,000 \text{ miles} = \$ 6,000.$$

Tax depreciation Method: Modified Accelerated Cost Recovery System (MACRS)

- ▶ In US, prior to 1954, the straight-line method was required for tax purposes, but that year accelerated methods such as double-declining balance and sum-of-years'-digits were permitted.
- ▶ In 1981, US government replaced conventional methods by Accelerated Cost Recovery System (ACRS).
- ▶ In 1986, Congress modified the ACRS and introduced the MACRS. This method outdated conventional methods for use in tax purposes.
- ▶ In conventional methods, it was required to have estimated life of asset, but MACRS abandoned this and provide recovery period as per the property classification.
- ▶ Under the MACRS, *the salvage value of property is always treated as zero.*

MACRS Property Classification

Recovery Period	ADR*	Applicable Property
Midpoint Class		
3 years	$ADR \leq 4$	Special tools for the manufacture of plastic products, fabricated metal products, and motor vehicles
5 years	$4 < ADR \leq 10$	Automobiles, [†] light trucks, high-tech equipment, equipment used for research and development, computerized telephone switching systems
7 years	$10 < ADR \leq 16$	Manufacturing equipment, office furniture, fixtures
10 years	$16 < ADR \leq 20$	Vessels, barges, tugs, railroad cars
15 years	$20 < ADR \leq 25$	Wastewater plants, telephone-distribution plants, similar utility property
20 years	$25 < ADR$	Municipal sewers, electrical power plant
$27\frac{1}{2}$ years		Residential rental property
39 years		Nonresidential real property, including elevators and escalators

MACRS Depreciation Percentage

Year	Depreciation Rate	Class 3		Class 5		Class 7		Class 10		Class 15		Class 20	
		200%	200%	200%	200%	200%	200%	200%	200%	150%	150%	150%	150%
1		33.33	20.00	14.29	10.00	5.00	3.750						
2		44.45	32.00	24.49	18.00	9.50	7.219						
3		14.81*	19.20	17.49	14.40	8.55	6.677						
4		7.41	11.52*	12.49	11.52	7.70	6.177						
5			11.52	8.93*	9.22	6.93	5.713						
6			5.76	8.92	7.37	6.23	5.285						
7				8.93	6.55*	5.90*	4.888						
8					4.46	6.55	5.90	4.522					
9						6.56	5.91	4.462*					
10						6.55	5.90	4.461					
11						3.28	5.91	4.462					
12							5.90	4.461					
13							5.91	4.462					
14							5.90	4.461					
15							5.91	4.462					
16							2.95	4.461					
17								4.462					
18									4.461				
19										4.462			
20										4.461			
21											2.231		

Example: MACRS

- A taxpayer wants to place in service a \$10,000 asset that is assigned to the five-year class. Compute the MACRS percentages and the depreciation amounts for the asset.
- **Solution:** Given, Life of Asset (N)= MACRS 5 year class; Cost (I)=\$10,000, DDB Rate= $(1/N)*100*2=(1/5)*100*2= 40\%$
- Then, MACRS Percentage and the depreciation amount are as follows:

Year n	MACRS Percentage (%)		Depreciation Basis		Depreciation Amount (D_n)
1	20	×	\$10,000	=	\$2,000
2	32	×	\$10,000	=	3,200
3	19.20	×	\$10,000	=	1,920
4	11.52	×	\$10,000	=	1,152
5	11.52	×	\$10,000	=	1,152
6	5.76	×	\$10,000	=	576

Year	Calculation (%)	MACRS Percentage
1	$\frac{1}{2}\text{-year DDB depreciation} = 0.5(0.40)(100\%)$	= 20%
2	DDB depreciation = $(0.40)(100\% - 20\%)$	= 32%
	SL depreciation = $(1/4.5)(100\% - 20\%)$	= 17.78%
3	DDB depreciation = $(0.40)(100\% - 52\%)$	= 19.20%
	SL depreciation = $(1/3.5)(100\% - 52\%)$	= 13.71%
4	DDB depreciation = $(0.40)(100\% - 71.20\%)$	= 11.52%
	SL depreciation = $(1/2.5)(100\% - 71.20\%)$	= 11.52%
5	SL depreciation = $(1/1.5)(100\% - 82.72\%)$	= 11.52%
6	$\frac{1}{2}\text{-year SL depreciation} = (0.5)(11.52\%)$	= 5.76%

Tax depreciation Method: Depreciation Rates in Nepal

- Income Tax Act 2058 provisioned depreciation rates for different types of assets in Nepal, which are as follows:

Block	Assets	Rate (on base amount)
A	Building, structures and similar asset of permanent nature	5 % per year
B	Office equipment, fixtures, furniture, computer and data processing equipment	25% per year
C	Automobile, Buses, Minibuses, and all other transport assets	20% per year
D	Construction and earthmoving equipment and any other depreciable asset that are not included in other block	15% per year
E	All Intangible assets including software	(Cost price-Salvage value)/Useful life

- For first accounting year, asset purchased in different dates:

- Purchase from Shrawan 1-Poush 30= 100% of value
- Purchase from Magh 1-Chaitra 31=2/3 of value
- Purchase from Baishak 1-Asar 32=1/3 of value

Introduction to Corporate Income Tax

- ▶ Any individual and corporation have to pay income tax to government.
- ▶ Corporate income tax is tax levied by government to organization for their taxable income. The corporate income tax law allow deductions of the cost of goods sold, salaries and wages, rent, interest, advertising, depreciation, amortization, depletion, etc. as expenses.
- ▶ The corporate tax rate structure in US is relatively simple.
- ▶ There are four basic rate brackets (15%, 25%, 34%, and 35%), plus two surtax rates (5% and 3%), based on taxable incomes.
- ▶ U.S. tax rates are progressive; that is, businesses with lower taxable incomes are taxed at lower rates than those with higher taxable incomes.

Item
Gross income
Expenses:
Cost of goods sold
Depreciation
Operating expenses
Taxable operating income
Income taxes
Net income

Introduction to Corporate Income Tax

Taxable Income (X)	Tax Rate	Tax Computation Formula
\$0–\$50,000	15%	$\$0 + 0.15X$
50,001–75,000	25%	$7,500 + 0.25(X - \$50,000)$
75,001–100,000	34%	$13,750 + 0.34(X - 75,000)$
100,001–335,000	34% + 5%	$22,250 + 0.39(X - 100,000)$
335,001–10,000,000	34%	$113,900 + 0.34(X - 335,000)$
10,000,001–15,000,000	35%	$3,400,000 + 0.35(X - 10,000,000)$
15,000,001–18,333,333	35% + 3%	$5,150,000 + 0.38(X - 15,000,000)$
18,333,334 and up	35%	$6,416,666 + 0.35(X - 18,333,333)$

► **Effective Tax Rate**= (Total Tax paid/Total taxable income)*100

Example: Effective Tax Rate

► Calculate effective tax rate from the following information: (CS Park, Ex.-9.13)

- Rent expenses=\$20,000
- Gross Income=\$12,50,000
- Depreciation=\$58,000
- Supplies and operating expenses=\$840,000

Solution:

► Taxable income=Gross Income-All allowable deduction (expenses)

$$= \$12,50,000 - 20,000 - 58,000 - 8,40,000 = \$ 3,32,000$$

As, income is between 100,001 to 335,000 range,

$$\text{Total Tax Amount} = \$22,250 + 0.39(X-100,000) = \$22250 + 0.39(332,000 - 100,000) = \$112,730$$

Then,

$$\begin{aligned}\text{Effective tax rate} &= (\text{Tax Amount}/\text{Taxable income}) * 100 \\ &= (112,730 / 332,000) * 100 \\ &= 33.95\%\end{aligned}$$

Taxation Law in Nepal

- ▶ The political history of Nepal shows the existence of various forms of tax since the ancient period. "Taxes were imposed as per the Shastras, Kautilya Nitee, Manu Smriti, Yagyavalkya Smriti, during the ancient period.
- ▶ The Licchhavi rulers entered Nepal around the middle of the fifth century B.C. and ruled Nepal. They imposed three forms of Karas (taxes): Bhaga, tax on agriculture, Bhoga, tax on livestock and Kara, tax on trade.
- ▶ The Mallas replaced Licchhavi rulers and ruled Kathmandu Valley for almost three centuries from 1200 to 1484 B.C. They seem to be the first rulers who started imposing taxes on land.
- ▶ The subsequent Shah regime also continued the tax system of the Mallas, which was based on land and trade. After the unification of the country, different types of taxes i.e. land tax, transit tax, forest product tax, mining tax, and market duties were levied.

Taxation Law in Nepal

- ▶ For Ranas, the main source of government revenue was land tax, customs duty and excise duty. The tax system was based on a contract and Amanat, Jimmal, Mukhiya, Ditha etc. were the persons who used to collect taxes.
- ▶ The modern tax system, however, began only with the advent of democracy in the 1950s, with an overhaul of the tax system in 1951 as one of the first steps.
- ▶ The first income tax was introduced by first elected government in 2016 under finance act. Business and Employment Tax act 2019 enacted till 2031. The Income Tax Act 2031 replaced it, which was further replaced by Income Tax Act 2058, which is the modern tax regulation in Nepal.
- ▶ Today, the Inland Revenue Department (IRD) oversees the enforcement of tax laws and administration and also monitors the non-tax revenue such as dividends, royalties etc.
- ▶ Income tax, VAT, customs duty and excise duty are the major sources of government revenue in Nepal. Besides, the IRD taxes are also collected at the local level by the local bodies as per the Local Government Act 1999.

Types of Tax Revenue

- ▶ Direct Tax (Charging directly to person and reduces the wealth, directly paid by person who are taxed.)
 - ▶ Income Tax (Personal and Corporate)
 - ▶ Property Tax
 - ▶ Vehicle Tax
- ▶ Indirect Tax (Charging to person but payment burden shifted to another person/sellers.)
 - ▶ Value Added Tax
 - ▶ Excise Duty
 - ▶ Custom Duty



Income Tax in Nepal

- ▶ **Income tax, made up of:**
- ▶ **normal corporate tax:** at 25%. Certain sectors like hydropower are taxed at concessional rate of 20% and other sectors like banking are taxed at 30% (section 2(4), Schedule 1, Income Tax Act 2002 (ITA));
- ▶ **dividend:** at 5% (section 88 (2) (a), ITA); and
- ▶ **capital gains** (for the gain from the disposition of the shares of non-listed company) are subject to withholding tax at 10% for a natural person and at 15% for others (section 95A, ITA).

Corporate Tax in Nepal

Corporation/Entity	Tax Rate
The income from export and special industry	20%
The income from petroleum industry, banks and financial institution	30%
Income from industrial enterprises and related with infrastructure projects	20%
Other general corporate organization	25%

Personal Tax in Nepal

- The taxable income of a resident individual for an income will be taxed at the following rates:
 - Up to Rs.250,000 – 1%;
 - Next Rs. 100,000 – @ 15 %
 - Next Rs. 350,001 to Rs. 25,00,000 – @ 25%
 - Balance exceeding Rs. 25,00,000 -@ 35%
- The taxable income of a couple, if they chose to be treated as a couple will be taxed at the following rates:
 - Up to Rs.300,000 – 1%;
 - Next Rs. 100,000 – @ 15 %
 - Next Rs. 400,001 to Rs. 25,00,000 – @ 25%
 - Balance exceeding Rs. 25,00,000 -@ 35%

Personal Tax in Nepal

- ▶ The business person who have registered own Proprietary firm should not pay above 1% tax.
- ▶ Any individual or couple having pension income can enjoy 25% of the normal exemption limit as an additional basic exemption.
- ▶ Any individual working in prescribed remote area is entitled to deduct prescribed amount as remote area allowance from taxable income.
- ▶ Any individual is entitled to deduct the following amount from taxable amount, if he is having investment insurance policy: Rs.20,000 amount or the actual premium paid, which ever is less.
- ▶ For the purposes of the Act, net gains from the disposal of non-business chargeable assets will be taxed at the rate of 10%.
- ▶ The presumptive tax for individuals conducting small businesses (who have a turnover of Rs.2 million or an income of Rs.200,000) in the Metropolitan or Sub-Metropolitans, Municipalities and anywhere else in Nepal amounts to Rs.5,000 Rs.2,500 and Rs.1,500 respectively.
- ▶ The taxable income of a non-resident individual is taxed at the rate of 25%.

Value Added Tax (VAT)

- ▶ VAT is the youngest member of the sales tax family. This tax was proposed for the first time by Dr. Wilhelm Von Siemens for Germany in 1919 as an improved turnover tax.
- ▶ It is a scientific tax system, which was first introduced in 1954 A.D. in France.
- ▶ Senegal, Denmark, Brazil, Netherlands, Sweden, USA, UK etc. introduced VAT in sixties and later. In the South Asian Association for Regional Cooperation (SAARC) region, VAT has been considered in great depth in India. This country introduced VAT in a different way under the name of modified value added tax (MODVAT) in 1986. Among the other members of the SAARC countries, Pakistan adopted VAT in 1990, Bangladesh in 1991, and Nepal in 1997 while Sri Lanka introduced VAT in 1998.
- ▶ Now this tax has become one of the mainstays of the tax system in over 145 countries.
- ▶ In Nepal VAT has come into consideration to replace of old indirect taxes. It was introduced on 16th November, 1997.

Value Added Tax (VAT)

- ▶ **Value Added Tax (VAT)** is an indirect tax levied on the value creation or addition. Concept of VAT in Nepal was introduced in FY 2049/50 but the act was developed in BS 2050. VAT was implemented in 1998 and is the major source of government's revenue. It is administered by Inland Revenue Department of Nepal.
- ▶ There are two rates of VAT: Normal VAT rate is 13%, some goods or services are subject to VAT at 0%. In addition some goods or services are exempt from VAT.
- ▶ Suppliers of taxable goods and services are required to register under the VAT Act and collect this tax. It is, however, not necessary for them to register if they deal with only tax exempt goods and services. Similarly, small vendors falling below the registration threshold are also not required to register for VAT.
- ▶ The existing level of threshold is Rs.2 million. In the case of imports, traders having annual commercial imports below Rs.200,000 are not required to register.

Value Added Tax (VAT)

- ▶ It is a modern tax system intended, when fully operational, to improve the collection of taxes, to increase efficiency and to lessen tax evasion.
- ▶ VAT intended to replace the existing Sales Tax, the Contract Tax, the Hotel Tax and the Entertainment Tax. It has been designed to collect the same revenue as the four taxes it replaces.
- ▶ It is believed that successful implementation of VAT will help to generate customs duties and income tax also and it is expected to enhance the revenue collection and it is closely associated with the GDP.
- ▶ The self-policing and catch up effect of VAT has turned out to be the rationale of the VAT system.

Multistage (Calculation of) VAT

Sales value: Rs. 150
Gross VAT 13% Rs.19.5/-
Net VAT Rs.19.5-13=6.5

'B' Manufacturer

Sales value: Rs. 100
Gross VAT 13% Rs.13/-
Net VAT Rs.13

'A' Raw Material Producer

Sales value: Rs. 200
Gross VAT 13%Rs. 26/-
Net VAT Rs. 26-19.5=6.5

'C' Wholesaler

Sales value: Rs. 250
Gross VAT 13% Rs.32.5/-
Net VAT Rs.32.5-26=6.5

'D' Retailer



Scenario on VAT implementation in Nepal

- ▶ Indirect tax is a major source of the tax revenue in Nepal. It covers about 80% of tax revenue.
- ▶ The share of VAT revenue to total tax revenue is 34.10% in the FY 2011/12.
- ▶ VAT implementation is seen extremely challenging in Nepal.
- ▶ Resistance from the business community, ignorance of general people, lack of full support and commitments from the politicians and government officials forced the authority responsible for implementing VAT to make compromises on various aspects of VAT which has weakened the process of its implementation right from the beginning. The attitude of businessmen and tax administration also appear hostile to the effective implementation of VAT in Nepal.
- ▶ The culture of doing business without maintaining proper books of accounts or maintaining multiple sets of books of accounts have made implementation of VAT difficult. Due to the lack of experts and skilled manpower in the VAT administration, the auditing system, one of the most important aspects of VAT operation, is not effective.



Scenario on VAT implementation in Nepal

- ▶ The existing large amount of unauthorized trade with India has been posing a great threat for proper implementation of VAT. The illegal import is helping to black market channel resulting in a large-scale tax evasion; the scope for illegal trade and tax evasion has not been decreased even after the implementation of VAT because tax administration is not strong and efficient enough to check this situation.
- ▶ No billing, Lack of invoicing, incorrect value in billing is the main problems observed in invoicing system, leading weak VAT implementation.
- ▶ There is high level of corruption and tax evasion by the means of illegal alliance between Taxpayer and tax administration. It is say that 50 % tax is leakage due to above reason.
- ▶ One of the best features of VAT is the catch up effect which makes tax evasion impossible but this effect is not achieved because of illegal trade, undervalued transactions, transactions without invoices and lack of administrative capabilities to catch and destroy the illegal channels.



How can VAT implementation be improved?

- ▶ Strengthening the organizational capability, reform in revenue administration, with the co-operation of private sector, enlarging tax base, reform in tax system by applying e-Governance, developing fair and integrity tax administration are components to make VAT effectiveness.
- ▶ Consumer should be made aware of taking invoices, which is their fundamental right and responsibility to the state. Consumer awareness program should be launched through media, journals, magazines, newspapers, pamphlets, seminar, discussion, lottery program etc. effectively which encourages people for invoices after buying goods and services.
- ▶ There should be a close tripartite co-operation between the consumers, business persons and the government.
- ▶ Taxpayer should be provided better services in efficient and effective manner.
- ▶ To foster internal revenue policy, professional and corruption less administration should be developed. Reliable and predictable revenue policy is also required. Result oriented administration, healthy co-ordination; regular market monitoring mechanism should be developed.
- ▶ Effort should be concentrate to minimize tax leakage and evasion. For this purpose illegal alliance between Taxpayer and tax officials should be destroy.
- ▶ VAT itself is not more revenue generator, it is only transparent and scientific system of collecting revenue. It needs more administrative support and efforts. A bold vision, evolutionary leadership, efficient bureaucrats, honest taxpayers plus collectors and graft-free society are the invisible infrastructures required. So, all must think from a long- term perspective for effective VAT implementation.

General Procedure for Making After Tax Economic Analysis

- ▶ After tax economic analysis refers to the profitability measurement of any project including all income taxes. In another word it is the analysis of after tax cash flow estimates and profitability analysis of the projects.
- ▶ General Procedure for ATCF Estimates:
 1. Find gross income before depreciation expenses also known as BTFC
 2. Calculate depreciation expenses for each year
 3. Find Taxable income (Deduct depreciation from BTFC/gross income)
 4. Find taxes for each period
 5. Deduct tax amount from BTFC to get ATCF for each year
 6. Find NPW/NFW (Consider time value of money) and make economic analysis

After Tax Cash Flow (ATCF) Estimate

- Example: Purchase Price = Rs. 40,000, useful life 5 years class based on MACRS Method, Annual Revenue=20,000, Annual Cost=7,000, No salvage value. Estimate ATCF if company has to pay corporate tax @ of 40%. **(PU, 2017)**

Solution: Annual Profit =Annual Revenue-Annual Cost=20,000-7,000=13,000

Year	BTCF (Given)	MACRS Dep. Rate	Depreciation (Given)	Taxable income (BTCF-Depreciation)	Income Tax (40%)	ATCF (BTCF-Tax)
0	-Rs. 40,000	-	-	-	-	-40,000
1	Rs. 13,000*0.5 =6,500	20%	8,000	-1,500	No Tax	6,500
2	Rs. 13,000	32%	12,800	200	80	12,920
3	Rs. 13,000	19.2%	7,620	5,380	2,152	10,848
4	Rs. 13,000	11.52%	??	??	??	??
5	Rs. 13,000	11.52%	??	??	??	??
6	Rs. 13,000*0.5 =6,500	5.76%	??	??	??	??

After Tax Cash Flow (ATCF) Estimate

- Example: Suppose an asset has been purchased for Rs. 200,000. It will be expected to produce net cash inflows of Rs. 60,000 per year during 6 years. The effective tax rate is 25% as per the Income Tax Act 2058. Depreciation charges for the asset for next six years will be: Rs. 20,000; Rs. 40,000; Rs. 40,000; Rs. 40,000; Rs. 40,000; Rs. 20,000 respectively. Calculate after tax cash flow (ATCF) and do economic analysis based on PW at 10% interest rate.

Solution: Calculation of NPW (10%) of ATCF=-2,00,000+50,000*(0.9091)
+55,000*(0.8264)+55,000*(0.7513)+ 55,000*(0.6830)+55,000*(0.6209)+ 50,000*(0.5645)=?????.
Thus,

Year	BTCF (Given)	Depreciation (Given)	Taxable income (BTCF-Depreciation)	Income Tax (40%)	ATCF (BTCF-Tax)
0	-Rs. 2,00,000	-	-	-	-Rs. 200,000
1	Rs. 60,000	Rs. 20,000	Rs. 40,000	Rs. 10,000	Rs. 50,000
2	Rs. 60,000	Rs. 40,000	Rs. 20,000	Rs. 5,000	Rs. 55,000
3	Rs. 60,000	Rs. 40,000	Rs. 20,000	Rs. 5,000	Rs. 55,000
4	Rs. 60,000	Rs. 40,000	Rs. 20,000	Rs. 5,000	Rs. 55,000
5	Rs. 60,000	Rs. 40,000	Rs. 20,000	Rs. 5,000	Rs. 55,000
6	Rs. 60,000	Rs. 20,000	Rs. 40,000	Rs. 10,000	Rs. 50,000

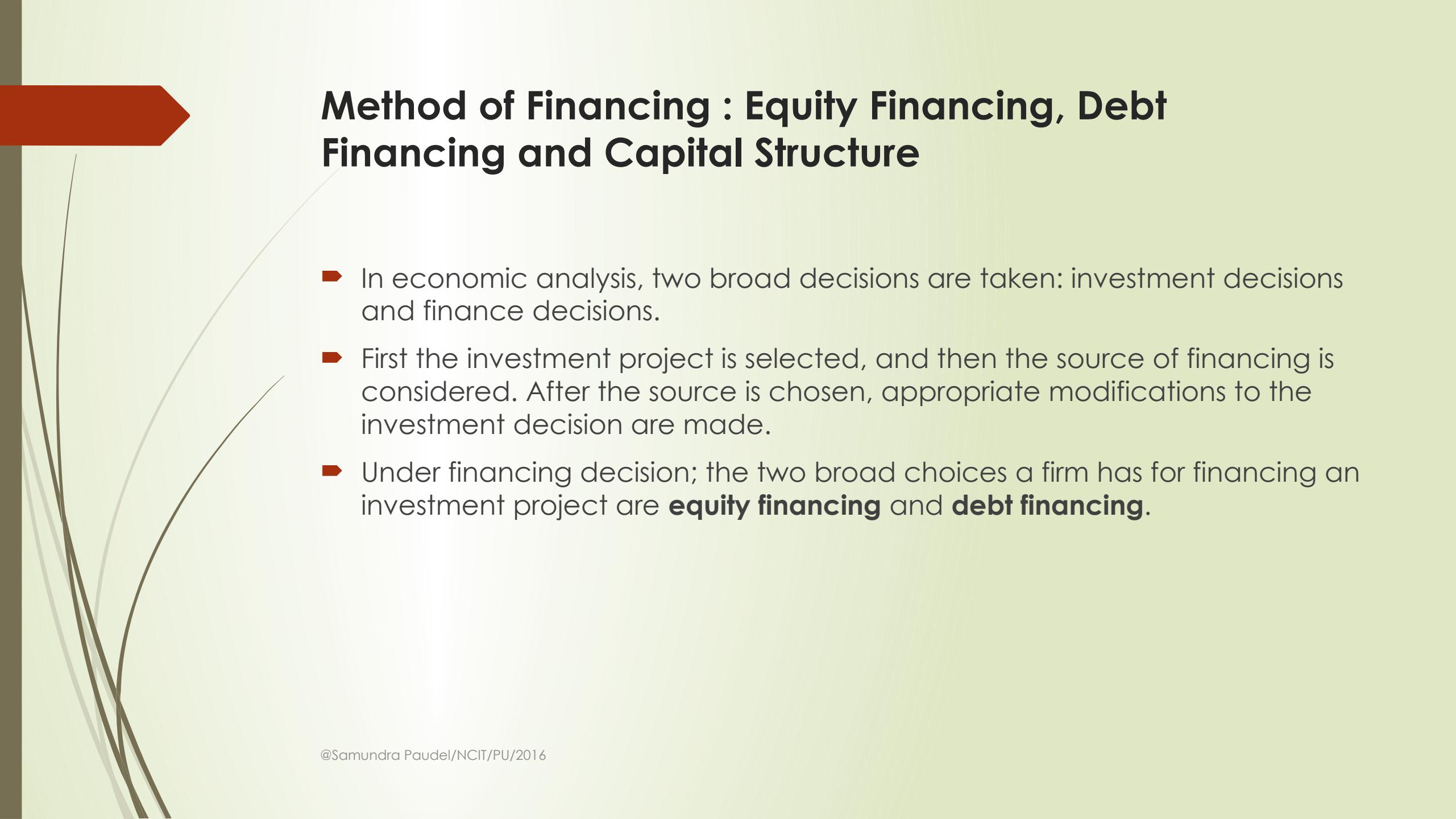
Chapter 8: Assignments

- ▶ What do you mean by depreciation? What are the main reasons for the allocation of depreciation funds?
- ▶ What is depreciation? Discuss causes of depreciation.
- ▶ Discuss basic methods of depreciation.
- ▶ What is value added tax? Explain effectiveness of vat implementation in Nepal.
- ▶ Discuss in detail about Taxation system of Nepal in reference of Nepalese law and policies.
- ▶ What do you mean by Value added tax? How do you calculate it?
- ▶ Write short notes on:
 - ▶ Accounting Vs Economic Depreciation
 - ▶ Direct and indirect tax
 - ▶ Value Added Tax (VAT)
 - ▶ Personal Tax and corporate tax
- ▶ **Numerical Questions for each depreciation method**
- ▶ **Numerical Questions for ATCF Estimates**



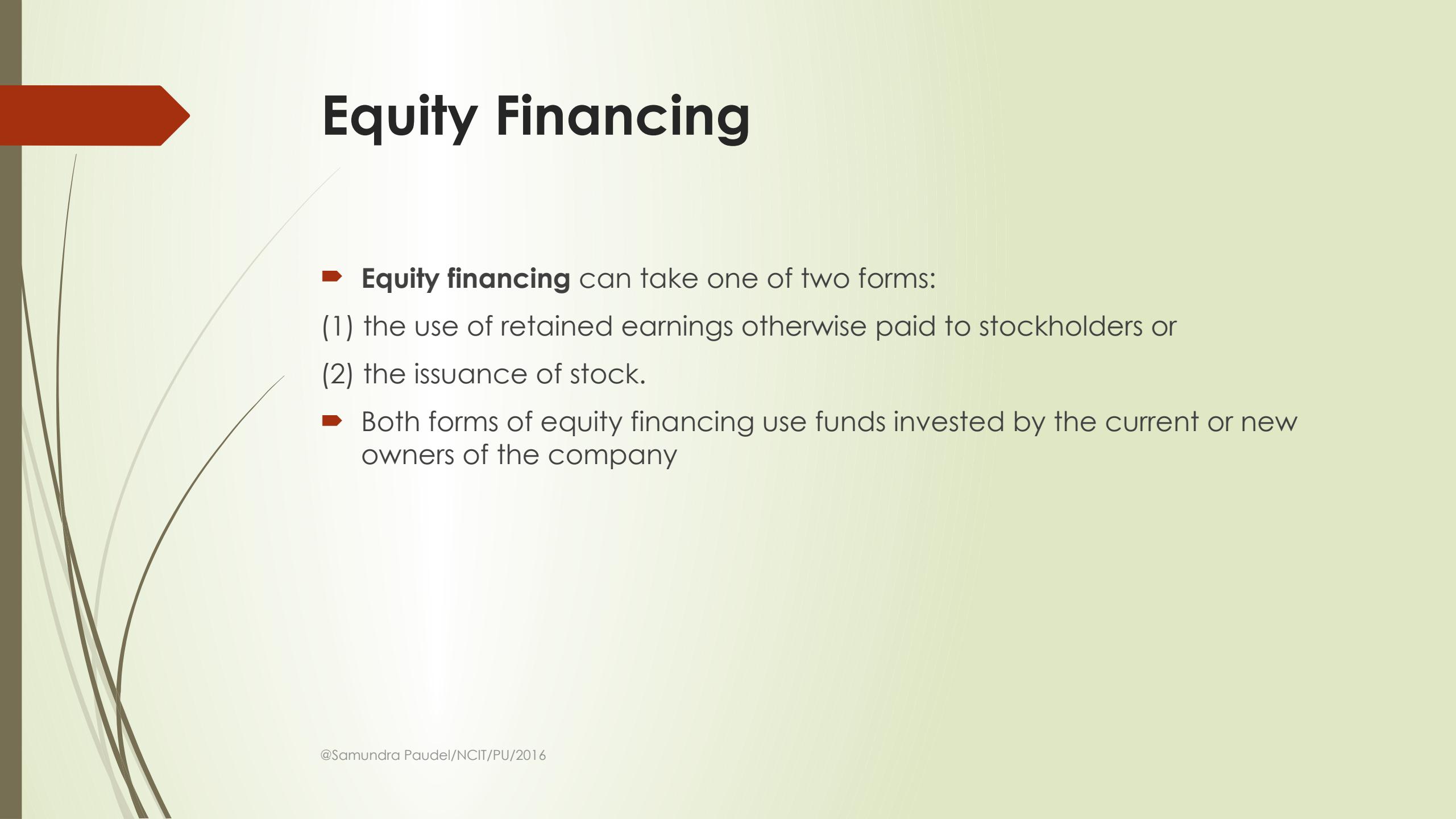
Chapter 9: Enterprise Financing and Capital Investment

- ▶ Method of Financing : Equity Financing, Debt Financing and Capital Structure
- ▶ Cost of Capital: Cost of Equity, Cost of Debt and Calculating Cost of Capital
- ▶ Project Funding Mechanism: Governmental Budget, Public Private Partnership and Private Investment
- ▶ FIRR, EIRR and Return on Equity



Method of Financing : Equity Financing, Debt Financing and Capital Structure

- ▶ In economic analysis, two broad decisions are taken: investment decisions and finance decisions.
- ▶ First the investment project is selected, and then the source of financing is considered. After the source is chosen, appropriate modifications to the investment decision are made.
- ▶ Under financing decision; the two broad choices a firm has for financing an investment project are **equity financing** and **debt financing**.



Equity Financing

- ▶ **Equity financing** can take one of two forms:
 - (1) the use of retained earnings otherwise paid to stockholders or
 - (2) the issuance of stock.
- ▶ Both forms of equity financing use funds invested by the current or new owners of the company



Equity Financing: Use of Retained Earnings

- ▶ Until now, most of our economic analyses presumed that companies had cash on hand to make capital investments; implicitly, we were dealing with cases of financing by retained earnings.
- ▶ If a company had not reinvested these earnings, it might have paid them to the company's owners—the stockholders—in the form of a dividend, or it might have kept these earnings on hand for future needs.

Equity Financing: The Issuance of Stock

- ▶ If a company does not have sufficient cash on hand to make an investment and does not wish to borrow in order to fund the investment, financing can be arranged by selling common stock to raise the required funds.
- ▶ Many small biotechnology and computer firms raise capital by going public and selling common stock.
- ▶ To do this, the company has to decide how much money to raise, the type of securities to issue (common stock or preferred stock), and the basis for pricing the issue.
- ▶ Once the company has decided to issue common stock, it must estimate **flotation costs**—the expenses it will incur in connection with the issue, such as investment bankers' fees, lawyers' fees, accountants' costs, and the cost of printing and engraving.
- ▶ Usually, an investment banker will buy the issue from the company at a discount, below the price at which the stock is to be offered to the public. The discount usually represents the *flotation costs*.

Equity Financing: The issuance of stock

- ▶ If the company is already publicly owned, the offering price will commonly be based on the existing market price of the stock.
- ▶ If the company is going public for the first time, no established price will exist, so investment bankers have to estimate the expected market price at which the stock will sell after the stock issue.
- ▶ Company should analyze how the flotation cost affects the cost of issuing common stock.
- ▶ Flotation costs are higher for small issues than for large ones due to the existence of fixed costs: Certain costs must be incurred regardless of the size of the issue, so the percentage of flotation costs increases as the size of the issue gets smaller.

EXAMPLE 15.1 Issuing Common Stock

Scientific Sports, Inc. (SSI), a golf club manufacturer, has developed a new metal club (Driver). The club is made out of titanium alloy, an extremely light and durable metal with good vibration-damping characteristics (Figure 15.1). The company expects to acquire considerable market penetration with this new product. To produce it, the company needs a new manufacturing facility, which will cost \$10 million. The company decided to raise this \$10 million by selling common stock. The firm's current stock price is \$30 per share. Investment bankers have informed management that the new public issue must be priced at \$28 per share because of decreasing demand, which will occur as more shares become available on the market. The flotation costs will be 6% of the issue price, so SSI will net \$26.32 per share. How many shares must SSI sell to net \$10 million after flotation expenses?

SOLUTION

Let X be the number of shares to be sold. Then total flotation cost will be

$$(0.06)(\$28)(X) = 1.68X.$$

To net \$10 million, we must have

$$\text{Sales proceeds} - \text{flotation cost} = \text{Net proceeds},$$

$$28X - 1.68X = \$10,000,000,$$

$$26.32X = \$10,000,000,$$

$$X = 379,940 \text{ shares.}$$

Now we can figure out the flotation cost for issuing the common stock. The cost is

$$1.68(379,940) = \$638,300.$$

Method of Financing : Debt Financing

- ▶ The second major type of financing a company can select is **debt financing**, which includes both short-term borrowing from financial institutions and the sale of long-term bonds, wherein money is borrowed from investors for a fixed period.
- ▶ With debt financing, the interest paid on the loans or bonds is treated as an expense for income-tax purposes.

Method of Financing : Debt Financing

- ▶ The two common debt-financing methods are as follows:
- ▶ **1. Bond Financing.** This type of debt financing does not involve the partial payment of principal; only interest is paid each year (or semiannually). The principal is paid in a lump sum when the bond matures. (See Section 4.6.3 for bond terminologies and valuation.) Bond financing is similar to equity financing in that flotation costs are involved when bonds are issued.
- ▶ **2. Term Loans.** Term loans involve an equal repayment arrangement according to which the sum of the interest payments and the principal payments is uniform; interest payments decrease, while principal payments increase, over the life of the loan. Term loans are usually negotiated directly between the borrowing company and a financial institution, generally a commercial bank, an insurance company, or a pension fund.

EXAMPLE 15.2 Debt Financing

Consider again Example 15.1. Suppose SSI has instead decided to raise the \$10 million by debt financing. SSI could issue a mortgage bond or secure a term loan. Conditions for each option are as follows:

- **Bond financing.** The flotation cost is 1.8% of the \$10 million issue. The company's investment bankers have indicated that a five-year bond issue with a face value of \$1,000 can be sold at \$985 per share. The bond would require annual interest payments of 12%.
- **Term loan.** A \$10 million bank loan can be secured at an annual interest rate of 11% for five years; it would require five equal annual installments.
 - (a) How many \$1,000 par value bonds would SSI have to sell to raise the \$10 million?
 - (b) What are the annual payments (interest and principal) on the bond?
 - (c) What are the annual payments (interest and principal) on the term loan?

SOLUTION

- (a) To net \$10 million, SSI would have to sell

$$\frac{\$10,000,000}{(1 - 0.018)} = \$10,183,300$$

worth of bonds and pay \$183,300 in flotation costs. Since the \$1,000 bond will be sold at a 1.5% discount, the total number of bonds to be sold would be

$$\frac{\$10,183,300}{\$985} = \$10,338.38.$$

- (b) For the bond financing, the annual interest is equal to

$$\$10,338,380(0.12) = \$1,240,606.$$

Only the interest is paid each period; thus, the principal amount owed remains unchanged.

- (c) For the term loan, the annual payments are

$$\$10,000,000(A/P, 11\%, 5) = \$2,705,703.$$

Example: Debt Financing

Method of Financing : Capital Structure

- ▶ The ratio of total debt to total capital, generally called the **debt ratio**, or **capital structure**, represents the percentage of the total capital provided by borrowed funds. For example, a debt ratio of 0.4 indicates that 40% of the capital is borrowed and the remaining funds are provided from the company's equity (retained earnings or stock offerings). This type of financing is called **mixed financing**.
- ▶ Borrowing affects a firm's capital structure, and firms must determine the effects of a change in the debt ratio on their market value before making an ultimate financing decision. Even if debt financing is attractive, you should understand that companies do not simply borrow funds to finance projects.
- ▶ A firm usually establishes a **target capital structure**, or **target debt ratio**, after considering the effects of various financing methods.
- ▶ This target may change over time as business conditions vary, but a firm's management always strives to achieve the target whenever individual financing decisions are considered.
- ▶ On the one hand, the actual debt ratio is below the target level, any new capital will probably be raised by issuing debt. On the other hand, if the debt ratio is currently above the target, expansion capital will be raised by issuing stock.

Method of Financing : Capital Structure

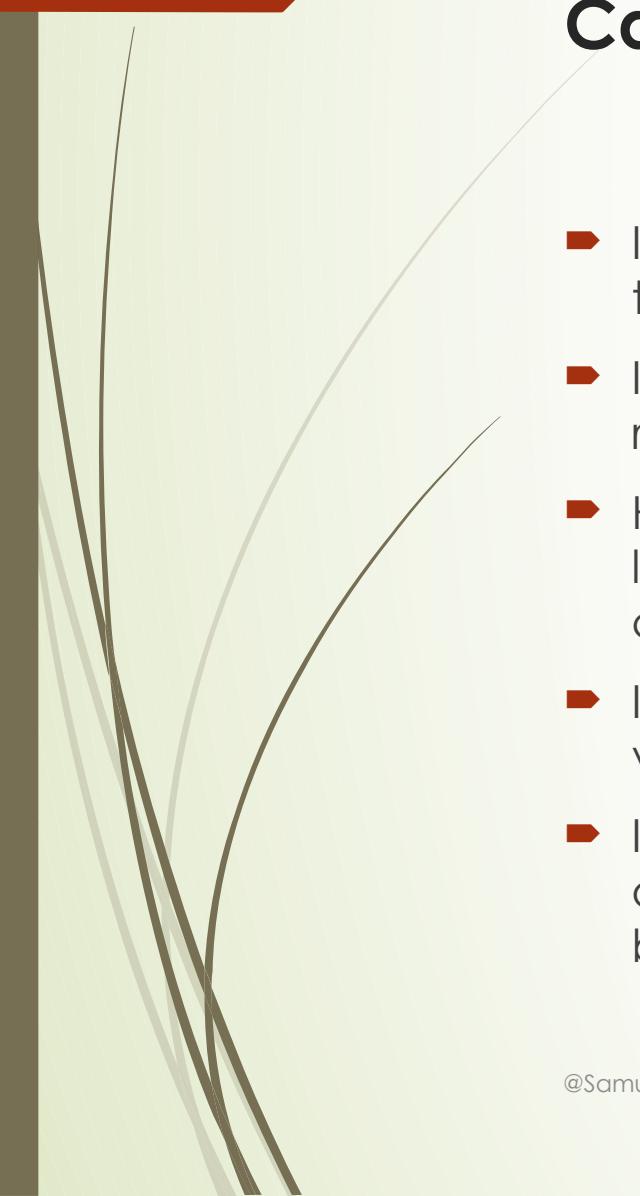
How does a typical firm set the target capital structure?

- ▶ This is a rather difficult question to answer, but we can list several ***factors that affect the capital-structure policy.***
- ▶ First, **capital-structure policy involves a trade-off between risk and return.** As you take on more debt for business expansion, the inherent business risk also increases, but investors view business expansion as a healthy indicator for a corporation with higher expected earnings.
- ▶ When investors perceive higher business risk, the firm's stock price tends to be depressed. By contrast, when investors perceive higher expected earnings, the firm's stock price tends to increase. The optimal capital structure is thus the one that strikes a balance between business risk and expected future earnings. The greater the firm's business risk, the lower is its optimal debt ratio.
- ▶ Unlike equity financing, in which dividends are optional, debt interest and principal (face value) must be repaid on time. Also, uncertainty is involved in making projections of future operating income as well as expenses. In bad times debt can be devastating, but in good times the tax deductibility of interest payments increases profits to owners.

Method of Financing : Capital Structure

How does a typical firm set the target capital structure?

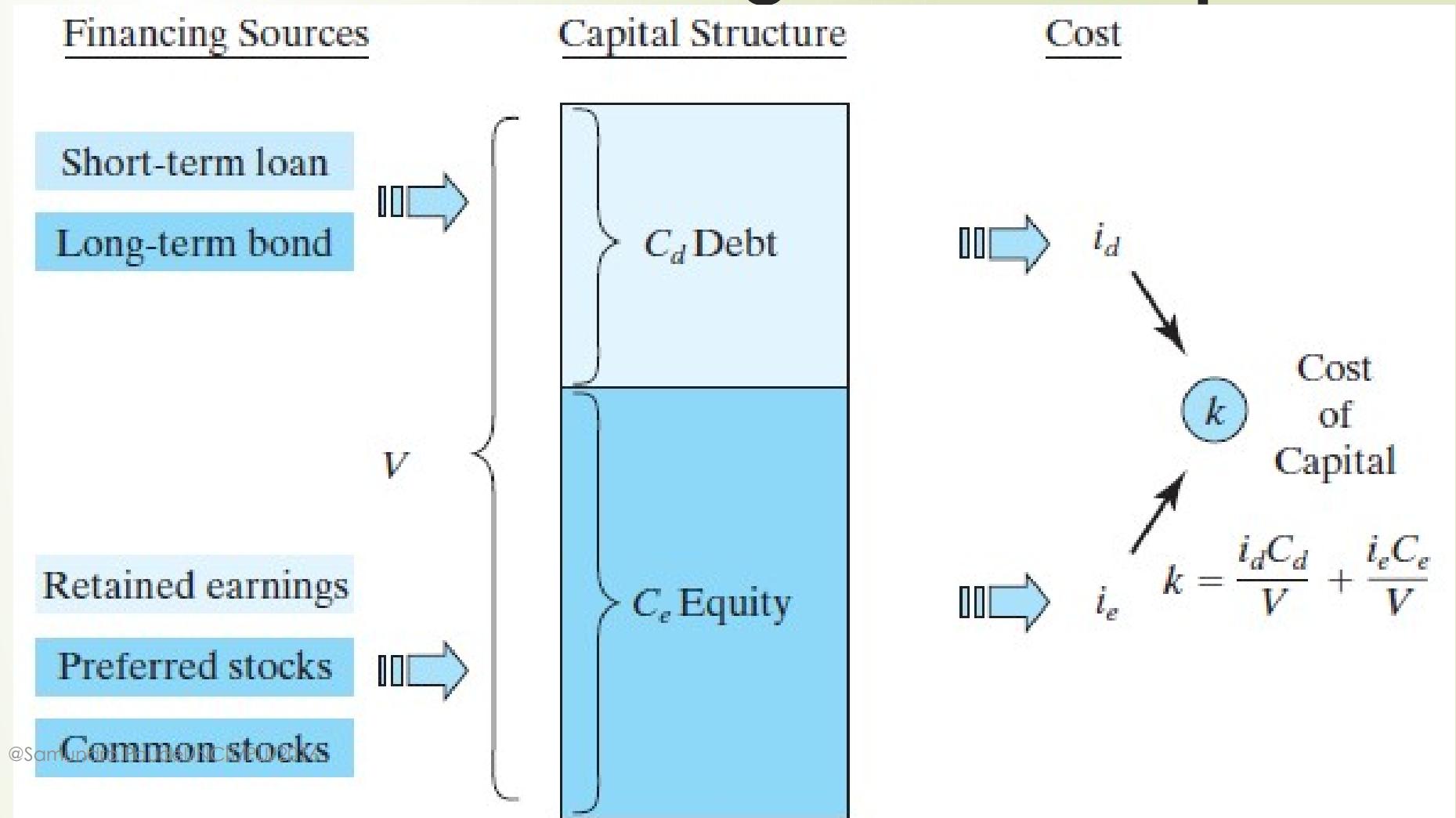
- ▶ **Second, a major reason for using debt is that interest is a deductible expense for business operations**, which lowers the effective cost of borrowing. Dividends paid to common stockholders, however, are not deductible. If a company uses debt, it must pay interest on this debt, whereas if it uses equity, it pays dividends to its equity investors (shareholders). A company needs \$1 in before-tax income to pay \$1 of interest, but if the company is in the 34% tax bracket, it needs $\$1/(1 - 0.34) = \1.52 of before-tax income to pay a \$1 dividend.
- ▶ **Third, financial flexibility**—the ability to raise capital on reasonable terms from the financial market—is an important consideration. Firms need a steady supply of capital for stable operations. When money is tight in the economy, investors prefer to advance funds to companies with a healthy capital structure (lower debt ratio).
- ▶ **These three elements (business risk, taxes, and financial flexibility) are major factors that determine the firm's optimal capital structure.**



Cost of Capital: Cost of Equity, Cost of Debt and Calculating Cost of Capital

- ▶ In most of the capital-budgeting examples in earlier chapters, we assumed that the firms under consideration were financed entirely with equity funds.
- ▶ In those cases, the cost of capital may have represented the firm's required return on equity.
- ▶ However, most firms finance a substantial portion of their capital budget with long-term debt (bonds), and many also use preferred stock as a source of capital.
- ▶ In these cases, a firm's cost of capital must reflect the average cost of the various sources of long-term funds that the firm uses, not only the cost of equity.
- ▶ In this section, we will discuss the ways in which the cost of each individual type of financing (retained earnings, common stock, preferred stock, and debt) can be estimated, given a firm's target capital structure.

Cost of Capital: Cost of Equity, Cost of Debt and Calculating Cost of Capital



Cost of Capital: Cost of Equity

- ▶ Whereas debt and preferred stocks are contractual obligations that have easily determined costs, it is not easy to measure the cost of equity.
- ▶ In principle, the cost of equity capital involves an **opportunity cost**. In fact, the firm's after-tax cash flows belong to the stockholders. Management may either pay out these earnings in the form of dividends, or retain the earnings and reinvest them in the business.
- ▶ If management decides to retain the earnings, an opportunity cost is involved: Stockholders could have received the earnings as dividends and invested the money in other financial assets.
- ▶ Therefore, the firm should earn on its retained earnings at least as much as the stockholders themselves could earn in alternative, but comparable, investments.

Cost of Capital: Cost of Equity-Cost of Retained Earnings

- ▶ Cost of Retained Earnings (k_r):

$$k_r = \frac{D_1}{P_0} + g.$$

- ▶ Where, k_r = Cost of Retained Earnings
- ▶ D_1 = First Year dividend
- ▶ P_0 = Current Stock Price
- ▶ g = growth rate of dividend

Cost of Capital: Cost of Equity -Cost of Issuing New Common Stock

- ▶ Cost of Issuing New Common Stock

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

- ▶ Where, k_e = Cost of Common Stock
 - ▶ D_1 = First Year dividend
 - ▶ P_0 = Current Stock Price
 - ▶ g = growth rate of dividend
 - ▶ f_c = flotation cost as a percentage of the stock price.

Cost of Capital: Cost of Equity-Cost of Preferred Stock

- ▶ A preferred stock is a hybrid security in the sense that it has some of the properties of bonds and other properties that are similar to common stock.
- ▶ Like bondholders, holders of preferred stock receive a fixed annual dividend.
- ▶ In fact, many firms view the payment of the preferred dividend as an obligation just like interest payments to bondholders. It is therefore relatively easy to determine the cost of preferred stock.
- ▶ For the purposes of calculating the weighted average cost of capital, the specific cost of a preferred stock will be defined as:

$$k_p = \frac{D^*}{P^*(1 - f_c)},$$

- ▶ Where, D^* is the fixed annual dividend, P^* is the issuing price.

Cost of Capital: Cost of Equity

- Once we have determined the specific cost of each equity component, we can determine the weighted-average cost of equity for a new project. We have;

$$i_e = \left(\frac{c_r}{c_e} \right) k_r + \left(\frac{c_c}{c_e} \right) k_e + \left(\frac{c_p}{c_e} \right) k_p.$$

- Where c_r is the amount of equity financed from retained earnings, c_c is the amount of equity financed from issuing new stock, c_p is the amount of equity financed from issuing preferred stock, and $c_r + c_c + c_p = c_e$

Example: Cost of Equity

EXAMPLE 15.4 Determining the Cost of Equity

Alpha Corporation needs to raise \$10 million for plant modernization. Alpha's target capital structure calls for a debt ratio of 0.4, indicating that \$6 million has to be financed from equity.

- Alpha is planning to raise \$6 million from the following equity sources:

Source	Amount	Fraction of Total Equity
Retained earnings	\$1 million	0.167
New common stock	4 million	0.666
Preferred stock	1 million	0.167

- Alpha's current common stock price is \$40, the market price that reflects the firm's future plant modernization. Alpha is planning to pay an annual cash dividend of \$5 at the end of the first year, and the annual cash dividend will grow at an annual rate of 8% thereafter.
- Additional common stock can be sold at the same price of \$40, but there will be 12.4% flotation costs.
- Alpha can issue \$100 par preferred stock with a 9% dividend. (This means that Alpha will calculate the dividend on the basis of the par value, which is \$9 per share.) The stock can be sold on the market for \$95, and Alpha must pay flotation costs of 6% of the market price.

Determine the cost of equity to finance the plant modernization.

SOLUTION

We will itemize the cost of each component of equity:

- Cost of retained earnings: With $D_1 = \$5$, $g = 8\%$, and $P_0 = \$40$,

$$k_r = \frac{5}{40} + 0.08 = 20.5\%.$$

- Cost of new common stock: With $D_1 = \$5$, $g = 8\%$, and $f_c = 12.4\%$,

$$k_e = \frac{5}{40(1 - 0.124)} + 0.08 = 22.27\%.$$

- Cost of preferred stock: With $D^* = \$9$, $P^* = \$95$, and $f_c = 0.06$,

$$k_p = \frac{9}{95(1 - 0.06)} = 10.08\%.$$

- Cost of equity: With $\frac{c_r}{c_e} = 0.167$, $\frac{c_c}{c_e} = 0.666$, and $\frac{c_p}{c_e} = 0.167$,

$$\begin{aligned} i_e &= (0.167)(0.205) + (0.666)(0.2227) + (0.167)(0.1008) \\ &= 19.96\%. \end{aligned}$$

Cost of Capital: Cost of Equity: Alternative way of determining cost of equity

- Cost of Equity:

$$i_e = r_f + \beta [r_m - r_f].$$

- Where, i_e =Cost of equity

- r_f = Risk free rate
- r_m = market rate of return
- β = firms beta risk

EXAMPLE 15.5 Determining the Cost of Equity by the Financial Market

Alpha Corporation needs to raise \$10 million for plant modernization. Alpha's target capital structure calls for a debt ratio of 0.4, indicating that \$6 million has to be financed from equity.

- Alpha is planning to raise \$6 million from the financial market.
- Alpha's β is known to be 1.99, which is greater than unity, indicating that the firm is perceived as more risky than the market average.
- The risk-free interest rate is 6%, and the average market return is 13%. (All these interest rates are adjusted to reflect inflation in the economy.)

Determine the cost of equity to finance the plant modernization.

SOLUTION

Given: $r_M = 13\%$, $r_f = 6\%$, and $\beta = 1.99$.

Find: i_e .

$$\begin{aligned} i_e &= 0.06 + 1.99(0.13 - 0.06) \\ &= 19.93\%. \end{aligned}$$

COMMENTS: In this example, we purposely selected the value of β to approximate the cost of equity derived from Example 15.4. What does this 19.93% represent? If Alpha finances the project entirely from its equity funds, the project must earn at least a 19.93% return on investment.

Cost of Capital: Cost of Debt

- ▶ Now let us consider the calculation of the specific cost that is to be assigned to the debt component of the weighted-average cost of capital. The calculation is relatively straightforward and simple.
- ▶ As we said earlier, the two types of debt financing are term loans and bonds. Because the interest payments on both are tax deductible, the effective cost of debt will be reduced.
- ▶ To determine the after-tax cost of debt (i_d) we evaluate the expression;

$$i_d = \left(\frac{c_s}{c_d} \right) k_s (1 - t_m) + \left(\frac{c_b}{c_d} \right) k_b (1 - t_m)$$

- ▶ where c_s is the amount of the short-term loan, k_s is the before-tax interest rate on the term loan, t_m is the firm's marginal tax rate, k_b is the before-tax interest rate on the bond, c_b is the amount of bond financing, and $c_s + c_b = c_d$.

EXAMPLE 15.6 Determining the Cost of Debt

Consider again Example 15.4, and suppose that Alpha has decided to finance the remaining \$4 million by securing a term loan and issuing 20-year \$1,000 par bonds under the following conditions:

Source	Amount	Fraction	Interest Rate	Flotation Cost
Term loan	\$1 million	0.333	12% per year	
Bonds	3 million	0.667	10% per year	6%

If the bond can be sold to net \$940 (after deducting the 6% flotation cost), determine the cost of debt to raise \$4 million for the plant modernization. Alpha's marginal tax rate is 38%, and it is expected to remain constant in the future.

SOLUTION

First, we need to find the effective after-tax cost of issuing the bond with a flotation cost of 6%. The before-tax specific cost is found by solving the equivalence formula

$$\begin{aligned} \$940 &= \frac{\$100}{(1 + k_b)} + \frac{\$100}{(1 + k_b)^2} + \dots + \frac{\$100 + \$1,000}{(1 + k_b)^{20}} \\ &= \$100(P/A, k_b, 20) + \$1,000(P/F, k_b, 20). \end{aligned}$$

Solving for k_b , we obtain $k_b = 10.74\%$. Note that the cost of the bond component increases from 10% to 10.74% after the 6% flotation cost is taken into account.

The after-tax cost of debt is the interest rate on debt, multiplied by $(1 - t_m)$. In effect, the government pays part of the cost of debt because interest is tax deductible. Now we are ready to compute the after-tax cost of debt as follows:

$$\begin{aligned} i_d &= (0.333)(0.12)(1 - 0.38) + (0.667)(0.1074)(1 - 0.38) \\ &= 6.92\%. \end{aligned}$$

Cost of Capital: Calculating the Cost of Capital

- ▶ With the specific cost of each financing component determined, we are ready to calculate the tax-adjusted weighted-average cost of capital based on total capital. Then we will define the marginal cost of capital that should be used in project evaluation.
- ▶ **Weighted-Average Cost of Capital**
- ▶ Assuming that a firm raises capital on the basis of the target capital structure and that the target capital structure remains unchanged in the future, we can determine a **tax-adjusted weighted-average cost of capital** (or, simply stated, the **cost of capital**).
- ▶ This cost of capital represents a composite index reflecting the cost of raising funds from different sources.

Cost of Capital: Calculating the Cost of Capital

- The **weighted average cost of capital** is defined as:

$$k = \frac{i_d c_d}{V} + \frac{i_e c_e}{V}, \quad (15.7)$$

where c_d = Total debt capital (such as bonds) in dollars,

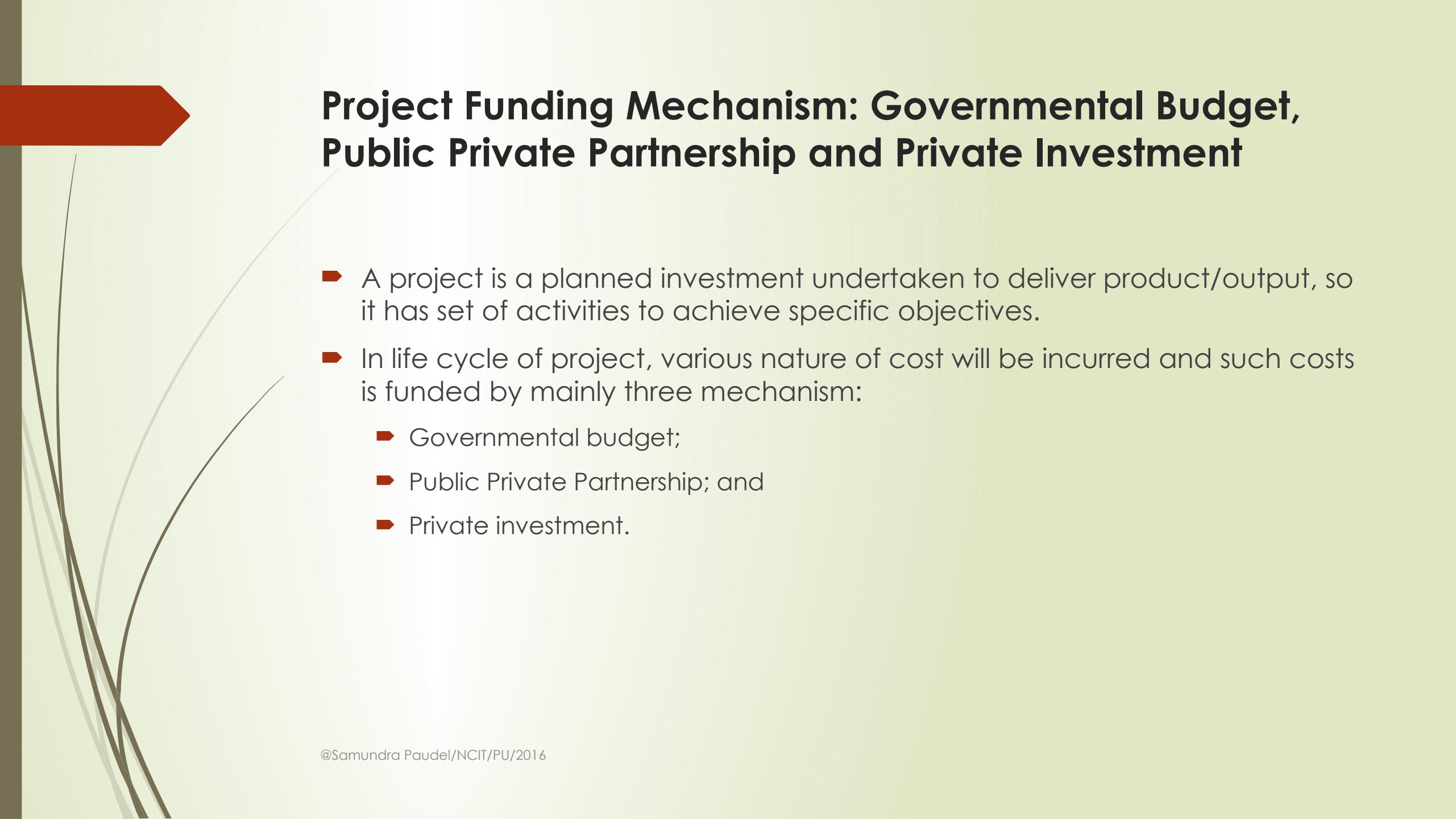
c_e = Total equity capital in dollars,

$V = c_d + c_e$,

i_e = Average equity interest rate per period, taking into account all equity sources,

i_d = After-tax average borrowing interest rate per period, taking into account all debt sources, and

k = Tax-adjusted weighted-average cost of capital.



Project Funding Mechanism: Governmental Budget, Public Private Partnership and Private Investment

- ▶ A project is a planned investment undertaken to deliver product/output, so it has set of activities to achieve specific objectives.
- ▶ In life cycle of project, various nature of cost will be incurred and such costs is funded by mainly three mechanism:
 - ▶ Governmental budget;
 - ▶ Public Private Partnership; and
 - ▶ Private investment.



Project Funding Mechanism: Governmental Budget

- ▶ Most of the development and public utility projects like road, water supply, electricity, gas, telephone, hospitals, etc are established and run by government funding through government budget.
- ▶ The funding made by local and national/central government agencies to produce and deliver various public utilities include in this heading.

Project Funding Mechanism: Public Private Partnership

- ▶ Public=Government institutions like; ministries, departments, municipalities, DDC, VDC, and state owned enterprises
- ▶ Private= Local and international privately held body that may include financial and technical expertise relevant to the project
- ▶ Partnership=Collaboration between two or more institution to perform certain task.
- ▶ PPP=Joint initiation of public and private sectors to provide public and semi public goods and services
- ▶ In PPP, government as well as private sector both active on commercial functions of the projects and work for their mutual benefits.
- ▶ PPP is widely accepted project funding mechanism throughout the world specially in the area of hydropower, water and sanitation, hospitals, stadium, air traffic control, prisons, railway, roads, airports, IT etc.



Project Funding Mechanism: Public Private Partnership

- ▶ Nepal has taken it as means of development since 1990s. Some of the municipalities are implementing PPP projects specially area of solid waste management, open space management, drinking water etc.
- ▶ Nepal has separate regulatory framework for managing PPP projects at local government level such as DDC, VDC, and municipalities as well as for ministries level.
- ▶ Through PPP, government can reduce cost and risk and private sector can generate business opportunities and general public can receive better and more accessible services.
- ▶ Benefits from PPP:
 - ▶ Improved service delivery
 - ▶ Cost effectiveness
 - ▶ Increase investment in public infrastructure
 - ▶ Reduce public sector risk
 - ▶ Better use of resources

Project Funding Mechanism: Private Investment

- ▶ Private investment is another funding mechanism.
- ▶ Private investment/sector includes domestic and foreign private organization having financial and technical capabilities.
- ▶ All private companies and business projects are established and run by the private investment.
- ▶ Generally private sector choose low risk with high return low investment as well as short run projects.
- ▶ Market oriented development strategies encourages private sector involvement in development projects
- ▶ Government also emphasized globalization and liberalization policies to encourage private sectors for the development works.

Financial Internal Rate of Return (FIRR)

- ▶ Financial IRR is the concept of calculating Internal rate of return of the investment projects.
- ▶ Same projects (mega projects) may generate different financial inflows and outflows for different stakeholders and their internal rate of return for that investment project may be different.
- ▶ FIRR can be calculated by various stakeholders based on their investment (cash inflow and outflow) for same investment projects. Eg. Pokhara International Airport, Uppar Karnali Hydropower etc.
- ▶ This can be:
 - ▶ FIRR for project entity
 - ▶ FIRR for stockholder
 - ▶ FIRR for lenders/banks
 - ▶ FIRR for government
 - ▶ FIRR for lender and contractor

Economic Internal Rate of Return (EIRR)

- ▶ Profits are essential signaling mechanism for investment decisions. However financial profitability are important decision criteria for investment decisions for the firm, it may not be good measurement for the national economy.
- ▶ So, the projects should be analyzed based on EIRR (especially mega projects eg. East West Rail Route, Kathmandu-Pokhara-Lumbini Rail Route, Kathmandu Metro Rail, Kathmandu-Hetauda Tunnel Road, Pokhara International Airport, Pancheswor Hydropower etc.).
- ▶ EIRR considers following aspect of the projects:
 - ▶ Project boundary is financial but economic profitability will be different.
 - ▶ Market prices may underestimate economic benefit i.e. opportunity cost may be higher than real cost/consumer surplus.
 - ▶ Project may create externalities.
 - ▶ Distortion of the environment.
- ▶ FIRR can be used as proxy for EIRR:
 - ▶ If there is no any project boundary and externalities
 - ▶ Price and policy distortion is zero.

Economic Internal Rate of Return (EIRR)

► How to calculate EIRR?

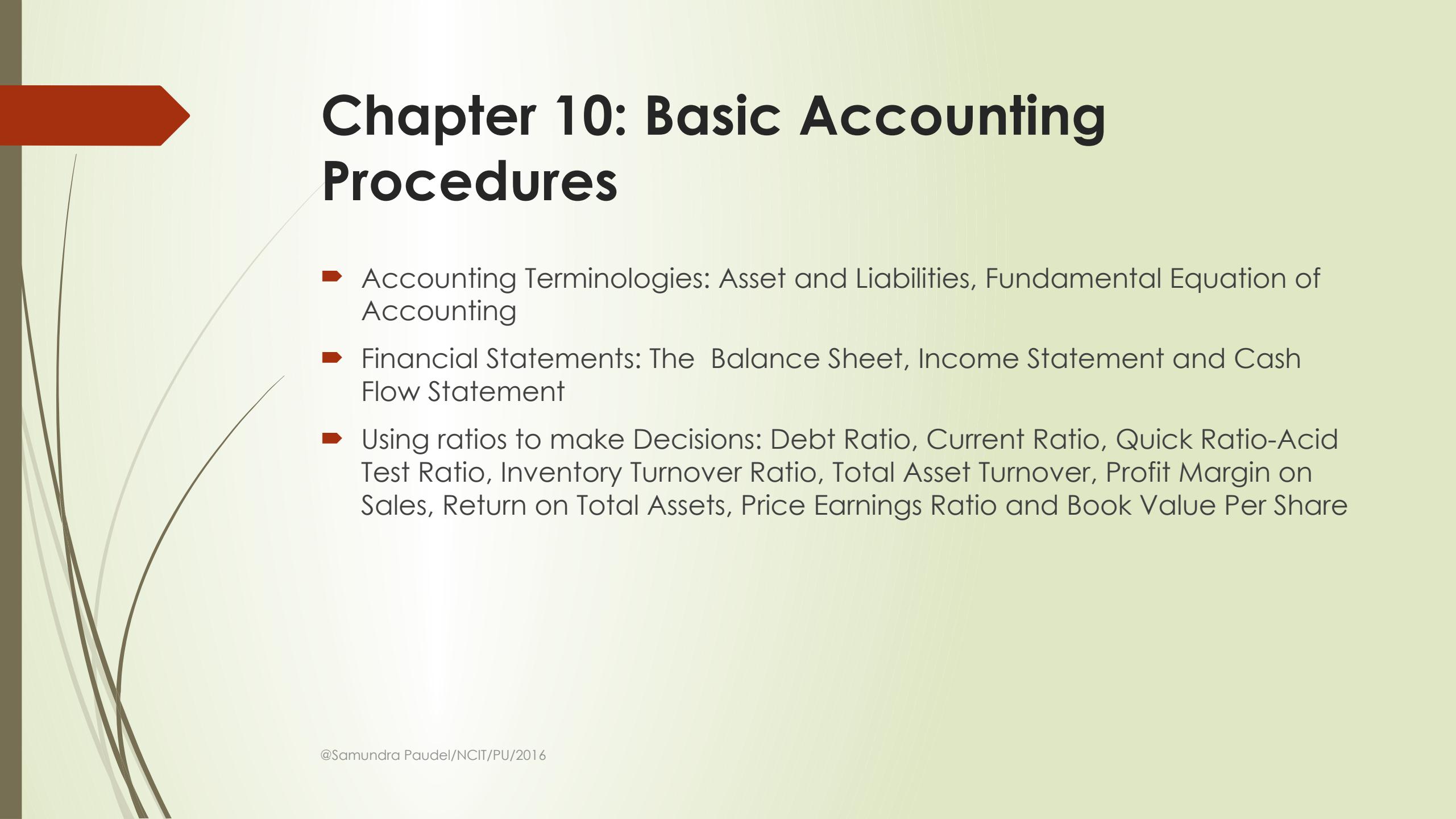
- $EIRR = FIRR + \text{Profitability associated with consumer/user (due to consumer surplus)} + \text{Profitability associated with externalities} + \text{Profitability associated with environment} + \text{Profitability associated with government surplus}$
- The EIRR is calculated as the rate of discount for which the present value of the net benefit stream becomes zero, or at which the present value of the benefit stream is equal to the present value of the cost stream.
- For a project to be acceptable, the EIRR should be greater than the economic cost of capital.

Return on Equity

- ▶ One popular measure of profitability is rate of return on common equity.
- ▶ This ratio shows the relationship between net income and common stockholders' investment in the company—that is, how much income is earned for every \$1 invested by the common stockholders.
- ▶ To compute the return on common equity, we first subtract preferred dividends from net income, yielding the net income available to common stockholders. We then divide this net income available to common stockholders by the average common stockholders' equity during the year.
- ▶ We compute average common equity by using the beginning and ending balances.
- ▶ For example: at the beginning of fiscal-year 2005, Dell's common equity balance was \$6,280 million; at the end of fiscal-year 2005, the balance was \$6,485 million. The average balance is then simply \$6,382.50 million, and we have
- ▶
$$\text{Return on common equity} = \frac{\text{Net income available to common stockholders}}{\text{Average common equity}}$$

Chapter 9: Assignments

- ▶ Explain cost of capital. Briefly explain the equity financing and debt financing.
- ▶ What is capital structure? Explain factors affecting capital structure policy.
- ▶ Discuss different project funding mechanisms.
- ▶ Explain cost of capital. How firm can calculate weighted average cost of capital?
- ▶ What is Economic IRR? Explain how EIRR is different than FIRR.
- ▶ Write short notes on:
 - ▶ FIRR and EIRR
 - ▶ Return on equity
- ▶ **Numerical Questions for each methods of cost of capital**



Chapter 10: Basic Accounting Procedures

- ▶ Accounting Terminologies: Asset and Liabilities, Fundamental Equation of Accounting
- ▶ Financial Statements: The Balance Sheet, Income Statement and Cash Flow Statement
- ▶ Using ratios to make Decisions: Debt Ratio, Current Ratio, Quick Ratio-Acid Test Ratio, Inventory Turnover Ratio, Total Asset Turnover, Profit Margin on Sales, Return on Total Assets, Price Earnings Ratio and Book Value Per Share

Accounting Terminologies:

- ▶ Accounting
- ▶ Fundamental Equation of Accounting
- ▶ Assets
- ▶ Liabilities
- ▶ Capital

Accounting

- ▶ Accounting is the system of collecting, summarizing, analyzing, classifying, and interpreting, business information in financial and monetary terms.
- ▶ It is science of recording transaction of economic nature in a systematic manner as well as it is also art of analyzing and interpreting them.
- ▶ Process of Accounting:
 - ▶ Recording of financial transactions
 - ▶ Preparation of financial statements
 - ▶ Analysis and interpretation of those statements,
 - ▶ Communicating the results of analysis to concerned parties (managers, owners, customers, investors, etc.) for further decision making and future plans.

Fundamental Equation of Accounting

- ▶ A company's balance sheet and financial statements are based on the most fundamental tool of accounting: the accounting equation.
- ▶ Assets, liabilities and owners equity (capital) are the three basic elements of every business transaction.
- ▶ The value of assets (resources) should be equal to sources of funds i.e. liabilities and capital.
- ▶ The **accounting equation** shows the relationship among assets, liabilities, and owners' equity:

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

- ▶ Change in one elements lead to corresponding change in same item or in other element.
- ▶ An accounting equation is also a foundation to double entry system of book keeping.
- ▶ The concept of double entry system refers "For every debit, there is credit which results" balance in accounting equation.
- ▶ It is also known as balance sheet equation.
- ▶ This equation shows that claims against assets are of two types: liabilities and stockholders' equity.

Asset

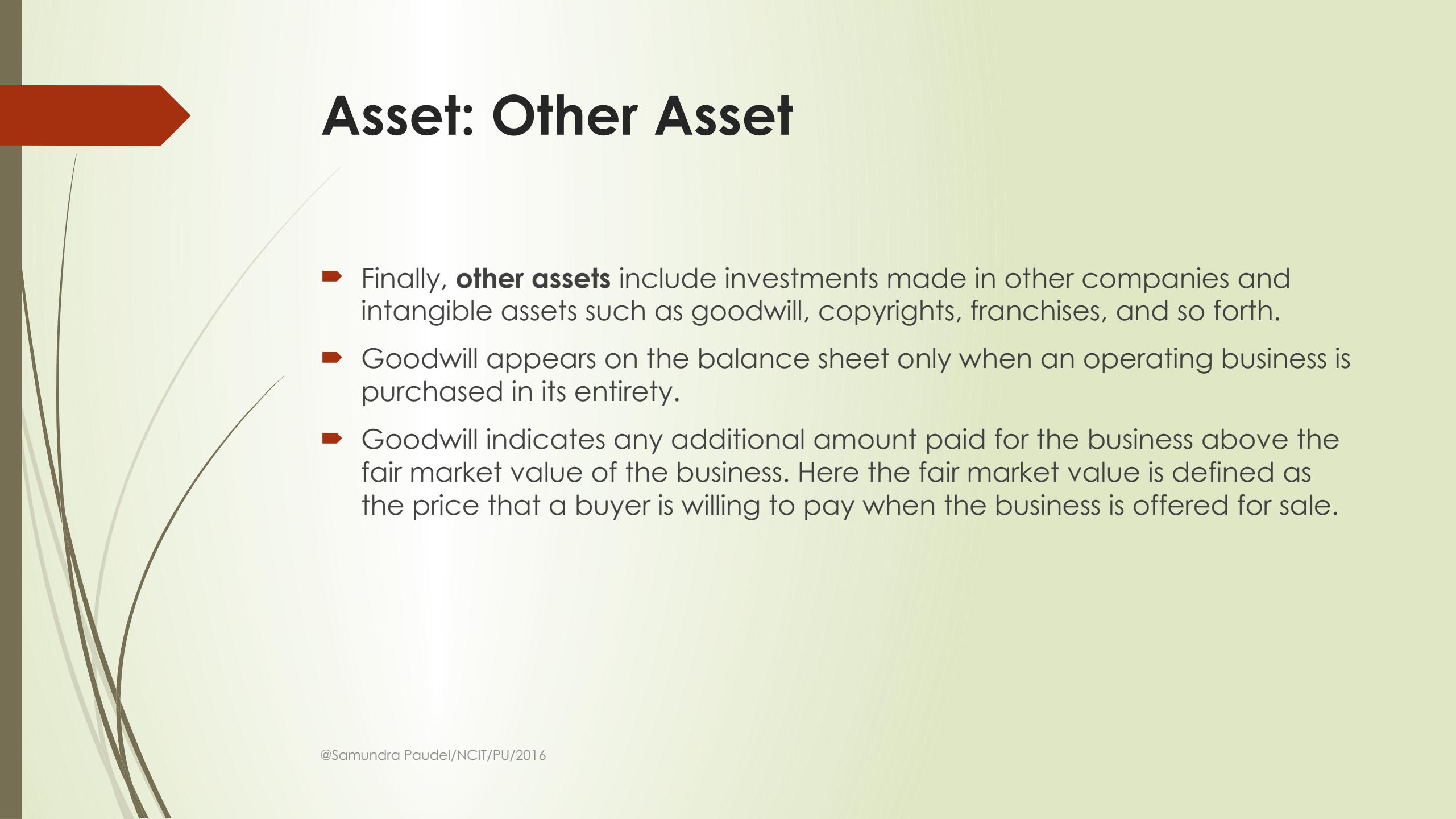
- ▶ The dollar amount shown in the assets portion of the balance sheet represents how much the company owns at the time it issues the report.
- ▶ We list the asset items in the order of their “liquidity,” or the length of time it takes to convert them to cash.
 - ▶ **Current Assets**
 - ▶ **Fixed Assets**
 - ▶ **Other Assets**

Asset: Current Asset

- ▶ **Current assets** can be converted to cash or its equivalent in less than one year. Current assets generally include three major accounts:
- ▶ **1.** The first is *cash*. A firm typically has a cash account at a bank to provide for the funds needed to conduct day-to-day business. Although assets are always stated in terms of dollars, only cash represents actual money. Cash-equivalent items are also listed and include marketable securities and short-term investments.
- ▶ **2.** The second account is *accounts receivable*—money that is owed the firm, but that has not yet been received. For example, when Dell receives an order from a retail store, the company will send an invoice along with the shipment to the retailer. Then the unpaid bill immediately falls into the accounts receivable category. When the bill is paid, it will be deducted from the accounts receivable account and placed into the cash category. A typical firm will have a 30- to 45-day accounts receivable, depending on the frequency of its bills and the payment terms for customers.
- ▶ **3.** The third account is *inventories*, which show the dollar amount that Dell has invested in raw materials, work in process, and finished goods available for sale.

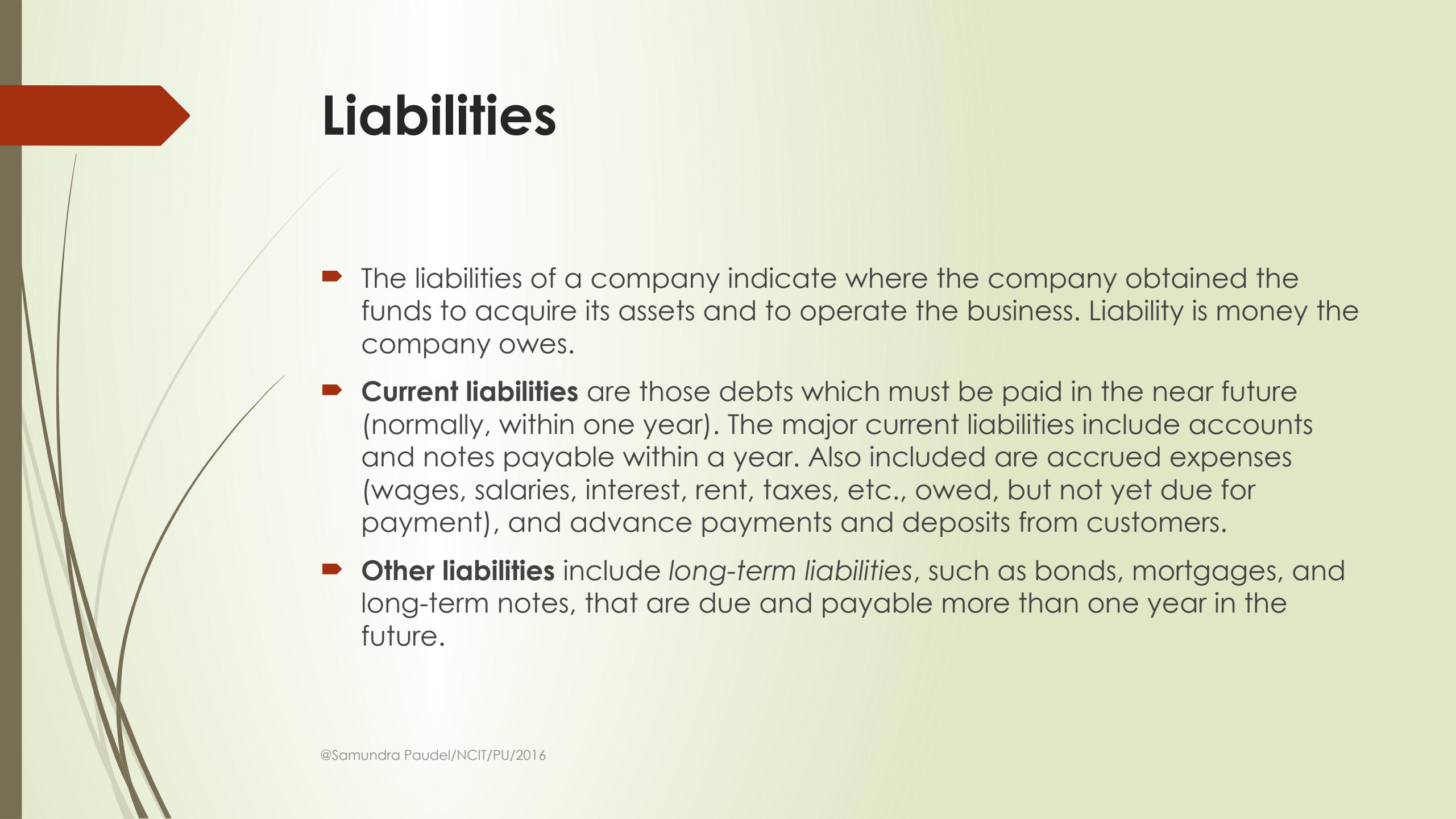
Asset: Fixed Asset

- ▶ **Fixed assets** are relatively permanent and take time to convert into cash. Fixed assets reflect the amount of money Dell paid for its plant and equipment when it acquired those assets.
- ▶ The most common fixed asset is the physical investment in the business, such as land, buildings, factory machinery, office equipment, and automobiles.
- ▶ With the exception of land, most fixed assets have a limited useful life. For example, buildings and equipment are used up over a period of years.
- ▶ Each year, a portion of the usefulness of these assets expires, and a portion of their total cost should be recognized as a depreciation expense. The term *depreciation* denotes the accounting process for this gradual conversion of fixed assets into expenses.
- ▶ *Property, plant and equipment, net* thus represents the current book value of these assets after deducting depreciation expenses.



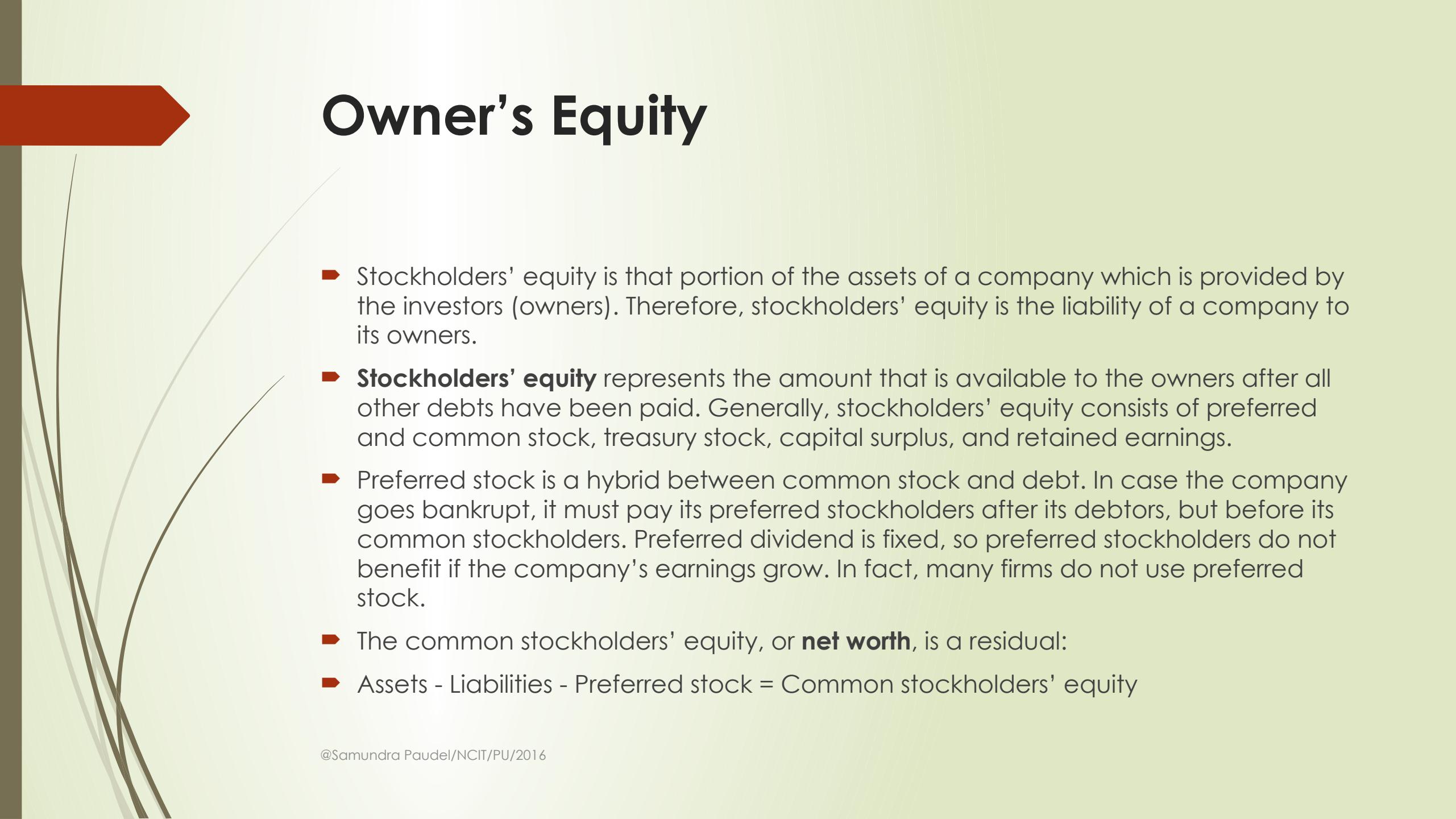
Asset: Other Asset

- ▶ Finally, **other assets** include investments made in other companies and intangible assets such as goodwill, copyrights, franchises, and so forth.
- ▶ Goodwill appears on the balance sheet only when an operating business is purchased in its entirety.
- ▶ Goodwill indicates any additional amount paid for the business above the fair market value of the business. Here the fair market value is defined as the price that a buyer is willing to pay when the business is offered for sale.



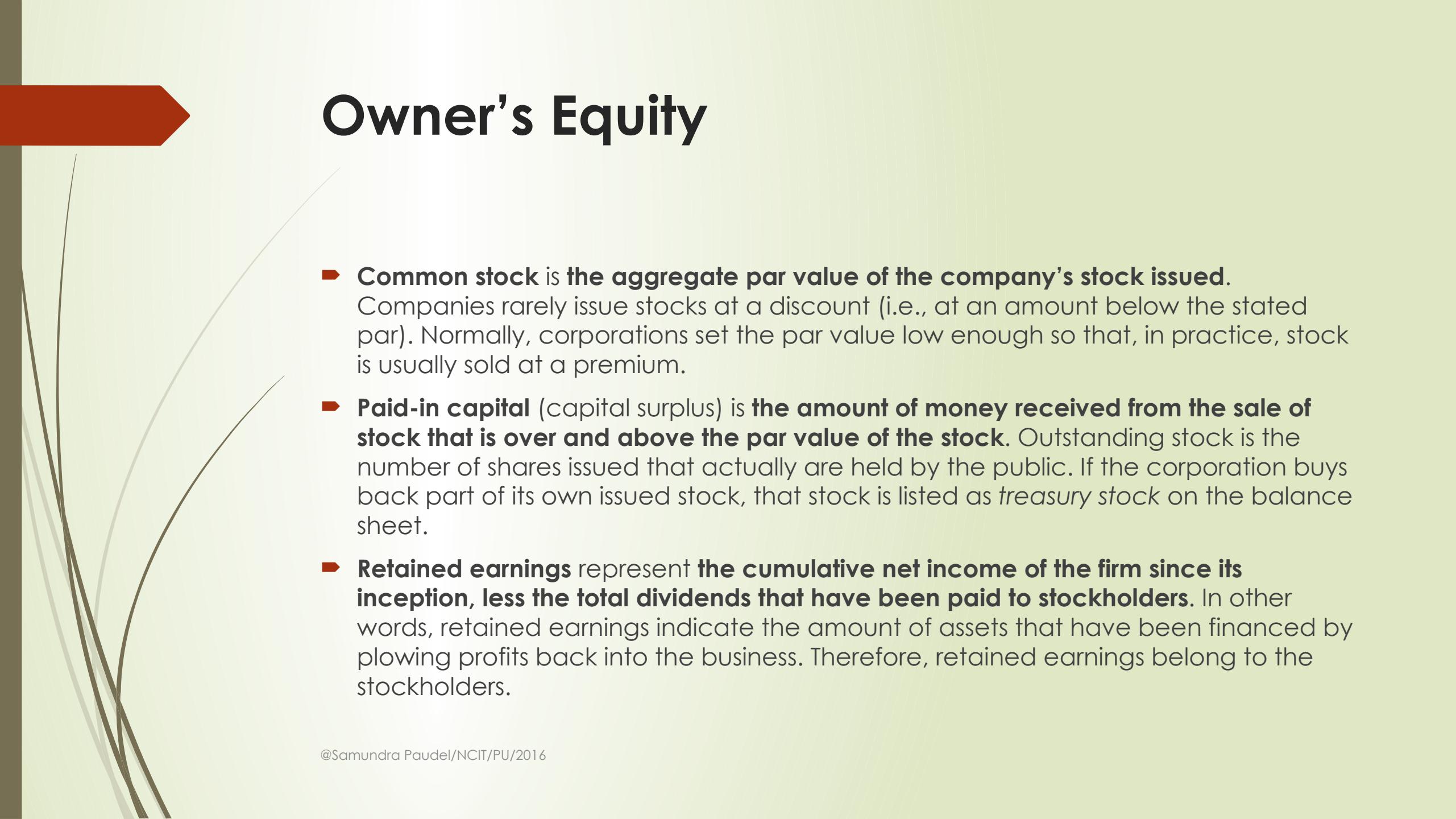
Liabilities

- ▶ The liabilities of a company indicate where the company obtained the funds to acquire its assets and to operate the business. Liability is money the company owes.
- ▶ **Current liabilities** are those debts which must be paid in the near future (normally, within one year). The major current liabilities include accounts and notes payable within a year. Also included are accrued expenses (wages, salaries, interest, rent, taxes, etc., owed, but not yet due for payment), and advance payments and deposits from customers.
- ▶ **Other liabilities** include *long-term liabilities*, such as bonds, mortgages, and long-term notes, that are due and payable more than one year in the future.



Owner's Equity

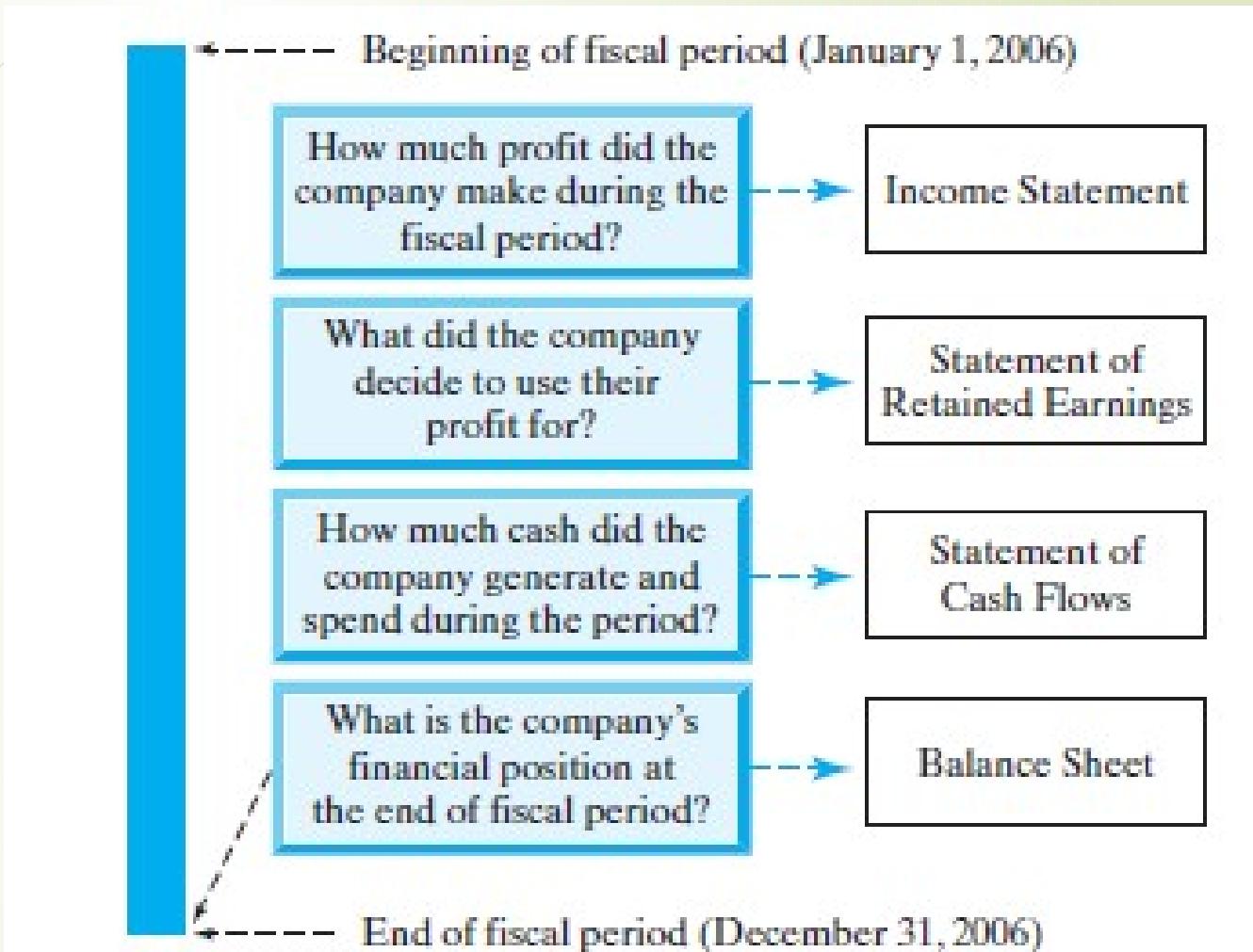
- ▶ Stockholders' equity is that portion of the assets of a company which is provided by the investors (owners). Therefore, stockholders' equity is the liability of a company to its owners.
- ▶ **Stockholders' equity** represents the amount that is available to the owners after all other debts have been paid. Generally, stockholders' equity consists of preferred and common stock, treasury stock, capital surplus, and retained earnings.
- ▶ Preferred stock is a hybrid between common stock and debt. In case the company goes bankrupt, it must pay its preferred stockholders after its debtors, but before its common stockholders. Preferred dividend is fixed, so preferred stockholders do not benefit if the company's earnings grow. In fact, many firms do not use preferred stock.
- ▶ The common stockholders' equity, or **net worth**, is a residual:
- ▶ $\text{Assets} - \text{Liabilities} - \text{Preferred stock} = \text{Common stockholders' equity}$

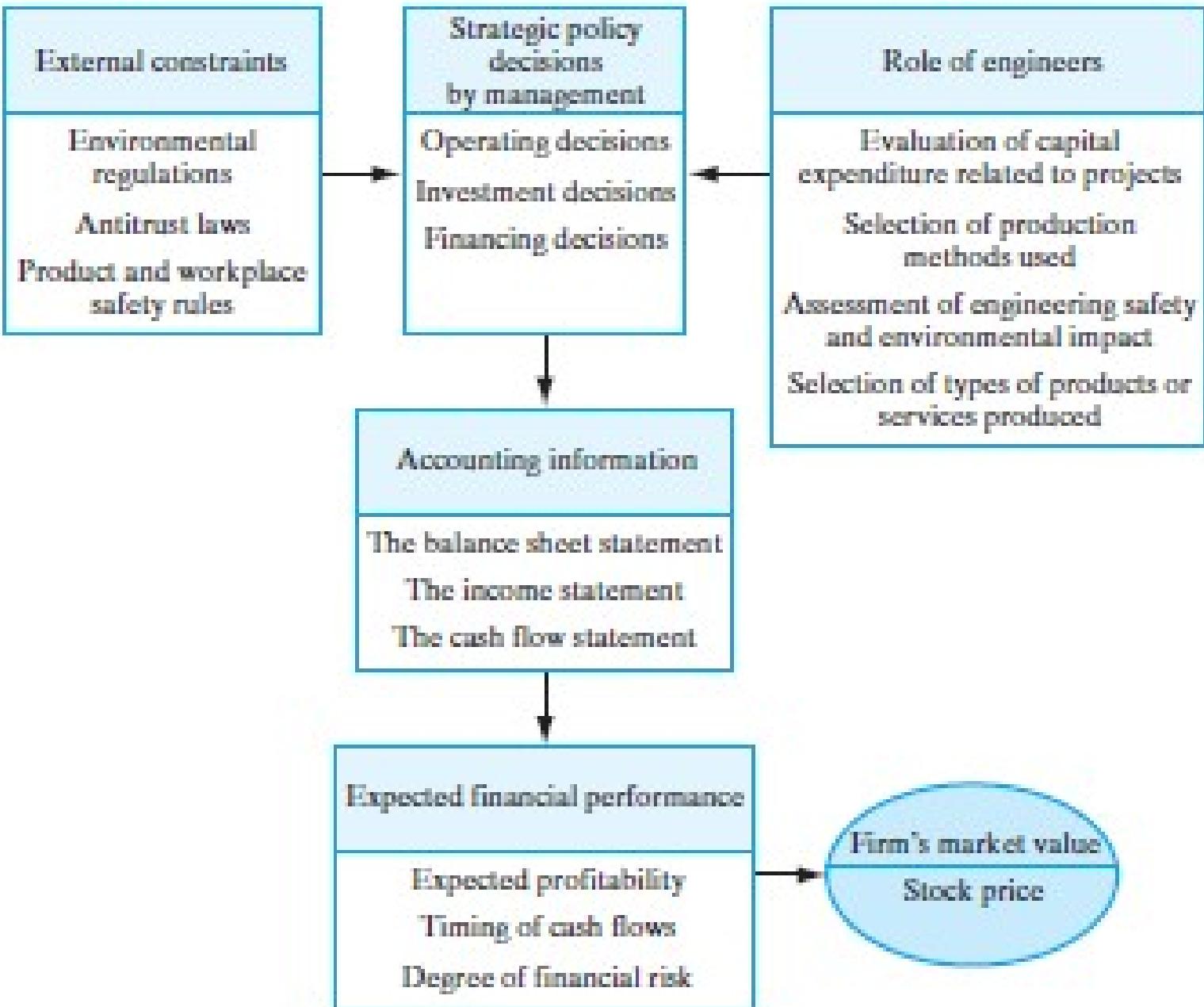


Owner's Equity

- ▶ **Common stock** is the aggregate par value of the company's stock issued. Companies rarely issue stocks at a discount (i.e., at an amount below the stated par). Normally, corporations set the par value low enough so that, in practice, stock is usually sold at a premium.
- ▶ **Paid-in capital** (capital surplus) is the amount of money received from the sale of stock that is over and above the par value of the stock. Outstanding stock is the number of shares issued that actually are held by the public. If the corporation buys back part of its own issued stock, that stock is listed as treasury stock on the balance sheet.
- ▶ **Retained earnings** represent the cumulative net income of the firm since its inception, less the total dividends that have been paid to stockholders. In other words, retained earnings indicate the amount of assets that have been financed by plowing profits back into the business. Therefore, retained earnings belong to the stockholders.

Financial Statements: The Balance Sheet, Income Statement and Cash Flow Statement





Balance Sheet

- ▶ What is the company's financial position at the end of the reporting period? We find the answer to this question in the company's **balance sheet statement**.
- ▶ A company's balance sheet, sometimes called its **statement of financial position**, reports three main categories of items: assets, liabilities, and stockholders' equity.
- ▶ It is a statement summarizing the financial position of a firm which is prepared at the end of the accounting period after completing the preparation of Income Statement.
- ▶ It is the statement of balance of ledger account which are not included in income statement, so it is called balance sheet.
- ▶ It is prepared at a given date (point of time) to reveal financial position of the firm on that certain date. It communicates information about assets, liabilities, owners equity, for a business firm of that specific date.
- ▶ In balance sheet, total of all assets will always be equal to the total of all liabilities and capital.

Format of Balance Sheet

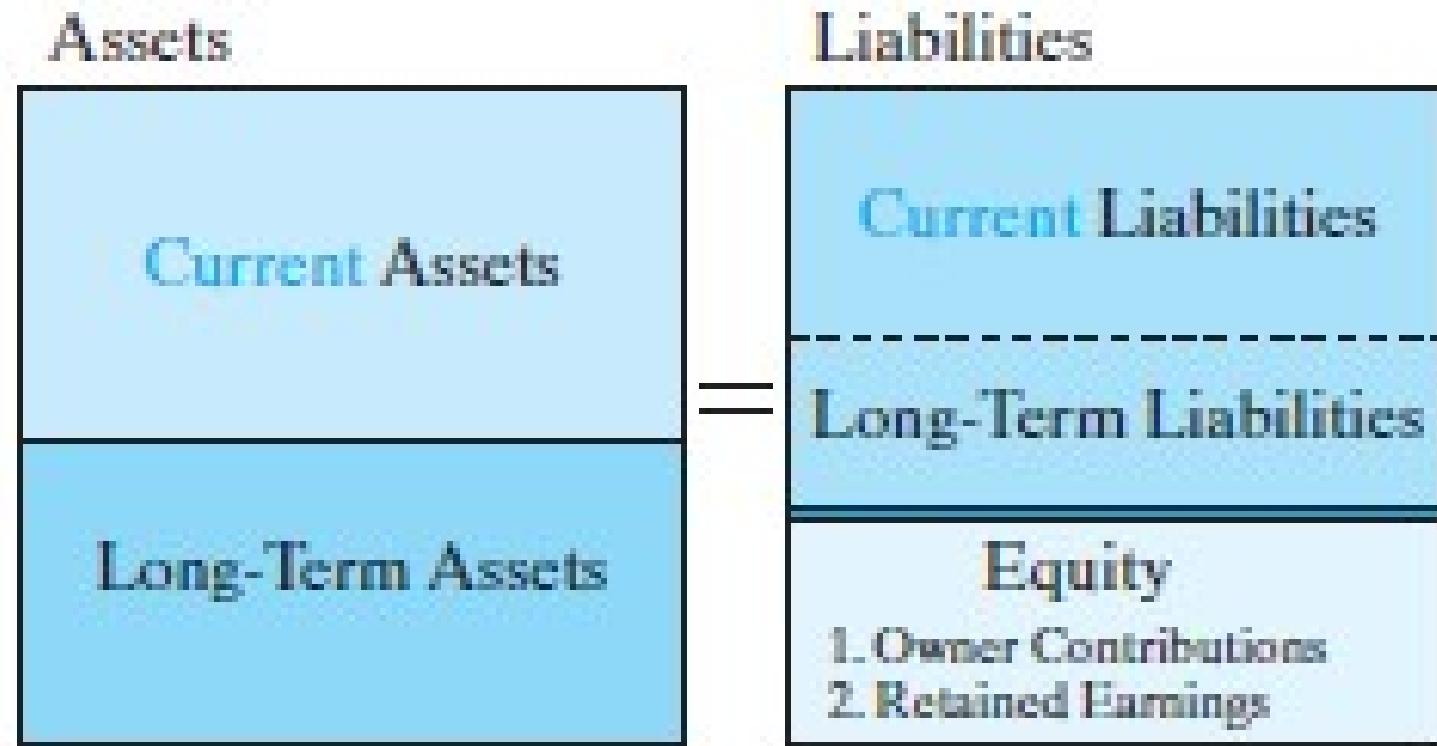


Figure 2.4 Using the four quadrants of the balance sheet.

Format of Balance Sheet

Assets

Current assets:

Cash and cash equivalents

Short-term investments

Accounts receivable, net

Inventories

Other

Total current assets

Property, plant, and equipment, net

Investments

Other noncurrent assets

Total assets

Liabilities and Stockholders' Equity

Current liabilities:

Accounts payable

Accrued and other

Total current liabilities

Long-term debt

Other noncurrent liabilities

Total liabilities

Commitments and contingent liabilities (Note 8)

Stockholders' equity:

Preferred stock and capital in excess of \$.01 par value; shares issued and outstanding: none

Common stock and capital in excess of \$.01 par value; shares authorized: 7,000; shares issued: 2,769 and 2,721, respectively

Treasury stock, at cost; 284 and 165 shares, respectively

Retained earnings

Other comprehensive loss

Other

Total stockholders' equity

Total liabilities and stockholders' equity

Liabilities & Capital	Rs.	Assets	Rs.
Opening capital	xxx	Fixed Assets:	xxx
Less: Drawing	xxx	Land and Building	xxx
Add: Net profit	xxx	Plant and Machinery	xxx
Less: Net loss	xxx	Equipments	xxx
Reserve & Funds:		Furniture & Fixtures	xxx
General reserve	xxx	Vehicles	xxx
Capital resource	xxx	Live stocks	xxx
Specific reserve	xxx	Goodwill	xxx
Sinking fund	xxx	Patent, trademark & copyright	xxx
Other reserve & funds	xxx	Investment:	
Secured Loans:		Investment in shares & debentures	xxx
Debenture	xxx	Investment in government-securities	xxx
Loan from bank	xxx	Current Assets:	
Other secured loan & advance	xxx	Sundry debtors	xxx
Mortgaged loan	xxx	Cash in hand	xxx
Bonds	xxx	Cash at bank	xxx
Unsecured Loan:		Interest accrued on investment	
Fixed deposits	xxx	Accured incomes	xxx
Short-term loan from bank	xxx	Stores & spare parts	xxx
Bank overdraft	xxx	Loss tools	xxx
Current Liabilities:		Closing stock	xxx
Bills payable	xxx	Loan & Advance:	
Sundry creditors/Accounts payable	xxx	Deposit with suppliers	xxx
Advance receipts	xxx	Bills receivables	xxx
Outstanding expenses	xxx	Prepaid expenses	xxx
Other current liabilities	xxx	Advance paid (tax, rates, etc)	xxx
Provisions:		Miscellaneous Expenditures:	
Provision for taxation	xxx	Preliminary expenses	xxx
Provision for staff provident fund	xxx	Advertisement suspense	xxx
Pension fund	xxx	Unadjusted expenditure	
Other provisions	xxx	Development	xxx
	xxx		xxx

Importance of Balance Sheet

- ▶ Balance sheet being the position statement at certain date, it reveals the different information for different stakeholders.
- ▶ It reveals the financial position of a business
- ▶ It helps to ascertain composition of assets and liabilities
- ▶ It depicts the solvency i.e. debt paying capacity of the firm
- ▶ It shows the position of the owners equity and capital.

Income Statement

- ▶ The second financial report is the **income statement**, which indicates whether the company is making or losing money during a stated period, usually a year.
- ▶ Most businesses prepare quarterly and monthly income statements as well. The company's accounting period refers to the period covered by an income statement.

Basic Income Statement Equation

Revenue

—
Expenses

Net Income (Loss)

Importance of Income Statement

- ▶ To ascertain gross and net profit
- ▶ To keep control on indirect expenses
- ▶ Basis for preparing balance sheet
- ▶ Basis for managerial decision

Reporting Format

- ▶ Typical items that are itemized in the income statement are as follows:
 - ▶ • **Revenue** is the income from goods sold and services rendered during a given accounting period.
 - ▶ • **Net revenue** represents gross sales, less any sales return and allowances.
 - ▶ • Shown on the next several lines are the expenses and costs of doing business, as deductions from revenue. The largest expense for a typical manufacturing firm is the expense it incurs in making a product (such as labor, materials, and overhead), called the **cost of revenue** (or cost of goods sold).
 - ▶ • Net revenue less the cost of revenue gives the **gross margin**.
 - ▶ • Next, we subtract any other operating expenses from the operating income. These other operating expenses are expenses associated with paying interest, leasing machinery or equipment, selling, and administration. This results in the operating income.
 - ▶ • Finally, we determine the **net income** (or net profit) by subtracting the **income taxes** from the taxable income. Net income is also commonly known as **accounting income**.

Net revenue

Cost of revenue

Gross margin

Operating expenses:

Selling, general, and administrative

Research, development, and engineering

Total operating expenses

Operating income

Investment and other income, net

Income before income taxes

Income tax provision

Net income

Format of Income Statement (Trading A/c and Profit and Loss A/c)

The general format of Trading Account is given below:
 Trading Account of
 For the year ending

Dr.	Particulars	Rs.	Cr.
	Particular		
To Opening Stock	xxx	By Sales	xxx
To Purchase	xxx	Less: Sales return or, Return inward or, Return from debtors	xxx
Less: Purchase return or, Return outward or, Return to creditors	xxx	By Closing Stock	xxx
To Purchase Expenses:		(By Gross Loss Transferred to Profit and Loss Account)	xxx
Carriage/Carriage inward	xxx		
Freight/Freight inward	xxx		
Carriage/Freight on purchase	xxx		
Dock charges	xxx		
Clearing charges	xxx		
Coolie and cartage	xxx		
Import duty	xxx		
Custom duty on import	xxx		
Packing on purchase, etc.	xxx		
To Factory/Manufacturing Expenses:			
Wages/Salaries	xxx		
Factory rent	xxx		
Fuel and power	xxx		
Coal, Gas and water	xxx		
Heating and lighting	xxx		
Store consumed (soap, cotton, chemical, grease, paper, etc)	xxx		
Excise duty	xxx		
Royalties	xxx		
All other factory expenses	xxx		
To Gross Profit Transferred to Profit and Loss A/C (i.e. balancing figure)	xxx		xxx

A general format of profit and loss account is given below:
 Profit and Loss Account of Company
 For the year ending

Dr.	Particulars	Rs	Cr
	Particulars		
To Gross Loss		By Gross Profit	
To Office & Administrative Expenses:		By Interest received	
		By Rent received	
		By Dividend received	
		By Discount received	
		By Commission received	
		By Bad debt recovered	
		By Profit on sale of assets	
		By Appreciation on fixed assets	
		By Net Loss Transferred to Balance Sheet	
To Selling & Distribution Expenses:			
	Salesman salary & Commission		
	Packing & Travelling expenses		
	Advertising & Publicity		
	Free sample & Ware house		
	Carriage & Freight outwards		
	Export duty & Discount allowed		
	Research & Development expenses		
	VAT & Bad debts etc.		
To Other Expenses & Losses:			
	Depreciation		
	Repair & Maintenance		
	Abnormal loss on goods, machine		
To Net Profit Transferred to Balance Sheet			

Example: Income Statement and Balance Sheet

(PU 2015, Fall)

- ▶ The following is trial balance of Acharya Company.
- ▶ Value of closing stock=52,000; Net Profit=18,000
- ▶ **Required: Income Statement and Balance Sheet.**

Particulars	Debit (Rs.)	Credit (Rs.)
Capitals		2,00,000
Plant and Machinery	50,000	
Furniture and Fitting	75,000	
Motor Van	24,000	
Sundry Debtors	40,000	
Cash at Bank	7,000	
Wages	1,50,000	
Purchase and Sales	2,13,000	4,00,000
Bills receivable and payable	35,000	15,000
Sundry Creditors		20,000
Salaries	36,000	
Drawings	20,000	
Discount received		10,000
Bank loan		30,000
General Reserve		20,000
Opening Stock	40,000	
Bad Debt	5,000	
Total	6,95,000	6,95,000

Solution: PU 2015, Fall

Income Statement of Acharya Company

Particulars	Amount (Rs.)
Sales	4,00,000
Closing Stock	52,000
Less: Opening Stock	40,000
Less: Purchase	2,13,000
Less: Wages	1,50,000
Gross Profit	49,000
Add: Discount Received	10,000
Less: Salaries	36,000
Less: Bad debt	5,000
Net Profit	18,000

Balance Sheet of Acharya Company

Particulars	Amount (Rs.)
Assets	
Plant and Machinery	50,000
Furniture and Fittings	75,000
Motor Van	24,000
Bills Receivables	35,000
Sundry Debtors	40,000
Closing Stock	52,000
Cash at Bank	7,000
Total Asset	2,83,000
Liabilities and Capital	
General Reserve	20,000
Bank Loan	30,000
Bills Payable	15,000
Sundry Creditors	20,000
Total Liabilities	85,000
Capital	2,00,000
Add: Net Profit	18,000
Less: Drawings	20,000
Total Liabilities and Capital	2,83,000

Example and Solution: Balance Sheet (PU 2014, Spring)

- ▶ Prepare balance sheet of ABC company from the following information as on 31st December 2014.

Capital	40,000	Building	30,000
Sundry Debtors	15,000	Furniture	12,500
Cash in hand	4,000	Cash at bank	7,500
Bank Overdraft	8,500	Bills receivables	4,500
Sundry Creditors	3,500	Closing Stock	3,500
Reserve Funds	4,500	Net Profit	20,500

Solution: Balance Sheet of ABC Company

Balance Sheet of ABC Company As on 31 st December 2014	
Particulars	Amount (Rs.)
Assets	
Building	30,000
Furniture	12,500
Cash at Bank	7,500
Bills Receivable	4,500
Closing Stock	3,500
Sundry Debtors	15,000
Cash in hand	4,000
Total Asset	77,000
Liabilities and Capital	
Reserve Fund	4,500
Bank Overdraft	8,500
Sundry Creditors	3,500
Total Liabilities	16,500
Capital	40,000
Add: Net Profit	20,500
Total Liabilities and Capital	77,000

Example: Income Statement and Balance Sheet (PU 2009, Fall)

- ▶ Moon and Moon Company has just completed preparing its trial balance as of June 2008.
- ▶ Prepare income statement, statement of retained earnings, and balance sheet

Moon & Moon Company Trial Balance As of 30 June 2008		
Particulars	Debit (Rs.)	Credit (Rs.)
Cash	6,200	
Account Receivables	10,400	
Prepaid Rent	4,400	
Chemical Inventory	9,400	
Equipment	18,200	
Accumulated Depreciation		1,050
Accounts Payable		1,180
Capital Stock		5,000
Retained Earnings		25,370
Treatment Revenue		40,600
Wages and Salaries	22,500	
Utility Expenses	1,240	
Advertising Expenses	860	10,000
Total	73,200	73,200

Solution: Income Statement and Balance Sheet (PU 2009, Fall)

Income Statement of Moon & Moon Company As of 30 June 2008

Particulars	Amount (Rs.)
Treatment Revenue	40,600
Less: Wages and Salaries	22,500
Gross Profit	18,100
Less: Utility Expenses	1,240
Less: Ad Expenses	860
Net Profit	16,000

Statement of Retained Earnings of Moon & Moon Company As of 30 June 2008

Particulars	Amount (Rs.)
Opening Retained Earnings	25,370
Add: Net Income <small>@Samundra Paudel/NCIT/PU/2016</small>	16,000
Closing Retained Earnings	41,370

Balance Sheet of Moon & Moon Company As on 30 June 2008

Particulars	Amount (Rs.)
Assets	
Cash	6,200
Account Receivables	10,400
Prepaid Rent	4,400
Chemical Inventory	9,400
Equipment	18,200
Total Asset	48,600

Liabilities and Capital

Accumulated Depreciation	1,050
Account Payable	1,180
Total Liabilities	2,230
Capital	5,000
Add: Cl. Retained Earnings	41,370
Total Liabilities and Capital	48,600

Example: P/L Account and Balance Sheet (PU 2006, Fall & PU 2005, Spring)

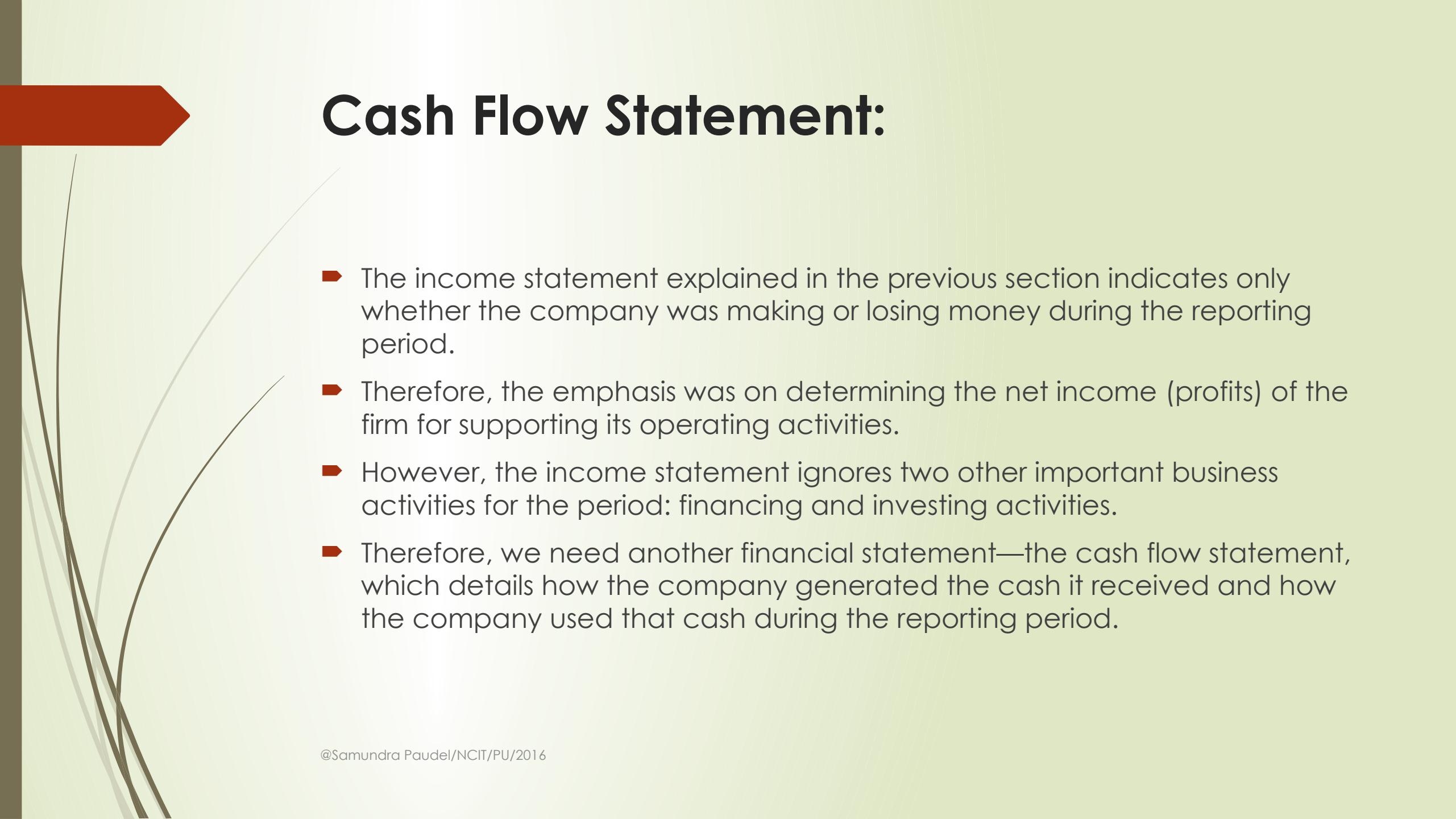
- From the following trial balance, prepare P/L account and balance sheet.

Debit Balance	Amount (Rs.)	Credit Balance	Amount (Rs.)
Closing Stock	30,000	Capital	2,50,000
Sundry Debtors	50,000	Gross Profit	1,22,000
Plant & Machinery	2,25,000	Dividend Received	1,250
Goodwill	14,500	Interest Received	750
Land & Building	1,35,000	Sundry Creditors	39,000
Salaries & Wages	27,500	Reserve Fund	50,000
Rent	7,500	Bank Loan	50,000
Selling Expenses	12,500	Bank overdraft	23,500
Cash at bank	10,000		
Deposit with custom office	7,500		
Advertisement	5,000		
Investment @Samundra Paudel/NCIT/PU/2016	12,000		
Total	5,36,500	Total	5,36,500

Solution: P/L Account and Balance Sheet (PU 2006, Fall & PU 2005, Spring)

Profit & Loss Account	
Particulars	Amount (Rs.)
Gross Profit	1,22,000
Add: Dividend Received	1,250
Add: Interest Received	750
Less: Salaries & Wages	27,500
Less: Rent	7,500
Less: Selling Expenses	12,500
Net Profit	76,500

Balance Sheet	
Particulars	Amount (Rs.)
Assets	
Closing Stock	30,000
Sundry Debtors	50,000
Plant & Machinery	2,25,000
Goodwill	14,500
Land & Buildings	1,35,000
Cash at bank	10,000
Deposit with Custom Office	7,500
Ad Suspense A/c	5,000
Investment	12,000
Total Asset	4,89,000
Liabilities and Capital	
Reserve Fund	50,000
Bank Loan	50,000
Bank Overdraft	23,500
Sundry Creditors	39,000
Total Liabilities	1,62,500
Capital	2,50,000
Add: Net Income	76,500
Total Liabilities and Capital	4,89,000



Cash Flow Statement:

- ▶ The income statement explained in the previous section indicates only whether the company was making or losing money during the reporting period.
- ▶ Therefore, the emphasis was on determining the net income (profits) of the firm for supporting its operating activities.
- ▶ However, the income statement ignores two other important business activities for the period: financing and investing activities.
- ▶ Therefore, we need another financial statement—the cash flow statement, which details how the company generated the cash it received and how the company used that cash during the reporting period.

Cash Flow Statement:

- ▶ Cash Inflow= Issue of share, debentures, sale of fixed assets, sale of investments, receiving loans, etc.
- ▶ Cash Outflow=redemption of share, debenture, repayment of loan, purchase of fixed assets etc.
- ▶ The difference between inflow and outflow of cash and cash equivalent is termed as net increase and decrease in cash or cash equivalent.
- ▶ The cash flow statement reports cash flows during the period in 3 category:
 - ▶ Operating activities
 - ▶ Investing activities
 - ▶ Financing activities

Cash Flow Statement: Sources and Uses of Cash

- ▶ The difference between the sources (inflows) and uses (outflows) of cash represents the net cash flow during the reporting period. This is a very important piece of information, because investors determine the value of an asset (or, indeed, of a whole firm) by the cash flows it generates.
- ▶ Certainly, a firm's net income is important, but cash flows are even more important, particularly because the company needs cash to pay dividends and to purchase the assets required to continue its operations.
- ▶ The goal of the firm should be to maximize the price of its stock. Since the value of any asset depends on the cash flows produced by the asset, managers want to maximize the cash flows available to investors over the long run.
- ▶ Therefore, we should make investment decisions on the basis of cash flows rather than profits. For such investment decisions, it is necessary to convert profits (as determined in the income statement) to cash flows.

Importance of Cash Flow Statement

- ▶ To know the liquidity position of the firm
- ▶ To know the company's operating, investing and financing activities during accounting period
- ▶ To evaluate the financial policies of the firm
- ▶ To know the information about the changes in the cash position of the firm
- ▶ To know the cash payment and cash receipt of the firm during the accounting period
- ▶ To understand the reasons for variation in cash position of the firm
- ▶ To assist short term cash planning of the firm
- ▶ To help in planning of the repayment of loan, replacement of fixed assets and other long term planning etc.

Cash Flow Statement: Reporting Format

- ▶ In preparing the cash flow statement, many companies identify the sources and uses of cash according to the types of business activities. There are three types of activities:
- ▶ • **Operating activities.** We start with the net change in operating cash flows from the income statement. Here, operating cash flows represent those cash flows related to production and the sales of goods or services. All noncash expenses are simply added back to net income (or after-tax profits). For example, an expense such as depreciation is only an accounting expense (a bookkeeping entry). Although we may charge depreciation against current income as an expense, it does not involve an actual cash outflow. The actual cash flow may have occurred when the asset was purchased. (Any adjustments in **working capital** will also be listed here.)
- ▶ • **Investing activities.** Once we determine the operating cash flows, we consider any cash flow transactions related to investment activities, which include purchasing new fixed assets (cash outflow), reselling old equipment (cash inflow), and buying and selling financial assets.
- ▶ • **Financing activities.** Finally, we detail cash transactions related to financing any capital used in business. For example, the company could borrow or sell more stock, resulting in cash inflows. Paying off existing debt will result in cash outflows.
- ▶ By summarizing cash inflows and outflows from three activities for a given accounting period, we obtain the net change in the cash flow position of the company.

Format of Cash Flow Statement

Cash flows from operating activities:

Net income	\$ 3,043
Adjustments to reconcile net income to net cash provided by operating activities:	
Depreciation and amortization	334
Tax benefits of employee stock plans	249
Effects of exchange rate changes on monetary assets and liabilities denominated in foreign currencies	(602)
Other	78
Changes in:	
Operating working capital	1,755
Noncurrent assets and liabilities	453
Net cash provided by operating activities	5,310

Cash flows from investing activities:

Investments:	
Purchases	(12,261)
Maturities and sales	10,469
Capital expenditures	(525)
Purchase of assets held in master lease facilities	—
Cash assumed in consolidation of Dell Financial Services, L.P.	—
Net cash used in investing activities	(2,317)

Cash flows from financing activities:

Repurchase of common stock	(4,219)
Issuance of common stock under employee plans and other	1,091
Net cash used in financing activities	(3,128)
Effect of exchange rate changes on cash and cash equivalents	565
Net increase in cash and cash equivalents	430
Cash and cash equivalents at beginning of period	4,317
Cash and cash equivalents at end of period	\$ 4,747

Ratio Analysis

- ▶ Ratio is the mathematical relationship between two figures where one number is expressed in terms of another.
- ▶ In accounting, it is a technique of analysis and interpretation of the financial statement through mathematical expression.
- ▶ Ratio analysis can evaluate the performance of any business organization, so that **ratio analysis is an analysis of financial statement by the help of ratio between two accounting figures.**
- ▶ Importance of Ratio analysis:
 - ▶ Helpful in accessing operating efficiency of the business
 - ▶ Helpful in measuring financial solvency
 - ▶ Helpful in decision making
 - ▶ Helpful in future forecasting
 - ▶ Helpful in corrective action
 - ▶ Helpful in comparing inter-firm performance
 - ▶ Helpful in cost control



Debt Management

Ratios that show how a firm uses debt financing and its ability to meet debt repayment obligations.

- **Debt ratio**
- **Times-interest-earned ratio**

Market Trend

A set of ratios that relate the firm's stock price to its earnings and book value per share.

- **P/E ratio**
- **Market/book ratio**

Liquidity

Ratios that show the relationship of a firm's cash and other assets to its current liabilities.

- **Current ratio**
- **Quick ratio**

Financial Ratios

Asset Management

A set of ratios which measure how effectively a firm is managing its assets.

- **Inventory turnover ratio**
- **Day's sales outstanding ratio**
- **Total assets turnover ratio**

Profitability

A set of ratios which show the combined effects of liquidity, asset management, and debt on operating results.

- **Profit margin on sales**
- **Return on total assets**
- **Return on common equity**

Figure 2.5 Types of ratios used in evaluating a firm's financial health.

Using Ratios to make decisions:

- ▶ Debt Ratio,
- ▶ Current Ratio,
- ▶ Quick Ratio-Acid Test Ratio,
- ▶ Inventory Turnover Ratio,
- ▶ Total Asset Turnover,
- ▶ Profit Margin on Sales,
- ▶ Return on Total Assets,
- ▶ Price Earnings Ratio and
- ▶ Book Value Per Share

Debt Ratio

- The relationship between total liabilities and total assets, generally called the **debt ratio**, tells us the proportion of the company's assets that it has financed with debt:

Debt ratio =Total debt/Total assets

- Total debt includes both current liabilities and long-term debt. If the debt ratio is unity, then the company has used debt to finance all of its assets.
- Certainly, most creditors prefer low debt ratios, because the lower the ratio, the greater is the cushion against creditors' losses in case of liquidation.
- If a company seeking financing already has large liabilities, then additional debt payments may be too much for the business to handle.
- For such a highly leveraged company, creditors generally charge higher interest rates on new borrowing to help protect themselves.

Current Ratio

- We calculate the **current ratio** by dividing current assets by current liabilities:

$$\text{Current ratio} = \text{Current assets} / \text{Current liabilities}$$

- The **current ratio** measures a company's ability to pay its short-term obligations.
- If a company is getting into financial difficulty, it begins paying its bills (accounts payable) more slowly, borrowing from its bank, and so on.
- If current liabilities are rising faster than current assets, the current ratio will fall, and that could spell trouble.
- What is an acceptable current ratio?
- The answer depends on the nature of the industry. The general rule of thumb calls for a current ratio of 2 to 1. This rule, of course, is subject to many exceptions, depending heavily on the composition of the assets involved.

Quick (Acid Test) Ratio

- ▶ The quick ratio tells us whether a company could pay all of its current liabilities if they came due immediately.
- ▶ We calculate the quick ratio by deducting inventories from current assets and then dividing the remainder by current liabilities:

$$\text{Quick ratio} = (\text{Current assets} - \text{Inventories}) / \text{Current liabilities}$$

- ▶ The quick ratio measures how well a company can meet its obligations without having to liquidate or depend too heavily on its inventory. Inventories are typically the least liquid of a firm's current assets; hence, they are the assets on which losses are most likely to occur in case of liquidation.
- ▶ We often compare against industry average figures and should note at this point that an industry average is not an absolute number that all firms should strive to maintain.
- ▶ In fact, some very well managed firms will be above the average, while other good firms will be below it.
- ▶ However, if we find that a firm's ratios are quite different from the average for its industry, we should examine the reason for the difference.

Inventory Turnover Ratio

- ▶ The inventory turnover ratio measures how many times the company sold and replaced its inventory over a specific period—for example, during the year. We compute the ratio by dividing sales by the average level of inventories on hand.
- ▶ We compute the average inventory figure by taking the average of the beginning and ending inventory figures.

Inventory turnover ratio =Sales/Average inventory balance

Total Assets Turnover

- ▶ The total assets turnover ratio measures how effectively the firm uses its total assets in generating its revenues. It is the ratio of sales to all the firm's assets:

Total assets turnover ratio =Sales/Total assets

Profit Margin on Sales

- We calculate the profit margin on sales by dividing net income by sales.
- This ratio indicates the profit per dollar of sales:

Profit margin on sales = Net income available to common stockholders/Sales

- If two firms have identical operations in the sense that their sales, operating costs, and earnings before income tax are the same, but if one company uses more debt than the other, it will have higher interest charges.
- Those interest charges will pull net income down, and since sales are constant, the result will be a relatively low profit margin.

Return on Total Assets

- ▶ The return on total assets—or simply, return on assets (ROA)—measures a company's success in using its assets to earn a profit. The ratio of net income to total assets measures the return on total assets after interest and taxes:

Return on total assets =

$$\text{(Net income + interest expense (1 - tax rate)) / Average total assets}$$

- ▶ Adding interest expenses back to net income results in an adjusted earnings figure that shows what earnings would have been if the assets had been acquired solely by selling shares of stock.
- ▶ This high return on total assets results from (1) the company's high basic earning power and (2) its low use of debt, both of which cause its net income to be relatively high.

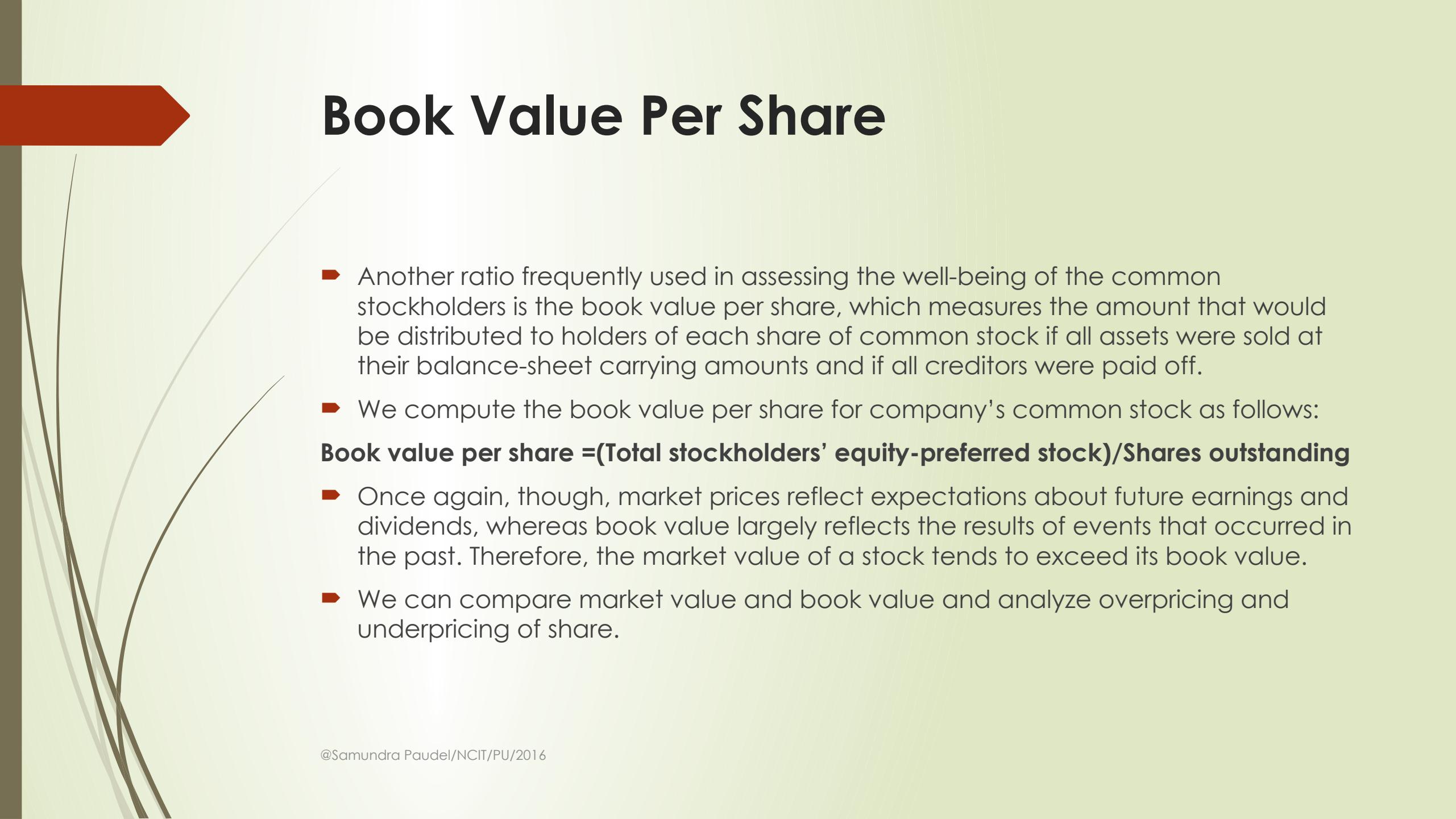


Price-to-Earnings Ratio

- ▶ The price-to-earnings (*P/E*) ratio shows how much investors are willing to pay per dollar of reported profits.

$$\mathbf{P/E \ ratio = Price \ per \ share / Earnings \ per \ share}$$

- ▶ In general, *P/E* ratios are higher for firms with high growth prospects, other things held constant, but they are lower for firms with lower expected earnings.
- ▶ However, all stocks with high *P/E* ratios carry high risk whenever the expected growths fail to materialize.
- ▶ Any slight earnings disappointment tends to punish the market price significantly.



Book Value Per Share

- ▶ Another ratio frequently used in assessing the well-being of the common stockholders is the book value per share, which measures the amount that would be distributed to holders of each share of common stock if all assets were sold at their balance-sheet carrying amounts and if all creditors were paid off.
- ▶ We compute the book value per share for company's common stock as follows:

Book value per share = $(\text{Total stockholders' equity} - \text{preferred stock}) / \text{Shares outstanding}$

- ▶ Once again, though, market prices reflect expectations about future earnings and dividends, whereas book value largely reflects the results of events that occurred in the past. Therefore, the market value of a stock tends to exceed its book value.
- ▶ We can compare market value and book value and analyze overpricing and underpricing of share.

Example: Conduct and interpret Ratios:

Debt Ratio, Current Ratio, Quick Ratio-Acid Test Ratio, Inventory Turnover Ratio, Total Asset Turnover, Profit Margin on Sales, Return on Total Assets, Price Earnings Ratio and Book Value Per Share

Table P2.3 shows financial statements for Nano Networks, Inc. The closing stock price for Nano Network was \$56.67 (split adjusted) on December 31, 2005. On the basis of the financial data presented, compute the various financial ratios and make an informed analysis of Nano's financial health.

TABLE P2.3 Balance Sheet for Nano Networks, Inc.

	Dec. 2005 U.S. \$ (000) (Year)	Dec. 2004 U.S. \$ (000) (Year)
Balance Sheet Summary		
Cash	158,043	20,098
Securities	285,116	0
Receivables	24,582	8,056
Allowances	632	0
Inventory	0	0
Current assets	377,833	28,834
Property and equipment, net	20,588	10,569

Depreciation	8,172	2,867
Total assets	513,378	36,671
Current liabilities	55,663	14,402
Bonds	0	0
Preferred mandatory	0	0
Preferred stock	0	0
Common stock	2	1
Other stockholders' equity	457,713	17,064
Total liabilities and equity	513,378	36,671
Income Statement Summary		
Total revenues	102,606	3,807
Cost of sales	45,272	4,416
Other expenses	71,954	31,661
Loss provision	0	0
Interest income	8,011	1,301
Income pretax	−6,609	−69
Income tax	2,425	2
Income continuing	−9,034	−30,971
Net income	−9,034	−30,971
EPS primary	−\$0.1	−\$0.80
EPS diluted	−\$0.10	−\$0.80
	−\$0.05	−\$0.40
	(split adjusted)	(split adjusted)

The balance sheet that follows summarizes the financial conditions for Flex, Inc., an electronic outsourcing contractor, for fiscal-year 2005. Unlike Nano Network Corporation in Problem 2.3, Flex has reported a profit for several years running. Compute the various financial ratios and interpret the firm's financial health during fiscal-year 2005.

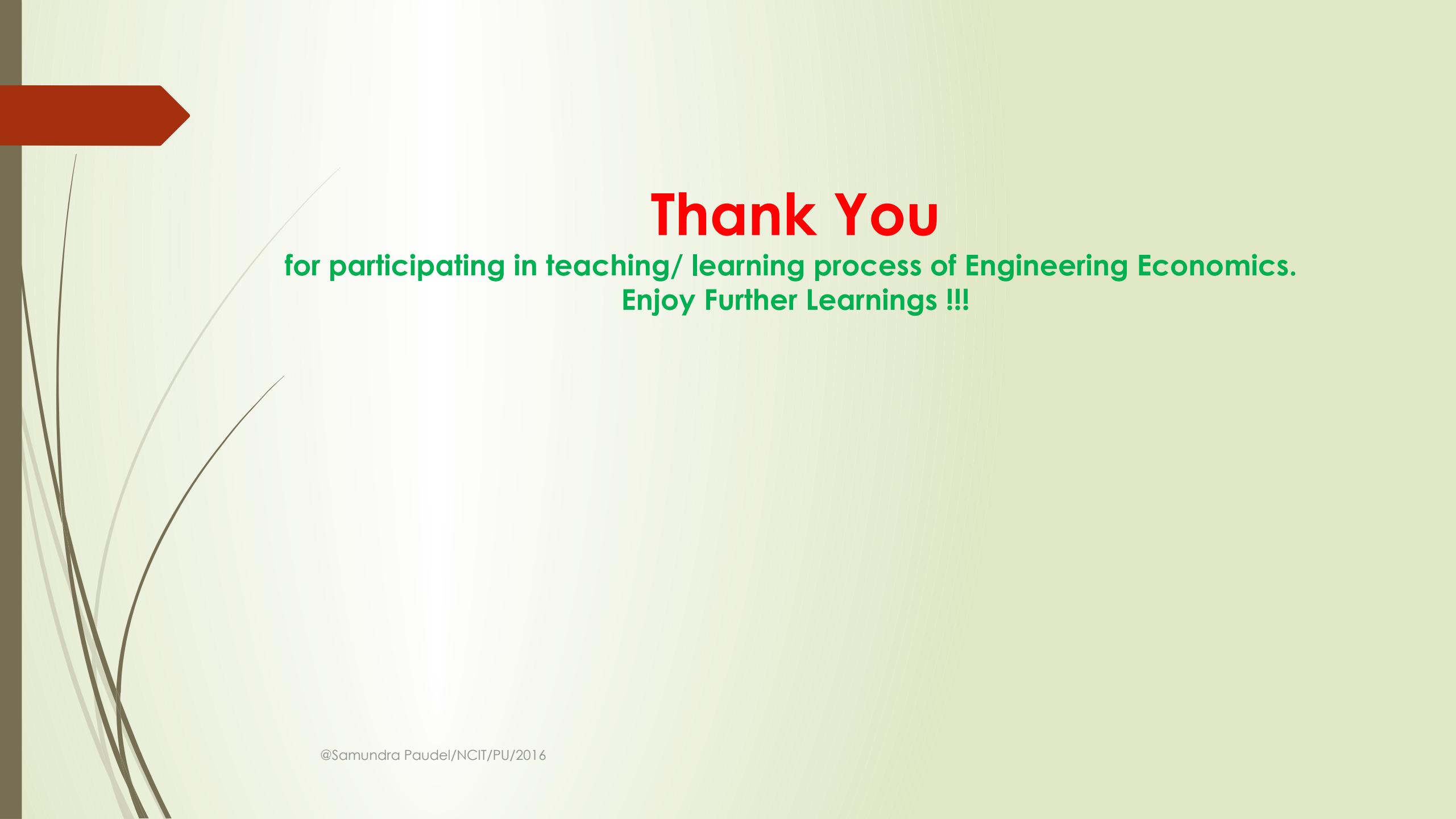
	Aug. 2005 U.S. \$ (000) (12 mos.)	Aug. 2004 U.S. \$ (000) (Year)	
Balance Sheet			
Summary			
Cash	1,325,637	225,228	
Securities	362,769	83,576	
Receivables	1,123,901	674,193	
Allowances	5,580	-3,999	
Inventory	1,080,083	788,519	
Current assets	3,994,084	1,887,558	
Property and equipment, net	1,186,885	859,831	
Depreciation	533,311	-411,792	
Total assets	4,834,696	2,410,568	
Current liabilities	1,113,186	840,834	
Bonds	922,653	385,519	
Preferred mandatory	0	0	
Preferred stock	0	0	
Common stock	271	117	
Other stockholders' equity	2,792,820	1,181,209	Income pretax
Total liabilities and equity	4,834,696	2,410,568	Income tax
Income Statement			
Summary			
Total revenues	8,391,409	5,288,294	Extraordinary
Cost of sales	7,614,589	4,749,988	Changes
Other expenses	335,808	237,063	Net income
Loss provision	2,143	2,254	EPS primary
Interest expense	36,479	24,759	EPS diluted

Example: Conduct and interpret Ratios:

Debt Ratio, Current Ratio, Quick Ratio-Acid Test Ratio, Inventory Turnover Ratio, Total Asset Turnover, Profit Margin on Sales, Return on Total Assets, Price Earnings Ratio and Book Value Per Share

Chapter 10: Assignments

- ▶ Define accounting. How do you formulate accounting equation.
- ▶ What is income statement and balance sheet? How are they related to each other?
- ▶ What do you mean by income statement and cash flow statement? What are the relationships and differences between them?
- ▶ Explain major ratios that can be applied in decision making process.
- ▶ Define ratio analysis. Explain the role of ratios on making decisions.
- ▶ Write short notes on:
 - ▶ Format of balance sheet
 - ▶ Format of income statement
 - ▶ Format of cash flow statement
 - ▶ Assets
 - ▶ Liabilities
 - ▶ Capital
- ▶ **Numerical Questions for Income Statement, Balance Sheet, Cash Flow Statement and Ratio Analysis**



Thank You

for participating in teaching/ learning process of Engineering Economics.
Enjoy Further Learnings !!!