Course Material

PRINCIPLES OF ECONOMICS

AS 2103

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Course Material for Principles of Economics by,

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Course Content and Intended Learning Outcomes

Course Aims

This course aims to provide an introduction to a broad range of economic concepts, theories, and analysis. It considers both microeconomics - the analysis of choices made by individual decision-making units, and macroeconomics - the analysis of economy as a whole.

Course capsule

Thinking like an economist; Introduction to economics, microeconomic concepts and analysis; Theory of consumer behaviour; Consumer demand; Theory of producer behaviour; Theory of supply; Theory of markets; Government intervention; Fundamentals of macroeconomics; National income calculation, aggregate demand and aggregate supply model.

Learning Objectives

On successful completion of the course, the student will be able to

1. explain the basic assumptions, concepts and economic terminology that underlie economic analysis.

2. interpret economic information available from different sources.

3. solve microeconomic problems using mathematical equations.

4. apply economic concepts to explain the real-life situations.

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LECTURE 01
Introduction to Economics
Microeconomic Concepts and Analysis

1.1 What is economics?

- Life is all about making choices.
- We need to make many kinds of choices every day. For example, how much should I spend on food? Where should I go for lunch today? What is the best route to work? Which specialization module I select for my major?
- The choices are aroused because there is a wide range of alternative uses of time and other resources or inputs.
- Economics is concerned with these choices, and it is the science of choice. It considers the choices at all levels of the society including choices of individuals, firms, and the governments.
- The nature of the resources available to produce goods is that they are limited or scarce.
- Hence, the central focus of economics is on the scarcity of resources and making choices among their alternative uses.
- Combining these two, we can go further to state that economics is about the study of scarcity and choice.
- It makes choices to merge unlimited wants with limited resources.
- The field of study "Economics" has been developed over a long period of time to discover a criterion for making choices properly.
- Basically, it involves comparing the benefits/gain (in terms of income or other desired outcome) resulting from an action with the sacrifices (in terms of cost) of the same.

1.2   The standard definition for Economics

> *"A social science directed at the satisfaction of needs and wants through the allocation of scarce resources which have alternative uses."*

1.3   What famous economists say?

Adam Smith (1723-1790)

- The father of Modern Economics
- Author of the famous book "An Inquiry into the Nature and Causes of the Wealth of Nations.
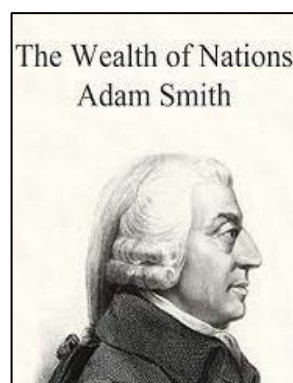
Alfred Marshall (1842-1924)

- The Principles of Economics (1890)
- Reflects the complexity of Economics
- It is on one side the study of wealth and on the other and important side, a part of the study of man.

Economics

Macroeconomics

Looks at the **total output** of a nation and the way the nation allocates its limited resources of land, labor, capital, and management in an attempt to maximize production levels and promote trade and growth for future generations.

Microeconomics

Looks into similar issues but, on the level of the **individual people and firms** within the economy. Analyzing certain aspects of human behavior, microeconomics shows us how individuals and firms respond to the changes in price, and why they demand, what they do at a particular price levels.

```
┌──────────────┐
│ Limited      │
│ resources    │
└──────────────┘
        │
        ↓
┌────────────────────────────────────────────────┐
│ Individuals and nations have to make decisions  │
│ regarding what goods and services they can buy  │
│ and which ones they produce.                    │
└────────────────────────────────────────────────┘
                    │
                    ↓
        ┌────────────────────────────────┐
        │ Decisions on                   │
        │ "Efficient Resource Allocation"│
        └────────────────────────────────┘
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1.4   Defining some key concepts of economics

a. Scarcity principle

- Economics is based on the concept that we live in a world where our needs and wants exceeds our resources.
- Hence the resources are described as scarce resources. Individual needs to make rational choices using marginal analysis in decision making.
- Scarcity principle says getting more of one thing will mean getting less of another.
- The three agents of the economy are consumers, producers, and the government.
- Under this scarcity principle, consumers will be forced to decide what to consume, producers will be forced to decide what to produce and the governments will be forced to decide how to allocate resources to achieve specific objectives.

b. Macroeconomics

- Macroeconomics is concerned with the behavior of the economy as a whole.
- It is the study of economic aggregates, for example, Gross Domestic Product (GDP), interest rate, inflation, unemployment, and exchange rates.
- It also studies the policies that the governments use to improve national performances.

c. Market

- The market is a place where buyers and sellers are met.
- It consists of a collection of buyers and sellers of a good or a service and the arrangement by which they come together to trade.
- There are different types of market systems, i.e., perfectly competitive market, monopoly, oligopoly, monopolistic competition, and monopsony which you may learn in the future.

d. Perfectly competitive market

- The perfect competition is a kind of hypothetical and theoretical market structure which is characterized by the following features.
    - ✓ A large number of buyers and sellers and hence individuals cannot influence the market.
    - ✓ No entry or exit barriers to the market
    - ✓ Homogenous products
    - ✓ Perfect information and access to knowledge

e. Opportunity cost

- Opportunity cost is a valuable decision-making criterion.
- It represents the value of opportunity forgone in selecting each possible alternative.
- Specifically, it is the value of the next best alternative which is not chosen.
- Suppose you are at a restaurant and trying to decide whether to buy a piece of cake or three sandwiches.
- So you have two alternatives for spending your money. The opportunity cost of choosing the piece of cake is the value of next best alternative, that is, the value of three sandwiches. Also, the opportunity cost of choosing three sandwiches is the value of the piece of cake.

f. Absolute and comparative advantage

- Absolute advantage is the ability of an individual, a firm, or a country to produce more of a product or service than competitors using the same amount of resources. Therefore, the concept of absolute advantage is expressed in terms of **efficiency**.
- Comparative advantage is the ability of an individual, a firm, or a country to produce a product or a service at a **lower opportunity cost** than other competitors.

- These concepts are very much important in international trade.
- The principle of comparative advantage is applied to trade theory. For example, if a country can produce a good at a lower opportunity cost than the other countries, that particular country specialize in producing that good in large scale using its resources.
- The total amount of goods available increases and everyone can be better off by exchanging the surplus of goods with others. Hence consumers can get their preferred mix of goods.

g. Cost benefit principle

- The cost-benefit principle recommends that you chose to do something only if the extra benefit (incremental benefit) gained from doing it is greater than (or equal to) the extra cost (incremental cost) of that activity.
- Since Economics is about efficient allocation of resources chosen from alternative uses, the cost-benefit principle helps to identify what choices should be made.

h. Economic surplus

$$Economic\ Surplus = Incremental\ benefit\ of\ an\ action - Incremental\ cost\ of\ that\ action$$

- The incremental cost of an action includes both explicit and implicit costs.
- An explicit cost is a direct payment that involves spending money on i.e. wages, rent, and materials etc.
- The implicit cost is a non-monetary opportunity cost, which is equal to what the firm must give up in order to use a factor of production for which it already owns and thus does not pay a rent.
- The economic surplus can be increased by maximizing the benefits and minimizing the cost.
- Benefits are maximized by making choices that minimize the opportunity cost.
- Opportunity cost is to assess whether an efficient choice between available resources has been made.

i. Sunk cost

- The sunk cost is defined as a cost that a firm has incurred, and which it can no longer recover by any means.
- These expenses have been spent in the past before the decision making on investment.

- However, sunk costs would have had to occur in order for a choice to be made.
- For example, exploration costs (oil, gem, mining), costs for market research (surveys, focus group discussions etc.), feasibility studies etc.
- Sunk costs are not considered in decision making to continue investing in an ongoing project, because these costs cannot be recovered.

j. Marginal analysis

- In Economics, choices and decisions are made based on marginal analysis and not on the average values.
- Marginal revenue is the change in total revenue from selling one extra unit.
- Marginal cost is the change in total cost to produce one extra unit.

Example: If you can sell 10 yoghurts for Rs.300 and sell 11 yoghurts for Rs.325, the marginal revenue of the 11th yoghurt:

$$\text{MR (Marginal Revenue)} = \frac{Change\ in\ total\ revenue}{One\ extra\ unit\ sold}$$
$$= \frac{Rs.325 - Rs.300}{(11-10)Yoghurts}$$
$$= \text{Rs.25 for 11th Yoghurt}$$

- Marginal cost is the change in total cost from doing one extra unit of an activity.

Example: If you can produce 10 yoghurts for a total cost of Rs.200 and produce 11 yoghurts for a total cost of Rs.215, the marginal cost of the 11th yoghurt:

$$\text{MC Marginal Cost)} = \frac{Change\ in\ total\ cost}{One\ extra\ unit\ produced}$$
$$= \frac{Rs.200 - Rs.215}{(11-10)Yoghurts}$$
$$= \text{Rs.15 for 11th Yoghurt}$$

- As you can see from above values, it is clear that the average cost does not give a clear indication as to whether or not to produce the next yoghurt on the perspective of the efficient use of resources.
- Therefore, economic theory suggests choices based on **marginal analysis** as it provides insights into how much a firm should produce in order to maximize profits.

    i.e. A firm should produce more to increase profits if MR > MC

- A firm should reduce output to increase profits if MR < MC, firms maximize profits when MR = MC
- These concepts will be discussed in detail in the latter course.

k. Decision making rule

- The decision-making rule in Economics is based on the following criteria.
  - ✓ Include opportunity cost
  - ✓ Exclude sunk cost
  - ✓ Measure costs in terms of absolute values and not in percentages.
  - ✓ Efficient choices are based on **Marginal Analysis.**

1.5   Summary

✓ Economics is a social science directed at the satisfaction of needs and wants through the allocation of scarce resources which have alternative uses.

✓ There is a collection of ideas, so economics helps to make sense out of how these individuals make choices.

✓ It involves methodologies to help consumers, producers, and the governments to make decisions.

✓ Mathematical models are available to help analyze these decisions and possible outcomes which are observed in everyday life.

LECTURE 02
Theory of Consumer Behavior – Part I
Utility

2.1   How Consumers make choices under income constraints?

Utility

- The value a consumer places on a unit of a good or service depends on the pleasure or satisfaction he or she expects to derive from having or consuming it at the point of making a consumption (consumer) choice.
- In economics the satisfaction or pleasure consumers derive from the consumption of consumer goods is called "utility".
- Consumers, however, cannot have everything they wish to have.
- Consumers' choices are constrained by their incomes.
- Within the limits of their incomes, consumers make their consumption choices by evaluating and comparing consumer goods with regard to their "utilities."

2.2   Basic Assumptions of a "Rational Consumer"

- Consumers are "*utility maximizers.*"
- Consumers prefer more of a good (thing) to less of it.
- Facing choices X and Y, a consumer would either prefer X to Y or Y to X or would be indifferent between them.
- **Transitivity**: If a consumer prefers X to Y and Y to Z, we conclude he/she prefers X to Z.
- **Diminishing marginal utility**: As more and more of good is consumed by a consumer, ceteris paribus, beyond a certain point the utility of each additional unit starts to fall.

2.3   How to measure Utility?

Cardinal utility Vs. ordinal utility

Cardinal Utility
- Measuring utility in "utils" (Cardinal):
- Jack derives 10 utils from having one slice of pizza but only 5 utils from having a burger.
- Effective tool for teaching purposes**.**

Ordinal Utility

- Measuring utility by comparison (Ordinal):
- Sally prefers a burger to a slice of pizza and a slice of pizza to a hotdog.
- For example, we could say:

Sally is willing to trade a burger for four hotdogs, but she will give up only two hotdogs for a slice of pizza.

- We can infer that to Sally, a burger has twice as much utility as a slice of pizza, and a slice of pizza has twice as much utility as a hotdog.

2.4   Utility and Money

- Because we use money in just about all of our trade transactions, we might as well use it as our comparative measure of utility.

Sally could say: I am willing to pay Rs. 80 for a burger, Rs. 40 for a slice of pizza and Rs. 20 for a hotdog.

2.5   Total Utility Vs Marginal Utility

Marginal utility (MU) is the utility a consumer derives from the last unit of a consumer good she or he consumes (during a given consumption period), ceteris paribus.

Total utility (TU) is the total utility a consumer derives from the consumption of all of the units of a good or a combination of goods over a given consumption period, ceteris paribus.

> ### *Total Utility =   Sum of Marginal Utilities*

2.6   The Law of Diminishing Marginal Utility

- Over a given consumption period, the more of a good a consumer has, or has consumed, the less marginal utility an additional unit contributes to his or her overall satisfaction (total utility).
- Alternatively, we could say: over a given consumption period, as more and more of a good is consumed by a consumer, beyond a certain point, the marginal utility of additional units begins to fall.

2.7   Calculation of Marginal Utility

Quantity of Ice cream (Q)	Total Utility (TU)	Marginal Utility (MU)
0	0	
1	40	40
2	85	45
3	120	35
4	140	20
5	150	10
6	157	7
7	160	3
8	160	0
9	155	-5
10	145	-10

2.8   Graphical representations

2.8.1 Total Utility (TU) and Marginal Utility (MU)
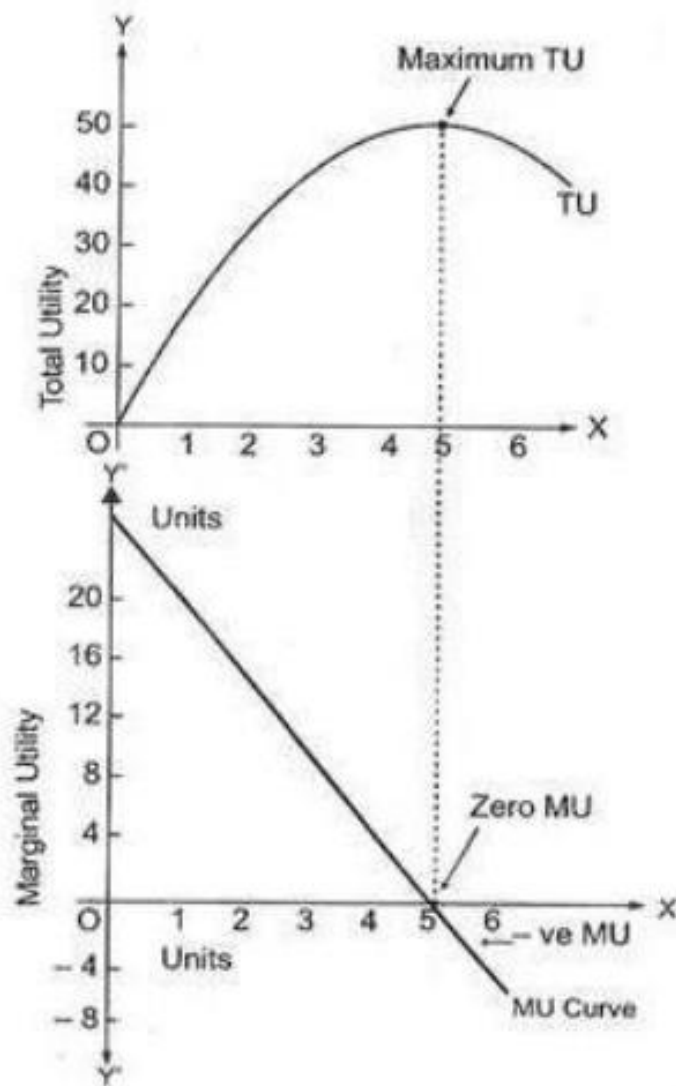
LECTURE 03
## Theory of Consumer Behavior – Part II
Indifference Curves

3.1   Decision on how much ice creams a person will buy/month?

- Depends on….
    - ✓ Consumer's **Income/Budget**
    - ✓ **Opportunity cost** of making a choice:

        Buying ice cream leaves a person less money to buy other things: each rupee spent on ice cream could be spent on rice.

    - ✓ Comparison between the expected utility derived from one additional rupee spent on one good to the expected utility derived from one additional rupee spent on another good.

3.2   Definition

- **The locus of combinations of two goods that derive the same level of satisfaction to the consumer.**

- An indifference curve is a graph showing combination of two goods that give the consumer equal satisfaction and utility.

- Each point on an indifference curve indicates that a consumer is indifferent between the two and all points give him the same utility.

- On the graph, a quantity of one product appears on the x axis and a quantity of another product appears on the y axis.

- Consumers would be equally satisfied at any point along a given curve, as each point brings the same level of utility to that consumer.

- The slope of the curve is referred to as the **Marginal Rate of Substitution (MRS).**

3.3   Graphical Representation of the Indifference Curve
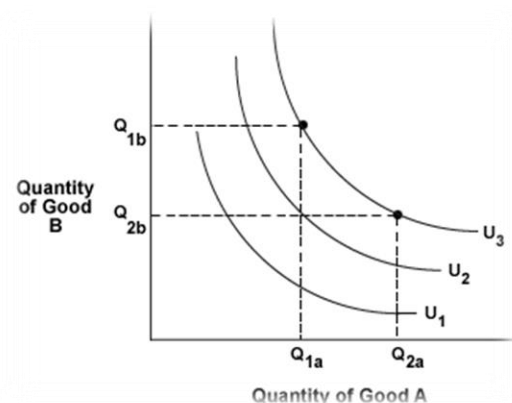
3.4   Characteristics of Indifference Curves

(1)   Indifference curves are negatively sloped

The indifference curves must slope down from left to right. This means that an indifference curve is negatively sloped. It slopes downward because as the consumer increases the consumption of one commodity, he must give up certain units of other commodity to maintain the same level of satisfaction.

(2)   Higher indifference curve represents higher level

A higher indifference curve that lies above and to the right of another indifference curve represents a higher level of satisfaction and combination on a lower indifference curve yields a lower satisfaction.

(3)   Indifference curve is convex to the origin

This is an important property of indifference curves. They are convex to the origin (bowed inward). This is equivalent to saying that as the consumer substitute's commodity X for commodity Y, the marginal rate of substitution diminishes of X for Y along an indifference curve.

(4)   Indifference curve cannot intersect each other

Given the definition of indifference curve and the assumptions behind it, the indifference curves cannot intersect each other. It is because at the point of tangency, the higher curve will give as much as of the two commodities as is given by the lower indifference curve. This is absurd and impossible.

3.5   Two Components of Consumer Demand

Opportunities:

- What can the consumer afford?
- What are the consumption possibilities?
- Summarized by the **budget constraint.**

Preferences:

- What does the consumer like?
- How much does a consumer like a good?
- Summarized by the **utility function.**

3.6   What is a Budget Constraint?

- A budget constraint shows the consumer's purchase opportunities as every combination of two goods that can be bought at given prices using a given amount of income.

- The budget constraint measures the combinations of purchases that a person can afford to make with a given amount of monetary income.

3.7   Mathematical Expression of Budget Constraint

Demand for Bread (B) and Rice (R)

Price of Bread is P_B and Price for Rice is P_R

Budget Constraint

I $=$ $P_B B$ $+$ $P_R R$ ………………………………………… *Equation 3.1.*

R $=$ I/P_R $-$ $(P_B/P_R)B$

(Y) $=$ c $-$ m (X)

I=Income

3.8   Graphical Representation of the Budget Line
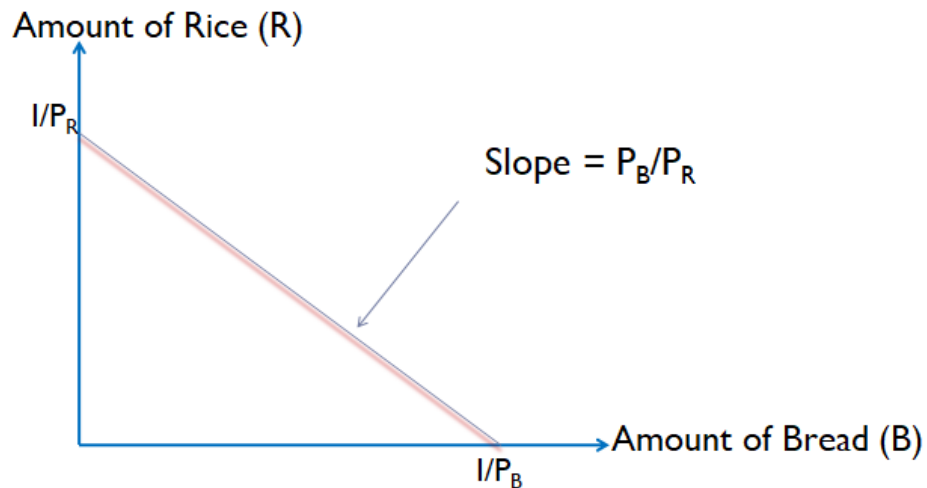
- Slope of the Budget line = Price Ratio (P_B/P_R)
- Slope and Intercept are constant.
- Along the budget line, income is constant.
- Points on the budget line and below are feasible.

3.9   Consumer Equilibrium

- The equilibrium consumption bundle is the affordable bundle that yield the highest level of satisfaction.
- Consumer's equilibrium occurs at the point where

$$MRS = \frac{P_B}{P_R}$$

- That is the slope of the budget line and the slope of the indifference curve.

R

U3
U2
UI
B

R

B

R

E

B
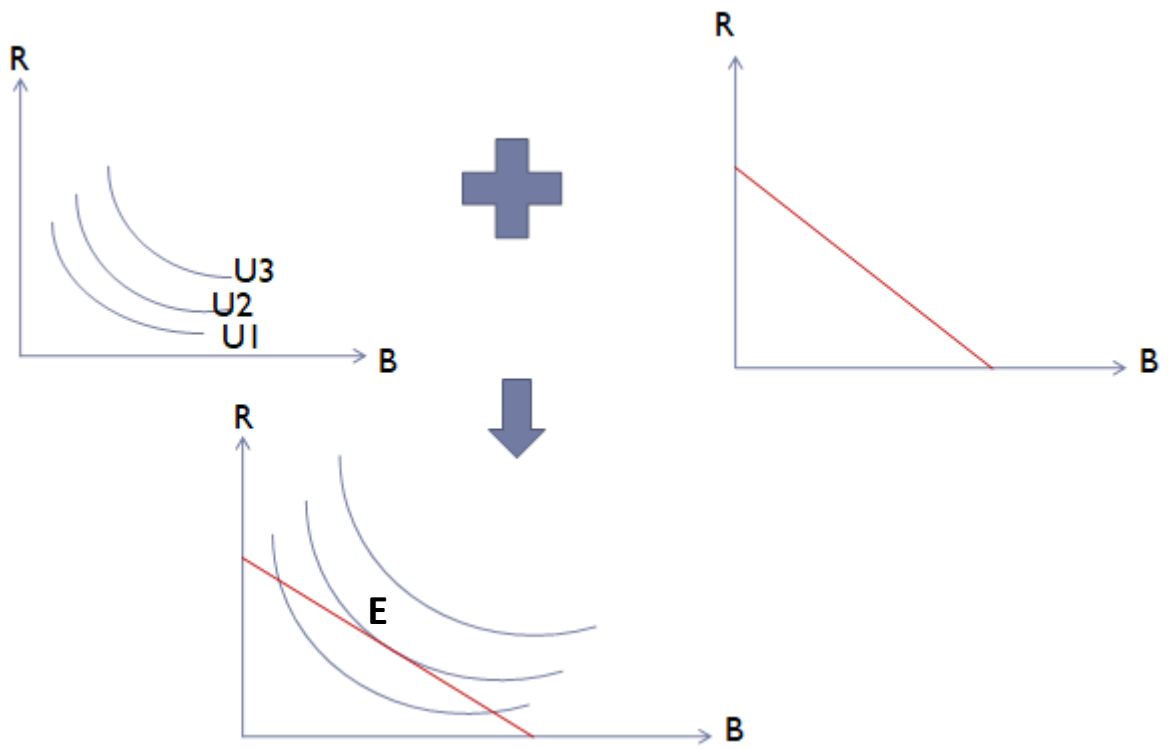
LECTURE 04
Theory of Consumer Behavior – Part III
Consumer Demand Curve

4.1   Consumer Demand Curve

- A demand curve is a single line that represents the various points on a graph where the price of a good or service aligns with its quantity.
- It is a downward curve or line that moves from left to right on a graph, where the vertical axis represents price and the horizontal axis represents quantity demanded.
- The downward shape of a demand curve indicates that, as price decreases, customers will demand more of a product.

4.2   Derivation of the Demand Curve from Consumer Equilibrium
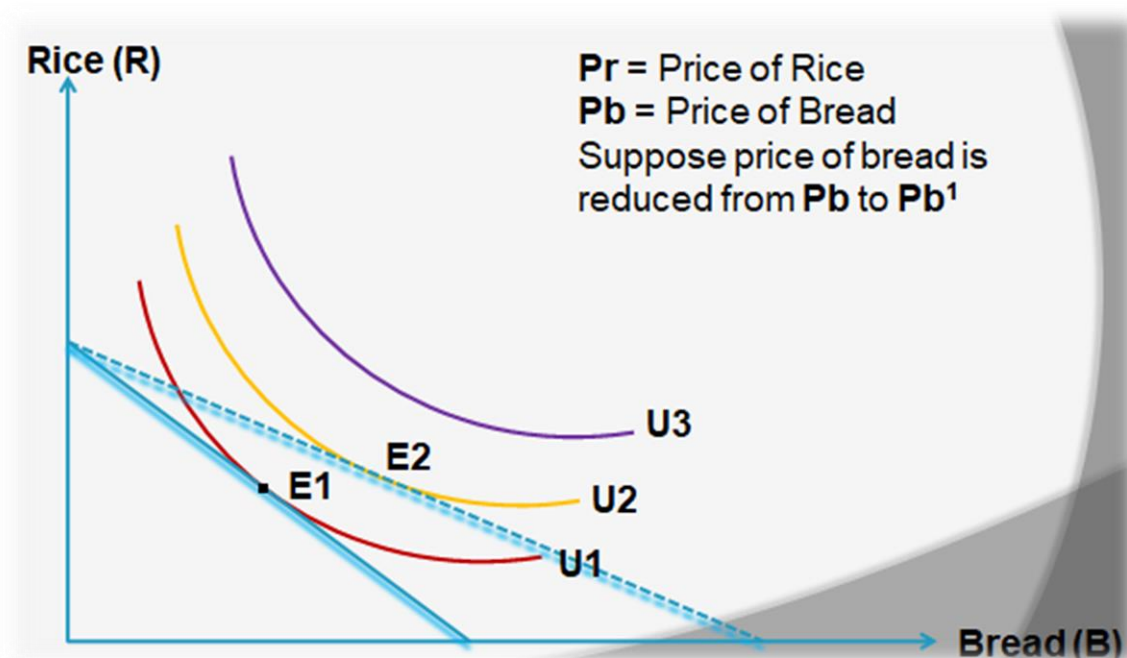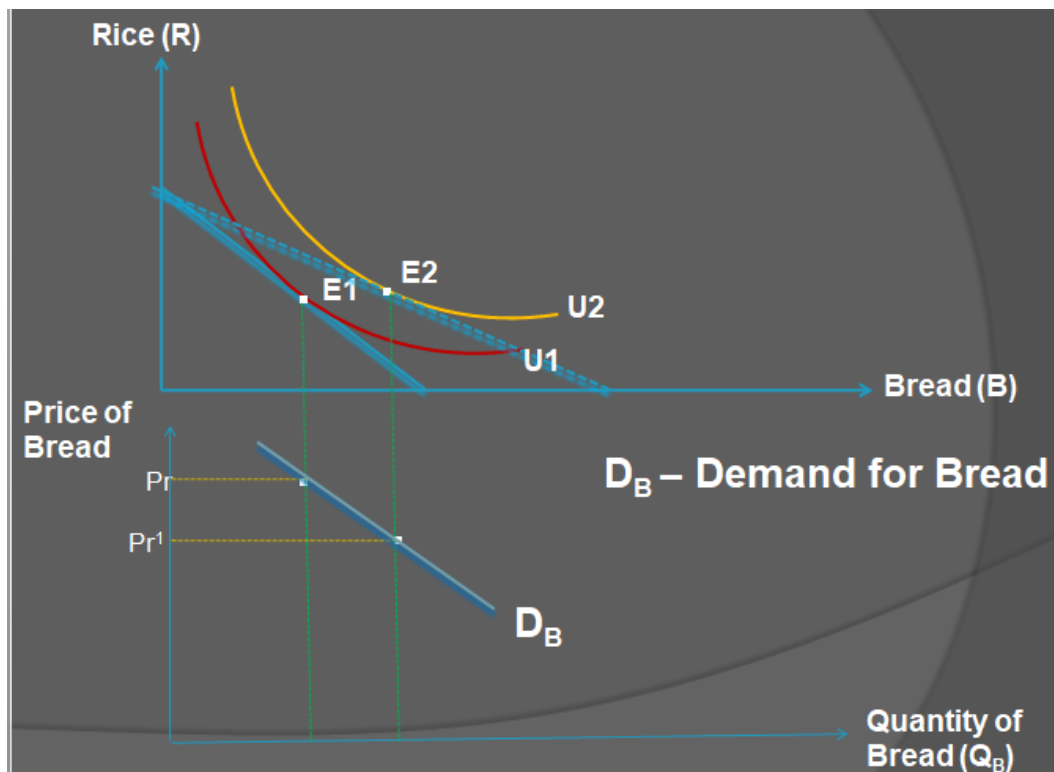
4.3   Characteristics of Demand Curve

- It is a curve from left to right.
- It shows the quantity demanded and price of a commodity.
- Negative relationship between price and demand.
- This is called the "Law of Demand".
- The rate of change in demand over various price points gives a demand curve its slope.
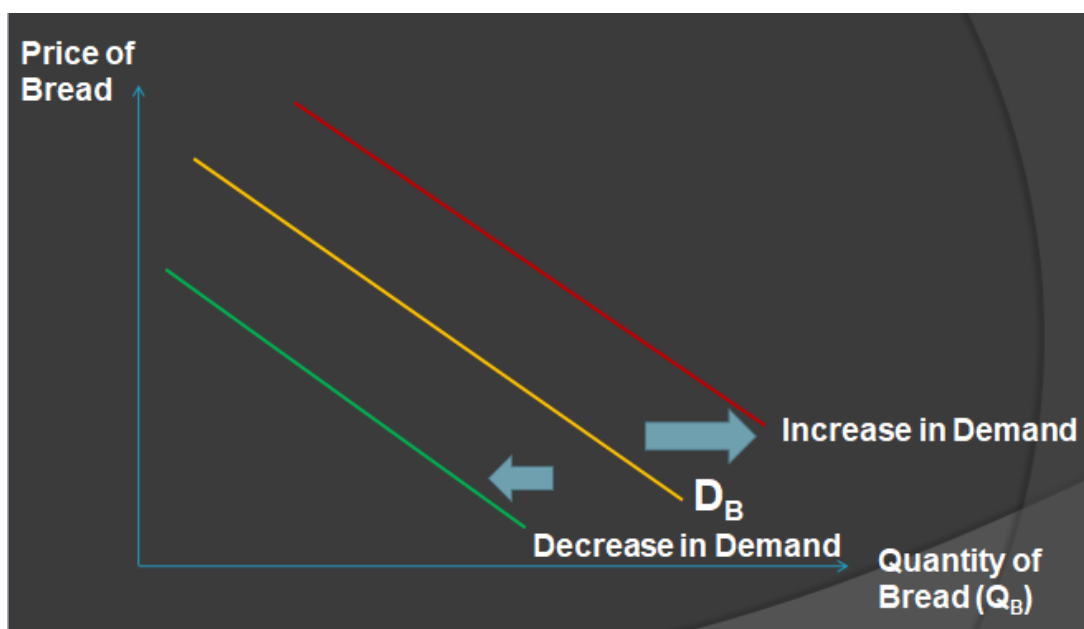
4.3.1   The Law of Demand

- When own price of the good goes up, Demand for that good goes down.
- When own price of the good goes down, Demand for that good goes up.
- Can be seen as *"Movement along the Demand Curve"*.
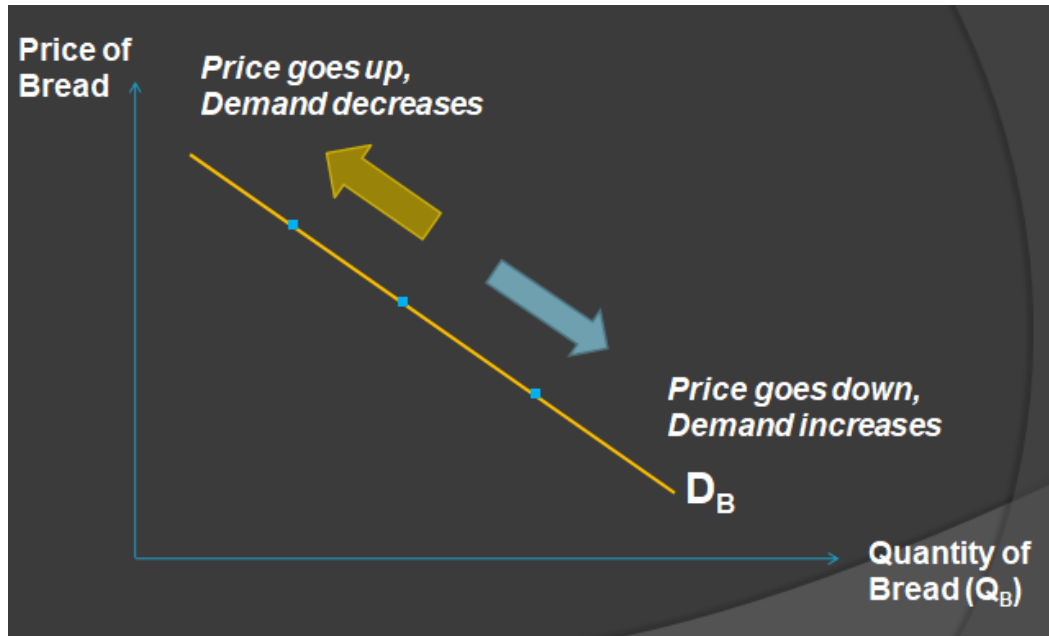
If prices were to stay same, what then could change the demand???

4.3.2   Consumer Income

- If consumer income increases, demand will increase.
- Having more money means, people will spend more money.
- Demand curve shift to right.
- Consumer income can increase in two ways,
  - ✓ Wages increase.
  - ✓ Price for goods and services decrease.

4.3.3   Consumer Tastes

- Consumer tastes are shaped by the way products are marketed (Advertised)
- Consumer tastes are also shaped by the new trends

4.3.4   Price of other goods

Substitutes

- Demand for product tends to decrease when price of its substitute decreases

- What are substitute goods???

    ✓ Butter and Margarine

    When price of butter goes up, then demand for margarine goes up.

Complements

- Complements are goods that are related

- We need to have both in order to use them

- What are complements?

    ✓ DVD player and DVDs

    If the price of DVD players goes down, then, demand for DVDs goes up

4.4   Price Elasticity of Demand

- The demand function can be written as $Q_x^D = f(P_x)$.
- This simply means that the quantity demanded of good X (Q_x^D) will depend upon the price of good X (P_x).
- The price elasticity of demand, therefore, simply tells us just "how much" the demand for good X depends upon the price of good X.
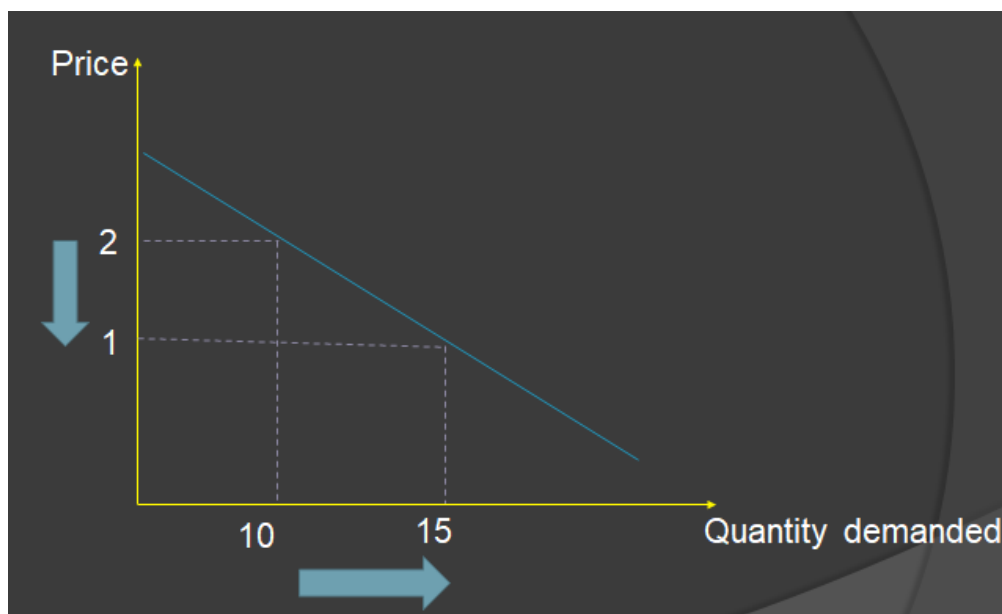
When the price moves from 2 to 1, demand moves from 10 to 15.

- The slope of the demand curve gives an idea on what happens to the demand when change the price of the commodity.
- The price elasticity of demand is defined as...
    Percentage change in demand due to one percent change in price of that good.

$$\epsilon_p = \frac{\%\,\Delta D}{\%\Delta P} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. \textit{Equation 4.1}$$

- Own price elasticity of demand is a negative value.

Algebraically:

$$\in_I = \frac{\%\Delta Q_D^x}{\%\Delta P_x}$$

 Where Δ (Delta) means "change in."

- The larger the elasticity, the more responsive or sensitive the demand for good X is to a change in its price.

Economists define the elasticity coefficient such that:

if $E_D > 1$, then demand is elastic.

if $E_D = 1$, then demand is unit elastic.

if $E_D < 1$, then demand is inelastic.

4.5   The Income Elasticity of Demand

$$\in_I = \frac{\%\Delta Q_D^x}{\%\Delta I}$$

Where, I = Income

Q_D^x = Quantity Demanded for good X

The sign here will tell us something about what "kind" of good X is. Normal or inferior.

For normal good → Value is positive (+)

For inferior good→ Value is negative (-)

4.6   The Cross Price Elasticity of Demand

$$\in_I = \frac{\%\Delta Q_D^x}{\%\Delta P_y}$$

Where P_y = Price of the other good

Q_D^x = Quantity Demanded for good X

The sign here will tell us something about the relationship between X and Y,

i.e. substitutes or complements

- ➢ Value is positive (+) for substitutes.
- ➢ Value is negative (-) for complements.

LECTURE 05
Market Demand

5.1   Market Demand

- The market demand curve is obtained by summing up the consumer's demand curves.
- At each price, the quantity demanded by the market is the sum of the quantity demanded by each of the consumer.
- Market demand curve will shift to the right as more consumers enter to the market.
- Factors that influence the demand of the consumers will also affect the market demand.

Table 5.1   Computing market demand from individual demand

Price	A	B	C	Market Demand
1	6	10	16	32
2	4	8	13	25
3	2	6	10	18
4	0	4	7	11
5	0	2	4	6
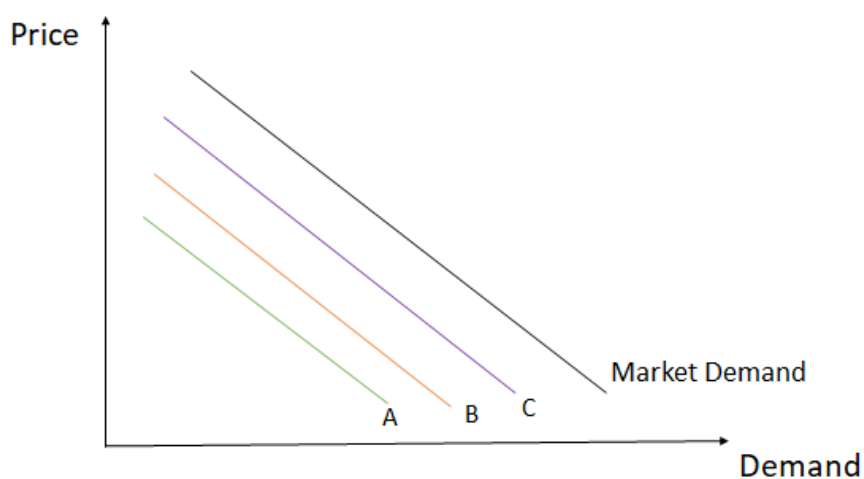
Figure 5.1   Graphical representation of the market demand

Q1

Consider consumer demand function is
$$Q_D = 300 - 10P$$
If there are 10,000 consumers in the market, the market demand curve is,
$$Q_2 = 10,000(300 - 10P)$$

5.2 Consumer Surplus (CS)

- Consumer surplus (CS) measures how much better off the consumers are in aggregate.
- Different consumers value the consumption of a particular good differently.
- CS is the difference between how much the consumer is willing to pay for a particular good and what he/she actually pays when buying the good.
- In the graph representing demand curve, the CS is the area below the demand curve and above the price line.
- In the Figure 5.2 below, the CS is represented by area X.
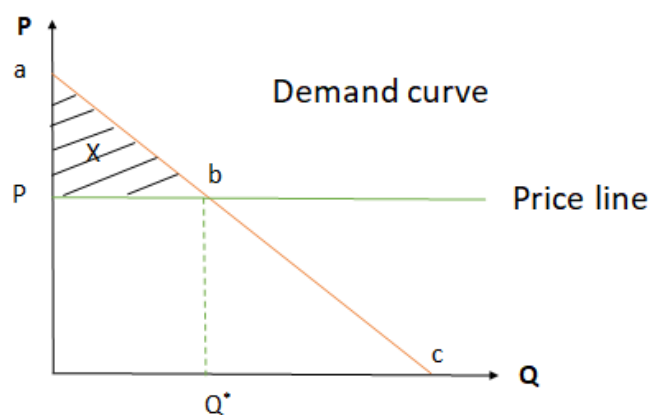
Consumer surplus = Area X

LECTURE 06
Types of Goods

6.1   A Good

- In economics, a **good** is a material that satisfies human wants and provides utility.
- All goods are considered tangible.
- Capable of being physically delivered to a consumer.
- Involve the transfer of product ownership to the consumer.

6.1.1   Normal Goods

- The quantity demanded of such commodities increases as the consumer's income increases and decreases as the consumer's income decreases.
- Demand increases more slowly than income.
- Have relatively inelastic demand.
- All necessary goods are also normal goods.

Example: While a person may buy more clothing when they make more money, they will increase their clothing purchases more slowly as their income rises.

6.1.2   Inferior Goods

- An increase in income causes a fall in demand.
- The quantity demanded of such commodities decreases as the consumer's income increases and increases as the consumer's income decreases.
- Associated with lower socio-economic groups.

Example: Consumers will generally prefer cheaper cars when their income is constricted. As a consumer's income increases the demand of the cheap cars will decrease.

6.1.3   Giffen goods

- A giffen good is an inferior good which people consume more of as price rises, violating the law of demand.
- Prominent among economically poor consumers.
- The income effect of a rise in the price causes to buy more of this cheap good because cannot pay for more expensive goods.

Example: If the price of wheat rises, a poor consumer may not be able to afford meat anymore, so must buy more wheat.

6.1.4   Luxury Goods

- Goods that are not essential but makes like more enjoyable.
- An increase in income causes a bigger increase in demand.
- As people become wealthier, they will buy more and more of the luxury good.

Example: A wealthy person stops buying increasing numbers of luxury cars for his automobile collection to start collecting airplanes (at such an income level, the luxury car would become an inferior). The Figure 6.1 below shows you the demand for various types of goods learned above at different income levels.
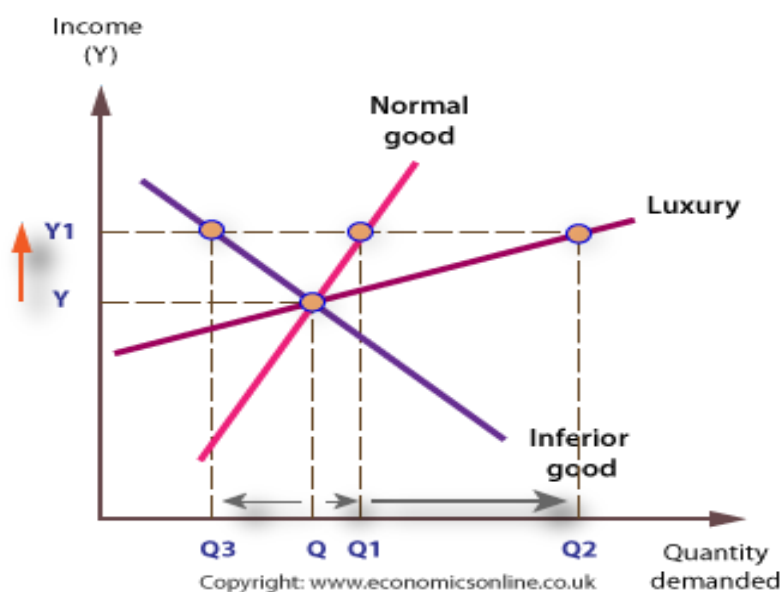
Figure 6.1: Demand and income relationship of various types of goods

6.2   Other Types of Goods

6.2.1 Substitute Goods

- Substitute goods are two goods that could be used for the same purpose.
- These goods are alternatives.
- If the price of one good increases, then demand for the substitute is likely to rise.

  Example: Pepsi and Coca-Cola

6.2.2 Complementary Goods

- Goods which are used together.
- If the demand for one good increases, then the demand for other good also increases.

Example: TV and DVD player

        Tennis balls, tennis rackets.

        Mobile phones, mobile phone credit for making calls.

LECTURE 07
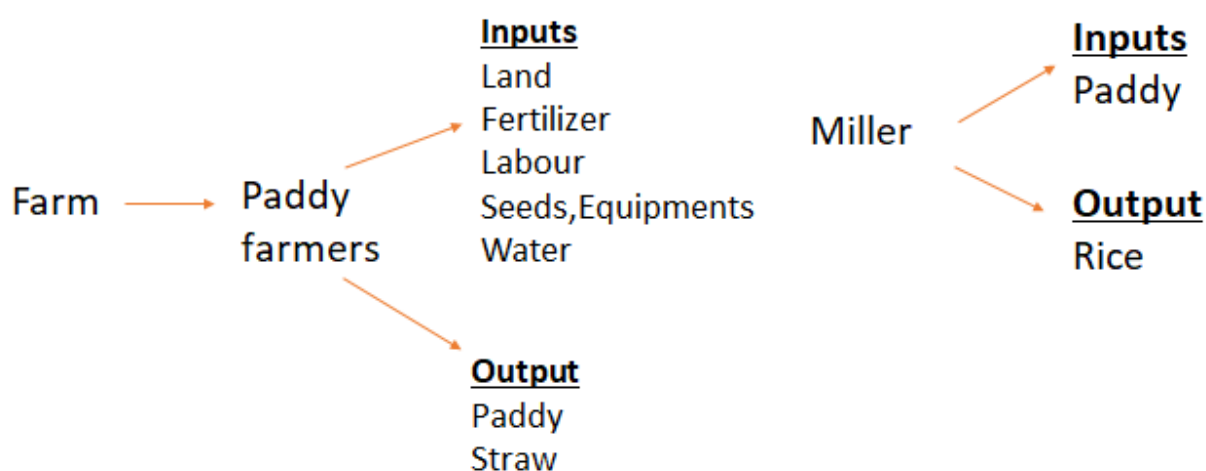# Theory of Producer Behavior

- Learn about behaviour of producers. The Figure 7.1 below shows you the different types of inputs and output which producers are using at various levels along the value chain.

Figure 7.1 Different types of inputs and outputs at varying levels along the value chain.

- It is important to know about the technical relationship between inputs and outputs.

- By knowing the relationship, producers can take decisions on,

  ✓ What to produce

  ✓ How much to produce

  ✓ Profit of the firm

7.1   Production Function

- A technical relationship between inputs and outputs.
- The demand function shows a behavioural relationship.

7.2   Classification of Inputs

Inputs

Labour
→ **Unskilled**
People who does primary work

→ **Semi Skilled**
Use both physical and Brain

→ **Skilled**
People who use their brain to work
Eg: Managers

Material
→ Seeds, Agrochemicals
→ Electricity
→ Plastic

Capital
→ Equipment
→ Land
→ Buildings

Inputs

Short run
Short run prefers to
a period of time in which
one or more factors of
production cannot be
changed

Fixed Inputs
Factors that cannot be
varied over the short run are
called fixed inputs

Long run
In the long run,
amount of time is sufficient
to make all inputs variable

Variable Inputs
In the long run, all inputs
are variable

Figure 7.2 Classification of inputs

7.3   Short Run Production Process

Inputs $\longrightarrow$ One variable input (Labour)

    One fixed input (Capital)
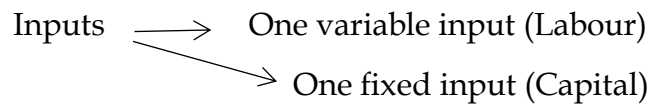
7.3.1   Tabular representation

Table 7.1   Tabular representation of the production function

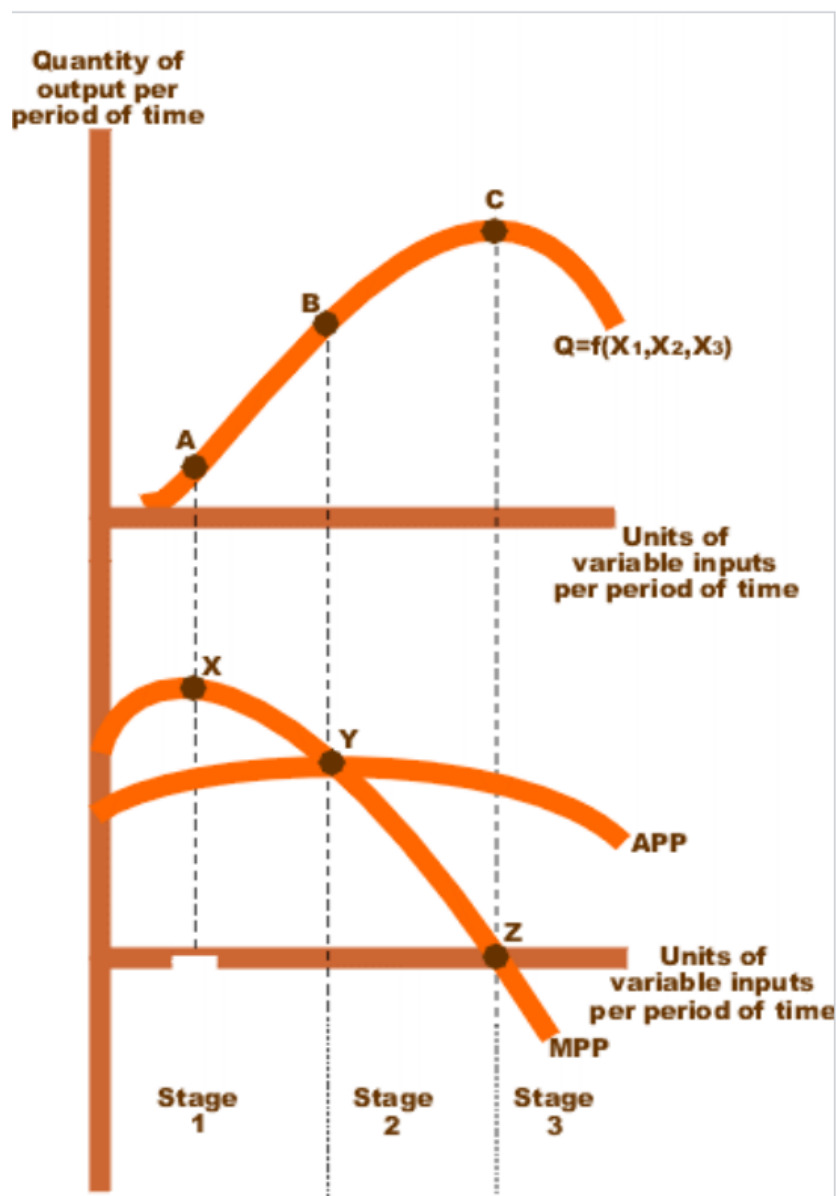| Capital	Labour (L)	No. Of Output Units (TP)	Marginal Product $MP = \frac{\Delta TP}{\Delta L}$	Average Product $AP = \frac{TP}{L}$
10	0	0		0
10	1	10	10	10
10	2	30	20	15
10	3	60	30	20
10	4	80	20	20
10	5	95	15	19
10	6	108	13	18
10	7	112	4	17
10	8	112	0	14
10	9	108	-4	12
10	10	100	-8	10

7.3.2 Graphical representation

Figure 7.3   Graphical representation of production function with per unit product curves (i.e. Average Physical Product (APP) and Marginal Physical Product (MPP))

7.4   Per unit product curves

7.4.1 Marginal Physical Product (MPP)

- MPP is the change in output resulting from a unit change in variable input.
- Slope in the production function at any given level of input.

$$MPP = \frac{Change\ in\ output}{Change\ in\ input} = \frac{\Delta Y}{\Delta X}$$

$$= \frac{\Delta y}{\Delta x} = \frac{dy}{dx} \rightarrow 1st\ derivative$$

7.4.2   Average Physical Product (APP)

• Output per unit of input

$$APP = \frac{Total\ output}{Total\ input} = \frac{Y}{X}$$

7.5   Characteristics of the production process

1. Shape of the Total Physical Product (TPP) curve is sygmoid shape.
2. During the first portion of the graph (see Figure 7.3), from origin to point "A" when unit of variable input increases, output (TPP) is also increased at an increasing rate. After point "A", when variable input increases, output still increases, however, at a decreasing rate.
3. The point "A" on the TPP is called "INFLECTION POINT". This point is where the TPP changes from increasing at an increasing rate to increasing at a decreasing rate.
4. In Figure 7.3, the point "X" on MPP curve represents the inflection point. You can observe the changes in the curvature of the function clearly. As MPP simply represents the slope of the TPP curve, at the inflection point, the slope of TPP changes from increasing slope to a decreasing slope.
5. At the inflection point (A), MPP at its maximum.
6. The following characteristics can observe in the Figure 7.3.

   From (0-A) → If increase inputs, output increases at an increasing
              rate.

   From (A-C)→ If increase inputs, output increases at a decreasing rate.

   After C   → Production declines.
7. There are three stages in the neo classical production process. They are referred to as "First stage", "Second stage", and "Third stage".

- **At the first stage (from origin to the point where APP=MPP)**

    - MPP increase to the maximum level and then decreasing.
- **Second Stage (from MPP=APP to MPP=0 or TPP at its maximum)**

    - Both APP and MPP are decreasing.
- **Third Stage (beyond TPP at its maximum)**

    - MPP curve has a negative value.

- At the maximum TPP → MPP = 0

- At the maximum APP → APP = MPP

- At the infection point → MPP at its maximum

Q1: Consider the given output table and calculate the MPP and APP

Labour	Output	MPP	APP
1	2		
2	6		
3	16		
4	29		
5	43		
6	55		
7	58		
8	60		
9	59		
10	56		

Q2: Consider the following output table and calculate the marginal product and average product.

Amount of capital	Amount of labour	Total product	Marginal product of labour	Average product of labour
2	0	0		
2	1	57		
2	2	118		
2	3	177		
2	4	228		
2	5	270		
2	6	300		
2	7	322		
2	8	336		
2	9	342		
2	10	340		

7.6   The Law of Diminishing Returns & Three Stages of Production
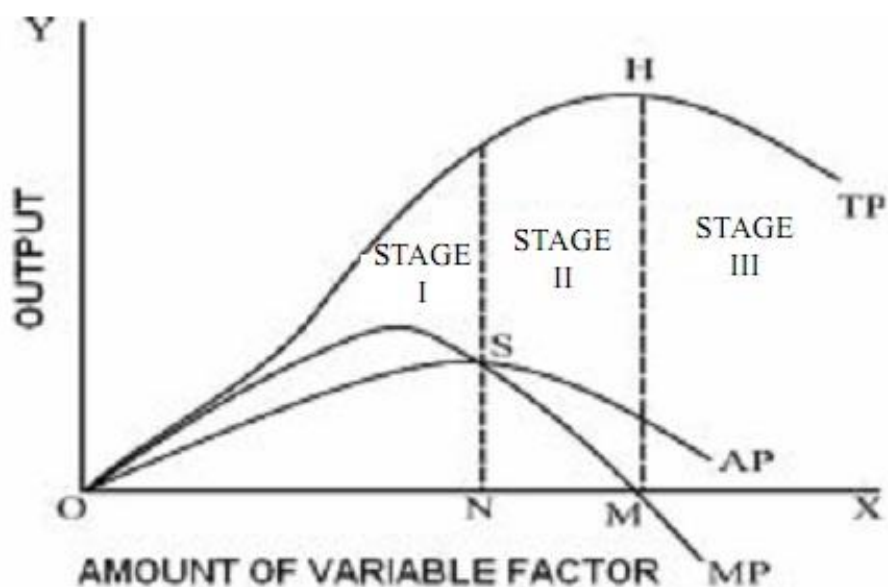
- First angle increases and then decreases.
- Therefore first, $\dfrac{d(MPP)}{dx} > 0$

  Then, $\dfrac{d(MPP)}{dx} < 0$

- There should be a point where $\dfrac{d(MPP)}{dx} = 0$

- This point is called "INFLECTION POINT"

- Before the inflection point, TPP curve is convex to the X.

- After the inflection point, it is concave to X.

MPP

- Increase up to inflection point.

- Decrease after inflection point.

- Maximum MPP is at inflection point.

- After maximum TPP, MPP become negative.

APP

- At the maximum APP → APP = MPP

Stages of production

- Stage I → x = 0, y = 0 to MPP = APP

- Stage II → MPP = APP to MPP = 0 or Max TPP

- Stage III → After MPP = 0

Stage I	Stage II	Stage III
•MPP>APP	•MPP is decreasing MPP< APP & MPP > 0	•Occurs where MPP < 0
• APP increasing (Increasing efficiency in resource use)	•APP is at a maximum at the beginning of this stage	•Occurs when excess quantities of variable input are combined with the fixed inputs
		•Total output begins to decrease
• APP reaches a maximum at the end of this stage	•Efficiency of the fixed inputs is greater at the beginning	

- Even if the input is free, it will be not use in stage III.

- If the product has any value, input used should be continued until stage II is reached.

- APP of the variable input increases throughout the stage I.

- Production should be continued in stage II and the suitable level of input use. depends on prices of inputs as well as outputs.

- At the maximum TPP, MPP is zero.

Q1
Given production function,

$$Y = X^2 - \frac{1}{30}X^3$$

What is the input level at which TPP is maximum?

Answer

At maximum TPP, MPP = 0

Therefore,

$$MPP = \frac{dy}{dx} = 2X - \frac{1}{10}X^2 = 0$$

$$X(2 - 0.1X) = 0$$

$$X = 0 \ or \ X = 20$$

But, when X = 0,

$$TPP = Y = X^2 - \frac{1}{30}X^3$$

$$Y = 0$$

However, it cannot be happened.

$$\therefore X = 20$$

When X=20,

$$Y = X^2 - \frac{1}{30}X^3 = 20^2 - \frac{1}{30}20^3$$

$$Y = 400 - \frac{8000}{30} = 133.33$$

When X=20, TPP is maximum. At that point, TPP = 133.33.

This gives the boundary between stage II and III.

7.7   Elasticity of Production and Point of Diminishing Returns

- At the inflection point, MPP is at a maximum.
- After that, MPP begins to decline.
- TPP & MPP begin to decline at a point beyond the inflection point.

7.7.1   Elasticity of Production

Percentage change in output due to one percent change in input level.

$$\epsilon_p = \frac{Percentage \ change \ in \ output}{Percentage \ change \ in \ input}$$

$$\epsilon_p = \frac{\Delta Y / Y}{\Delta X / X}$$

$$\epsilon_p = \frac{\Delta Y / \Delta X}{Y / X}$$

$$\epsilon_p = \frac{MPP}{APP}$$

- In stage I, MPP > APP, therefore $\epsilon_p > 1$
- In stage II, MPP < APP, therefore $\epsilon_p < 1$ but > 0
- In stage III, MPP < 0, therefore $\epsilon_p < 0$

Q
Given production function,
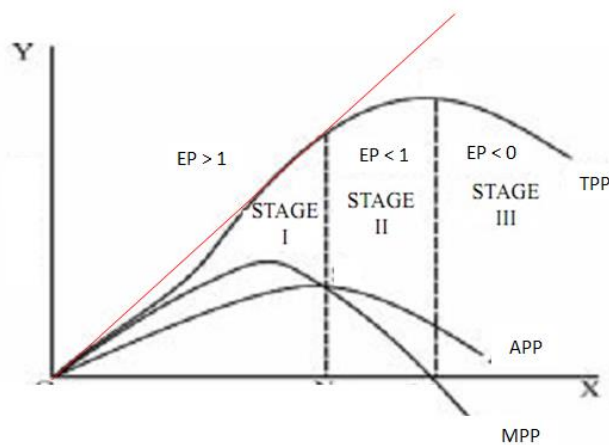$$Y = X^2 - \frac{1}{30}X^3$$
What is elasticity of production?

Answer

$$MPP = 2X - \frac{1}{10}X^2$$

$$APP = X - \frac{1}{30}X^2$$

$$\epsilon_p = \frac{2X - \frac{1}{10}X^2}{X - \frac{1}{30}X^2}$$

At the point of diminishing returns ,

   APP = MPP

   Ep = 1.0

This is the lower bound of stage II

Relevant production interval,

  $0 \leq Ep \leq 1.0$

Elasticity of production E_P,

$$E_P = \frac{\% \, \Delta \text{ in output}}{\% \, \Delta \text{ in input}}$$

$$= \frac{\Delta Q/Q \times 100}{\Delta L/L \times 100}$$

$$= \frac{\Delta Q}{\Delta L} \cdot \frac{Q}{L}$$

$$\underset{MP}{} \qquad \underset{\frac{1}{AP}}{}$$

7.8 Return to scale at different stages

- First stage : Increasing Returns to Scale (IRS)

- Lower bound of stage 2 : Constant Returns to Scale (CRS)   (At point B)

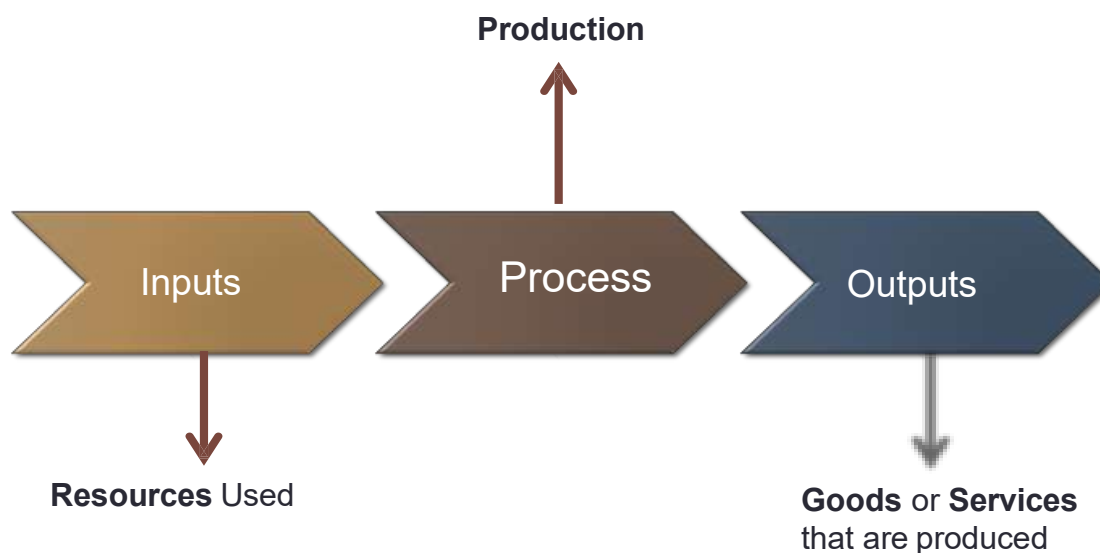- During second stage : Decreasing Returns to Scale (DRS)

# LECTURE 08
Isoquants and Iso-Cost Curve

8.1 Connector

Production theory is the study of production, or the economic process of converting **inputs** into **outputs**.

Production

Inputs → Process → Outputs

Resources Used

Goods or **Services** that are produced

8.2 Physical Relationships

8.2.1 Isoquants

Combination	Labour	Capital	Output level
A	20	1	100 unit
B	18	2	100 unit
C	12	3	100 unit
D	9	4	100 unit
E	6	5	100 unit
F	4	6	100 unit
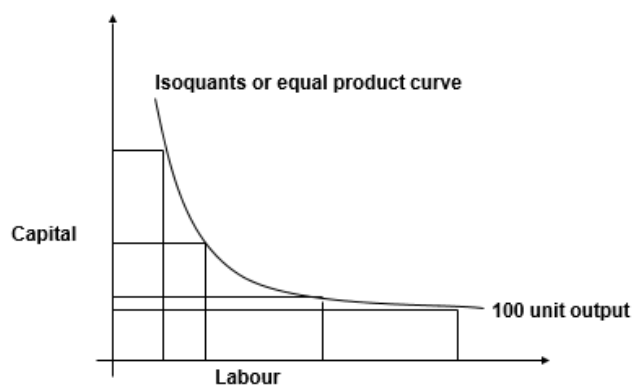
An isoquants represent all those possible combination of two inputs (Labour and Capital), which is capable to produce an equal level of output.

Properties of Isoquants

- Isoquants are negatively sloped
- A higher isoquant represents a larger output
- No two isoquants intersect or touch each other
- Isoquants are convex to the origin
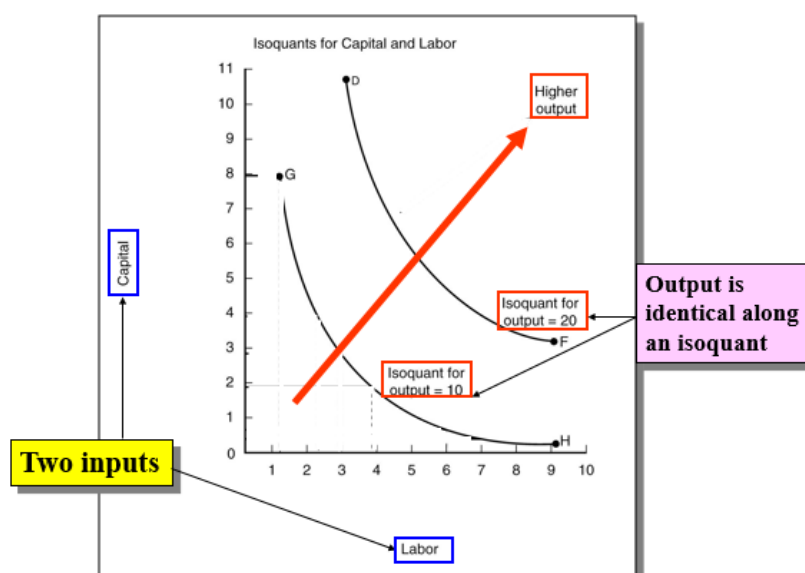
Slope of an Isoquant

The slope of an isoquant is referred to as the Marginal Rate of Technical Substitution, or MRTS. The value of the MRTS in our example is given by:

MRTS = ΔCapital ÷ Δlabor

If output remains unchanged along an isoquant, the loss in output from decreasing labor <u>must be</u> <u>identical</u> to the gain in output from adding capital.

Rate of Technical Substitution

- **Marginal rate of technical substitution (MRTS)**: the amount by which one input can be reduced when one more unit of another input is added while holding output constant (i.e. negative of the slope of an isoquant).

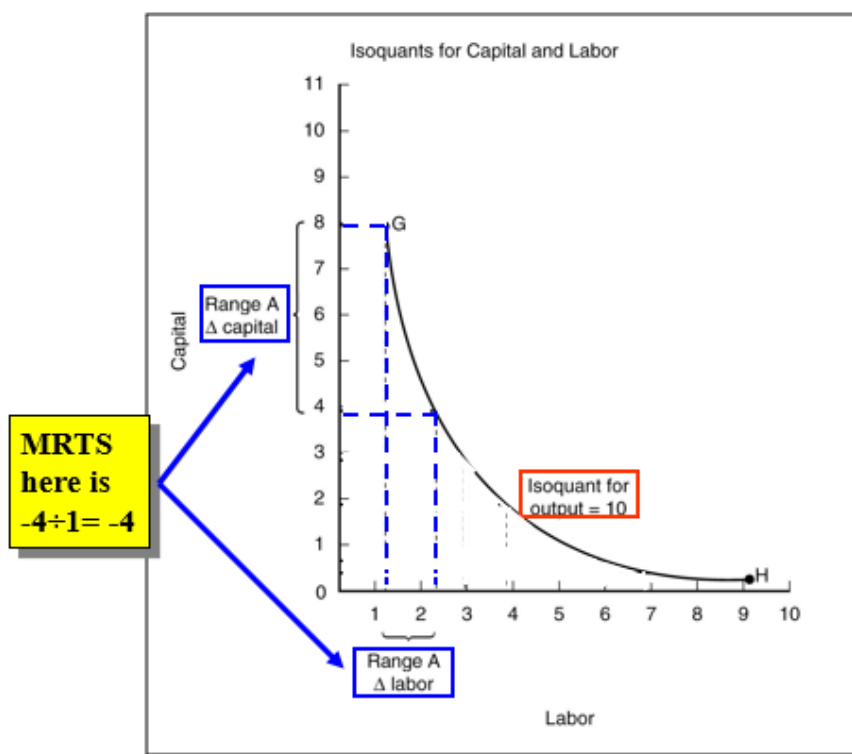- It is the rate that capital can be reduced, holding output constant, while using one more unit of lab.

$$\text{Rate of technical substitution (of labor for capital)}$$
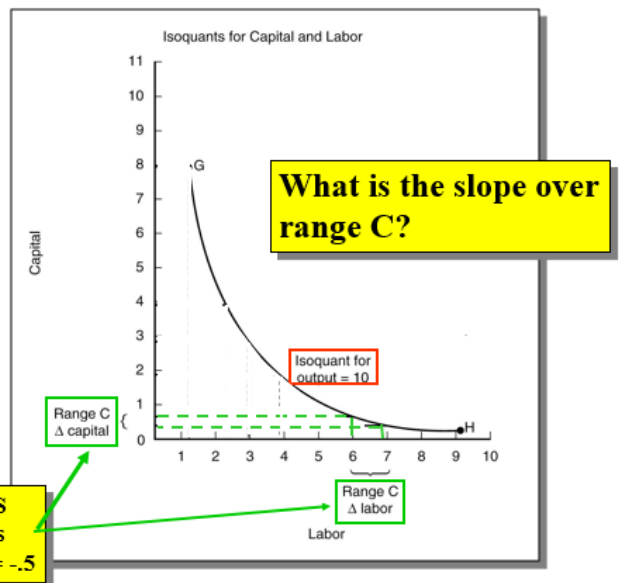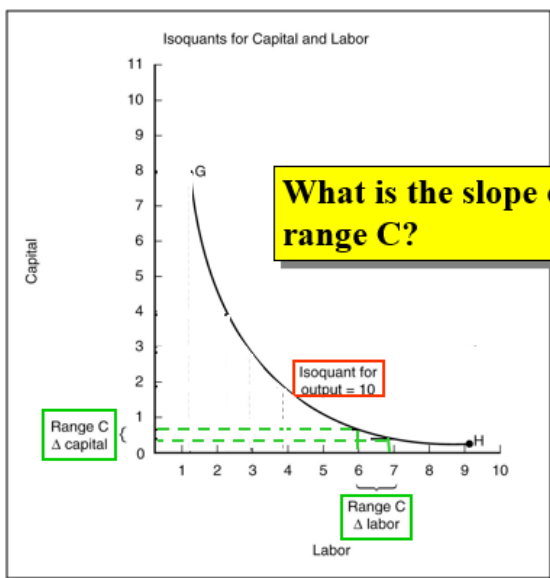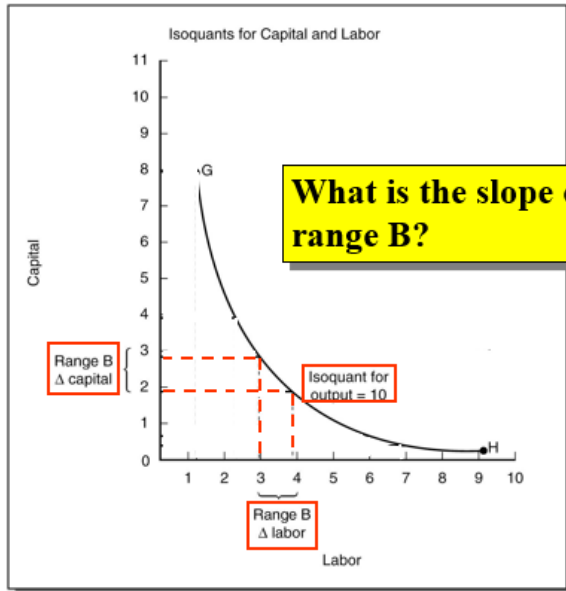$$= \text{RTS (of L for K)}$$
$$= -(\text{Slope of isoquant})$$
$$= \frac{-\text{Change in capital input}}{\text{Change in labor input}}$$
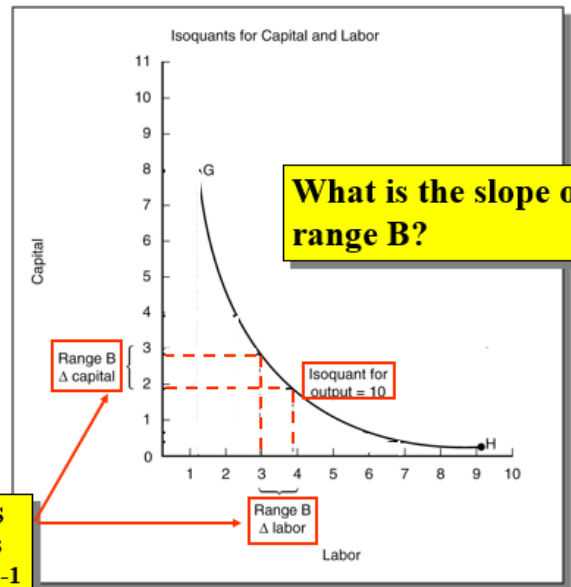
The MRTS and Marginal Products

- Note that the MRTS is equal to the ratio of the marginal product of labor to the marginal product of capital.
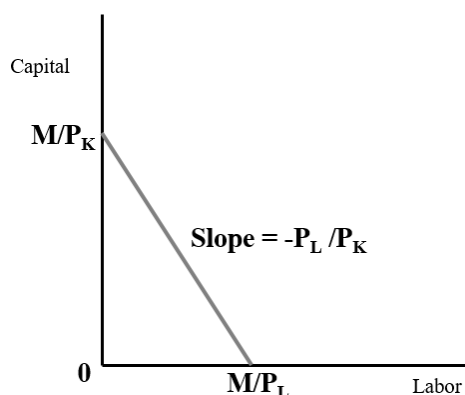
$$\text{MRTS (of L for K)} = \frac{MP_L}{MP_K}$$
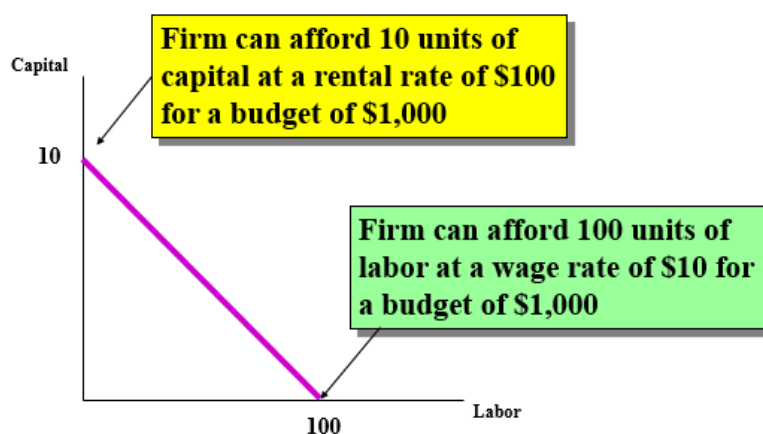
8.3 Introducing Input Prices

Iso-cost curves

- Various combinations of inputs that a firm can buy with the same level of expenditure

$$P_L L + P_K K = M$$

- Where, M is a given amount of money

Plotting the Iso-Cost Line

Least Cost Combination of Inputs to Produce a *Specific* Level of Output

8.4 Producer Equilibrium

- It is attained at the point where the iso-cost line is tangent to the isoquant curve.

- It is the point where the isoqaunt curve just touches the iso-cost line.

- It doesn't intersect the iso-cost line.

- Slope of the isoqaunt curve and iso-cost line are the same at this point

- MRTS = w/r

Least Cost Input Choice for 100 Units

Iso-cost line for $1,000. Its slope reflects price of labor and capital.

100 units of output

Least Cost Input Choice for 100 Units

We can determine this graphically by observing where these two curves are tangent….

100 units of output

Least Cost Input Choice for 100 Units

We can shift the original iso-cost line from AB out in a parallel fashion to A*B* (which leaves prices unchanged) which just touches the isoquant at G

Capital

C_1

A^*

A

G

100 units of output

0

B   B*

L_1

Labor

Least Cost Input Choice for 100 Units

At the point of tangency, we know that:
slope of isoquant = slope of iso-cost line, or...
$MPP_{LABOR} \div MPP_{CAPITAL} = -$ (wage rate $\div$ rental rate)

Capital

C_1

A^*

G

100 units of output

0

B*

L_1

Labor

Least Cost Input Choice for 100 Units

This therefore represents the cheapest combination of capital and labor to produce 100 units of output…

Summary

- ✓ **Concepts of iso-cost line and isoquants**
- ✓ **Marginal rate of technical substitution (MRTS)**
- ✓ **Least cost combination of inputs for a specific output level**

LECTURE 09
Theory of Firms
Supply and Individual Producer

9.1   The Real-World Observation

- As the price a product (or service) **increases**, assuming *ceteris paribus*, producers will supply **more**.

  Note: there is an upward sloping (positive) relationship between price and quantity supplied.

- A change in Price - a movement along the supply curve.

- **Supply** in economics is represented as a **relationship** between price and quantity supplied.

9.2   Individual Supply

Some firms will be able to produce different quantities of a product (service) for the same price.

Why?

Price ($/kg)	Quantity (kg)		
	A	B	C
1	3	6	11
2	5	9	12
3	7	12	13
4	9	15	14

9.3   Market Supply

- All individual producers' quantities supplied are added to create the market supply for a product (service)

Price ($/kg)	Quantity (kg)			
	A	B	C	Market
1	3	6	11	20
2	5	9	12	26
3	7	12	13	32
4	9	15	14	38

Individual Vs. Market Supply Curves
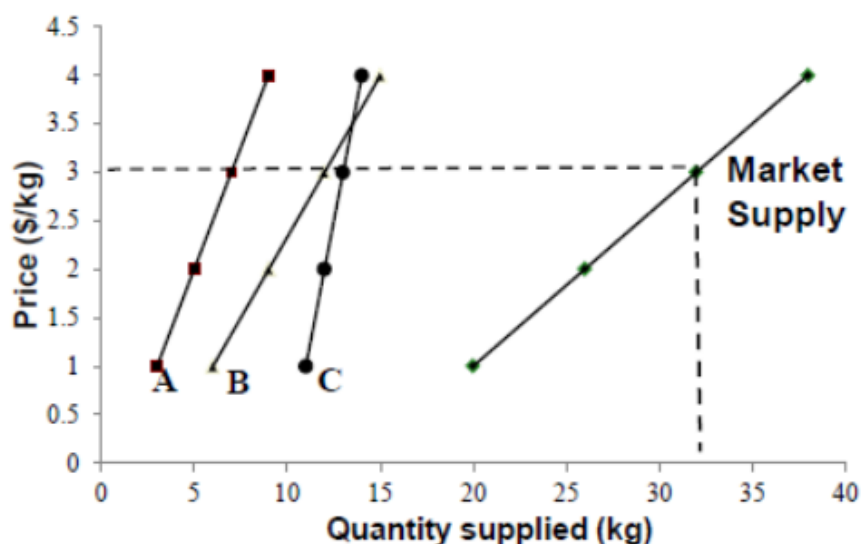
Factors causing shift in supply

1. Change in number of suppliers in the market

2. Change in expectations of future selling price

3. Change in level of input costs

4. Change production to a new, substitute product

5. Changes in technology

6. Changes in government taxes on a product

Shift in Supply

*"A shift" assumes **price remains fixed** and some other variable changes to affect the quantity supplied by the producer/firm.*

Profit = revenue – expense
= price/unit * quantity - expense

If profit is able to be **increased** with price/unit fixed, then one way to do this is to sell the same quantity (or more) if the **expenses are reduced**. ie: reducing expenses will help shift the supply curve to the **right**.
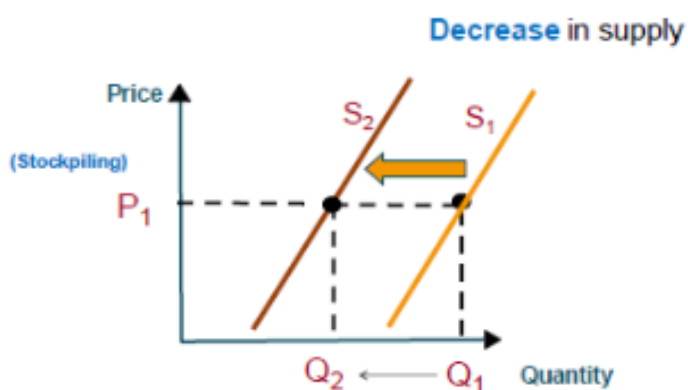
1. **Change in no. of suppliers in the market**

   Example: Explain what happen to the market supply of maize after the outbreak of caterpillar called "Sena"
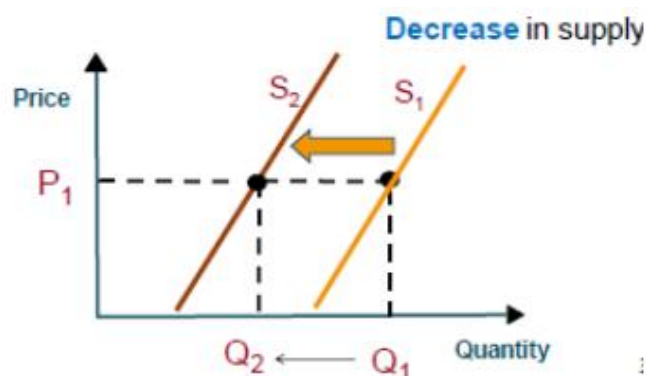
2. **Change in expectations of future selling price**

   Example: The price of gold in 2018 was nearing Rs.52,000 per pound and talk in the market suggested it might reach Rs.59,000 per pound in the near future.

   Stockpiling: Accumulating a larger stock for future use.

   The current supply decreases as producers keep the stocks for future use.

3. **Change in level of input cost**

   Example: In the construction industry, small residential builders can face increasing costs for construction materials such as reinforcing steel, as well as higher wages. Often builders are not able to cover these costs and go out of business.

Decrease in supply

Price

S_2 S_1

P_1

Q_2 ←── Q_1 Quantity
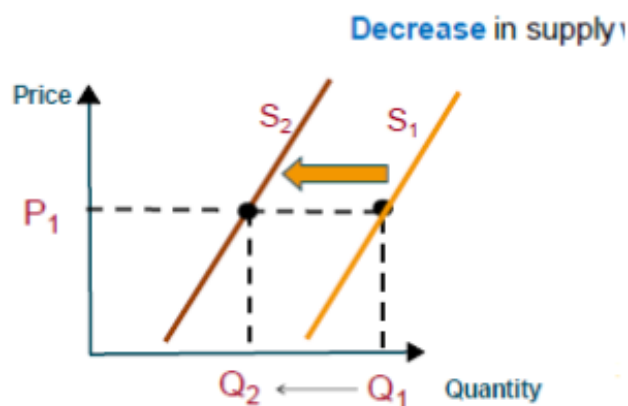
4. Change in production to a new, substitute product

Example: Apple decides to drop the production of its i-pod and put more effort into the production of the i-phone. What happens to the supply curve for i-pods?

Decrease in supply

Price

S_2 S_1

P_1

Q_2 ←── Q_1 Quantity
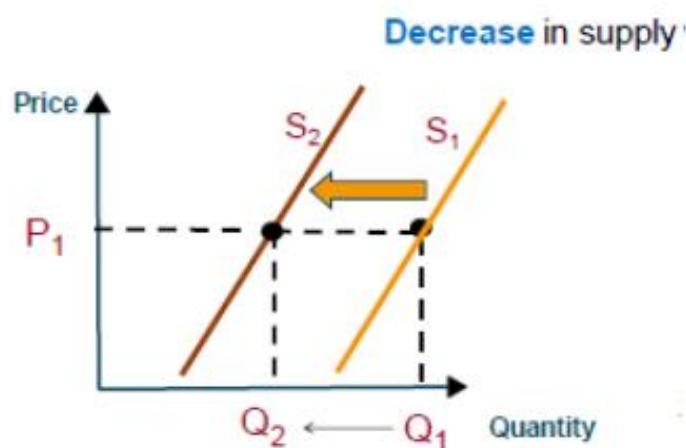
5. Changes in technology

Example: An improved technology used in tea processing industry increases tea exports.

Increase in supply

Price

S_1 S_2

P_1

Q_1 ──→ Q_2 Quantity
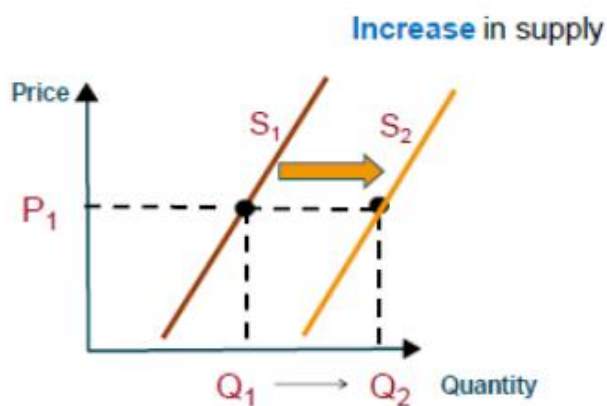
6. **Changes in government taxes on a product**

Example: The Government decides to increase the tax on cigarettes by Rs.2 a packet. What is the effect on the supply of cigarettes?

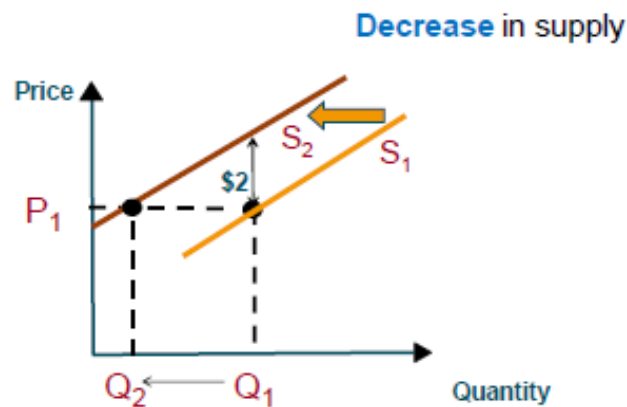## 9.4   Market Equilibrium
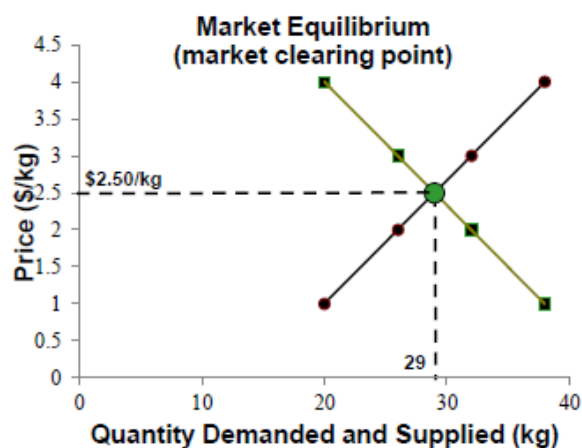
The interaction of supply and demand

- The intersection of the supply and demand curves so

  i. quantity supplied = quantity demanded

  ii. selling price = purchase price

- A point where suppliers are happy to sell a given quantity at a certain price, and this exactly matches the price consumers are willing to pay for this quantity supplied.

- A situation where there is no tendency for the price to change (both consumers and suppliers are happy)

Questions

1. Assume a linear supply function of paddy is : $Qs = -30 + 10P$. Using this supply function,

   I.   Calculate the quantity supplied for prices from Rs.4 – Rs.10

   II.   Plot these figures to give the supply curve for paddy

2. Suppose monthly quantity demand function for chicken meat is, $Qd = 10,000-80P$, and monthly quantity supply function for the same is, $Qs=20P$.

   I.   Find the equilibrium price and equilibrium quantity

   II.   Graphically illustrate the market equilibrium

3. Suppose that demand is given by the equation $Q_D=500 – 50P$, where Q_D is quantity demanded, and P is the price of the good. Supply is described by the equation $Q_S= 50 + 25P$ where Q_S is quantity supplied

   I.   What is the equilibrium price and quantity?

   II.   Graphically illustrate the market equilibrium

4. If the demand and supply curve for potato are:

   $D = 100 - 6P$,

   $S = 28 + 3P$.

   Where P is the price/1kg of potatoes. What is the price and quantity of potatoes bought and sold at equilibrium?

LECTURE 10
Theory of Firms
Cost Functions

10.1 Cost Function

Cost is a function of inputs,

$$C = f(L,K)$$

Where C = Cost of Production of the Product

10.2 Important categories of costs

* Fixed Costs, Variable costs and Total Costs

10.2.1 Fixed Costs (FC)

* Costs that are spent and cannot be changed in the period of time under consideration.
* No fixed costs in the LR
* Do not change with the level of output
* Include overhead costs
* DIRTI 5 (Depreciation, Interest, Rent, Taxes, Insurance) are included in fixed costs.

10.2.2 Variable Costs (VC)

* Costs that change as output changes
* As output increases, variable cost increases

10.2.3 Total Costs (TC)

* Sum of the fixed and variable costs

$$TC = FC + VC$$

Total Vs Average Costs

Total Cost:
- **total** expense incurred in reaching a particular level of output.

Average Cost

- Cost per unit of output.
- total cost is divided by the quantity produced to obtain average cost

Average Total Cost, Average Fixed Costs and Average Variable Costs

➢ Average Total Costs: - Total cost per unit of output

$$ATC = \frac{TC}{Q}$$

➢ Average Fixed Costs

$$AFC = \frac{FC}{Q}$$

➢ Average Variable Costs

$$AVC = \frac{VC}{Q}$$

Where Q = Quantity produced

10.2.4 Marginal Cost (MC)

The most important cost considers when deciding how many units (quantity) to be produced.

MC - The increase (or decrease) in total cost from increasing (or decreasing) the level of output by one unit.

Question 1

O/P	FC $	VC $	TC (FC+VC) $	MC (ΔTC / ΔOUTPUT) $	AFC (FC/OUTPUT) $	AVC (VC/OUTPUT) $
3	50	38	88			
4	50	50	100			
9	50	100	150			
10	50	108	158			
16	50	150	200			
17	50	157	207			
22	50	200	250			

Answer 1

O/P	FC $	VC $	TC (FC+VC) $	MC (ΔTC / ΔOUTPUT) $	AFC (FC/OUTPUT) $	AVC (VC/OUTPUT) $
3	50	38	88		16.67	12.66
4	50	50	100	12	12.50	12.50
9	50	100	150	10	5.56	11.11
10	50	108	158	8	5.00	10.80
16	50	150	200	7	3.13	9.38
17	50	157	207	7	2.94	9.24
22	50	200	250	8.6	2.27	9.09

Shapes of the Cost Curves- SR
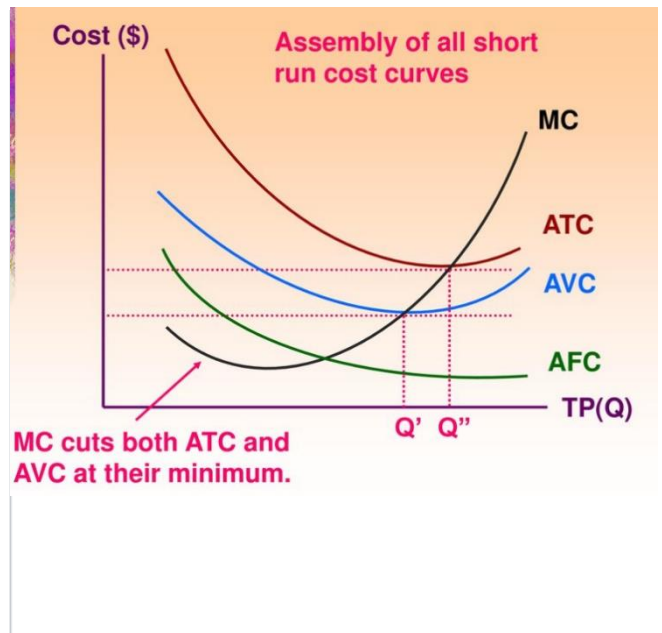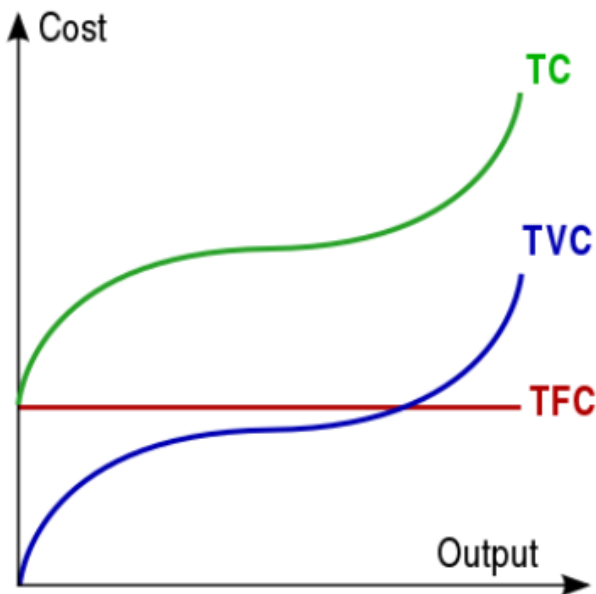
CURVE	SHAPE
1. Total Fixed Cost	Constant ,Doesn't change with the output.
2. Avg. Fixed cost (AFC)	Downward sloping
3. Avg. Variable cost (AVC)	U. Shaped
4. Avg. Total cost (ATC)	U. Shaped
5. MC	U. Shaped . Goes through the minimum points of AVC & ATC

Change with the level of

$$AVC = \frac{TVC}{Y} = \frac{P_x X}{Y} = P_x \frac{X}{Y} \quad \longleftarrow \quad \boxed{1/APP}$$

$$AVC = \frac{P_x}{APP}$$

$$MC = \frac{\Delta TC}{\Delta Y} = \frac{\Delta TVC}{\Delta Y} = \frac{P_x(\Delta X)}{\Delta Y} = P_x \frac{\Delta X}{\Delta Y} \quad \longleftarrow \quad \boxed{1/MPP}$$

$$MC = \frac{P_x}{MPP}$$

- Production Analysis ⟷ Cost Analysis
- Laws governing costs are the same laws governing productivity

- When MPP ↓ ⟶ MC ↑

  APP ↓ ⟶ AVC ↑

  - Therefore, productivity falls is equivalent to that cost rises.
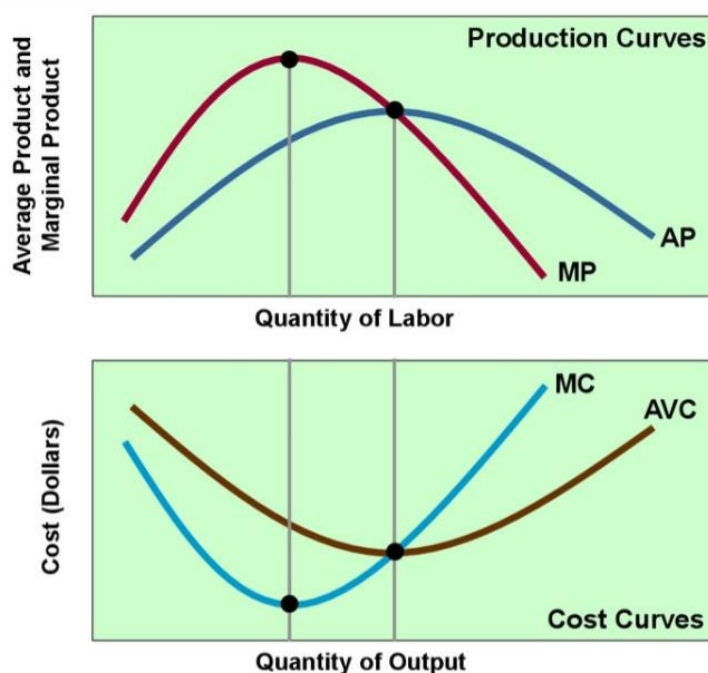
In short run,

Output can only be raised by increasing variable input

↓

More and more variable input add to fixed input

↓

Law of Diminishing marginal returns

↓

MPP & APP fall

**The Relationship between Productivity and Cost**

- Minimum of AVC is the maximum of APP (at the same output levels)

- The minimum point of the MC is the same level of output at the maximum point on MP

- When productivity curves are falling, corresponding cost curves are rising.

- Reason :-

  - As productivity falls → Costs per unit ↑
  - As productivity increases → Costs per unit ↓

Economics of scale

Production	Cost
When MPP> APP , APP ↑ If MP< AP then AP is falling When MPP= APP , APP maximum	If MC > ATC , then ATC↑ If MC = ATC , ATC minimum If MC < ATC , then ATC ↓ If MC > AVC , then AVC ↑ If MC = AVC , AVC is minimum If MC < AVC , AVC is↓

Shift in Cost Curves
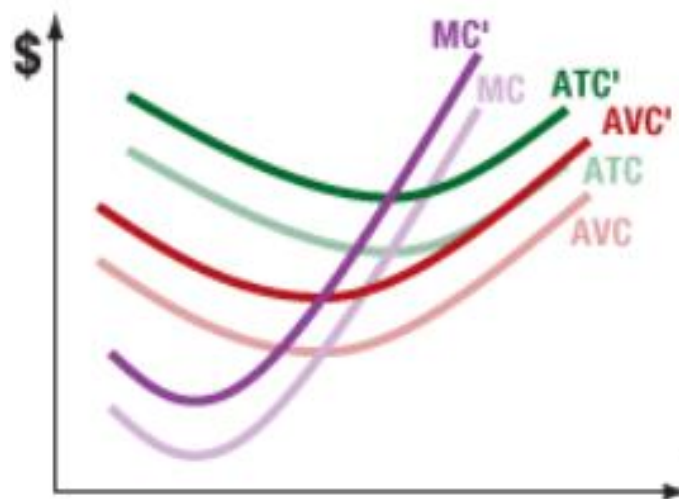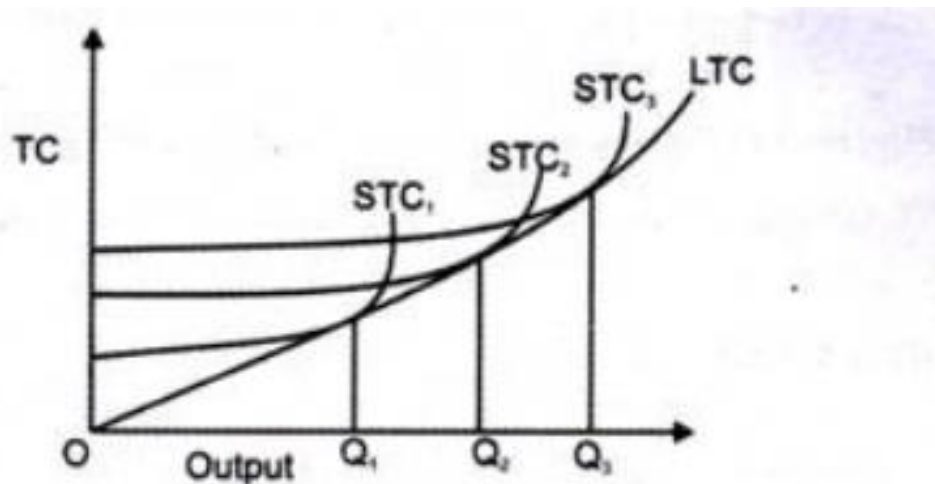
Long-Run Cost Curves

- The law of diminishing marginal returns doesn't apply to the long run since in the long run all inputs are variable.

- The most important determinant of economic efficiency in long run → Economies of scale

When long-run ATC decrease as output increase

Long-Run Total Cost (LRTC) Curve

- The summation of short-run TC curves gives you the LRTC curve.

- The LRTC curve is **a cost function that models the minimum cost over time, meaning inputs are not fixed**. Using the long-run cost curve, firms can scale their means of production to reduce the costs of producing the good.

Long-run Average Total Cost Curve
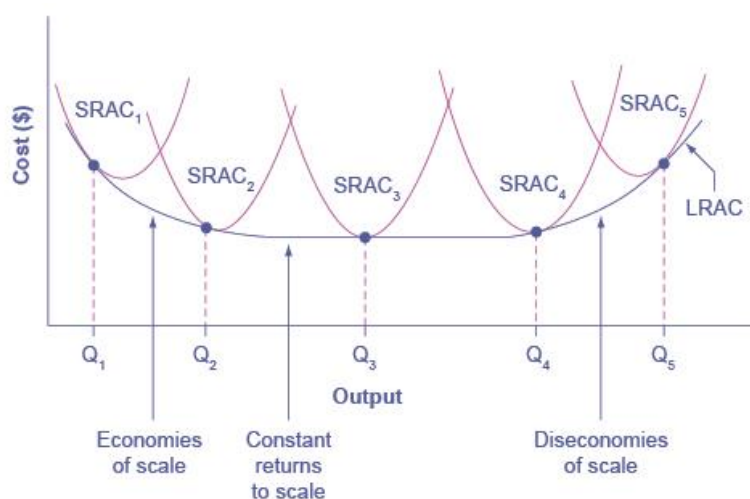
- In the long run, all inputs are variable, so only <u>economies of scale</u> can influence the shape of the long run cost curve. Businessmen prefer to maintain their scale of production at the "*Minimum efficient scale of production*"
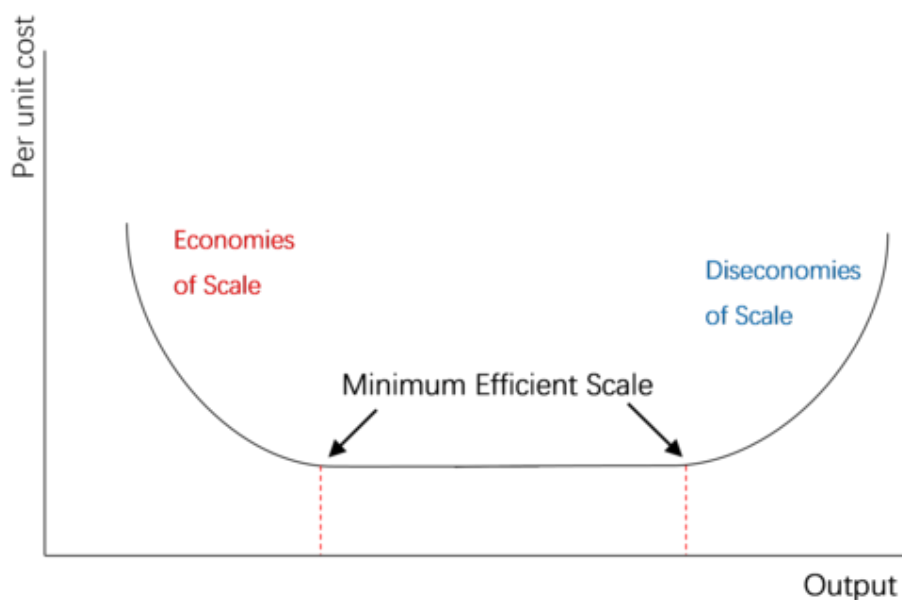
At the *Minimum Efficient Scale of production*,

- Price at which they expect to be able to sell a good.

- The market has expanded to a size, large enough for the firms to take advantage of all economies of scale.

- Point at which ATC is minimum.

LECTURE 11
Market Structures

11.1 Types of Market Structures
1. Perfect Competition

2. Monopoly

3. Monopolistic Competition

4. Oligopoly

11.1.1 Perfect Competition
- This refers to a market in which an individual buyers or sellers can not influence the price
- All the buyers and firms are price takers

- This requires the following conditions
  - ✓ Large number of buyers and sellers
  - ✓ Freedom of entry and exit
  - ✓ Homogenous products
  - ✓ Perfect knowledge
  - ✓ Perfect knowledge of factors of production

Equilibrium of the Firm (Short run)
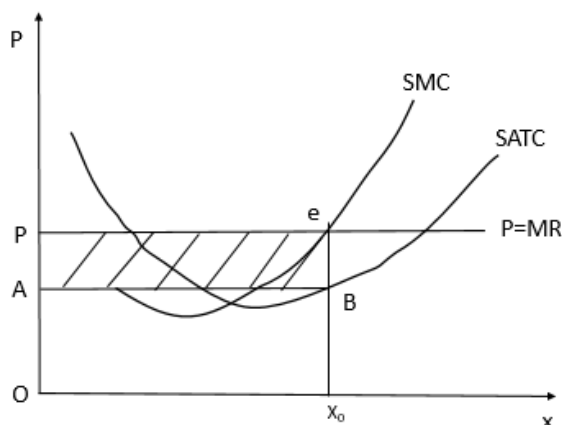
- Since the firm can not influence the price the AR will be constant. Therefore AR=MR

In the short run,

- Market price will be higher than the average cost of many firms

- The profit maximizing output is produced at an average cost which is higher than the minimum cost

- AC is rising. Similarly at this output MC is also rising. There is production inefficiency since output is not at the minimum cost

- If P=MC production is allocatively efficient

- However firms are earning abnormal profits in short run

- The demand for the firm's product is perfectly elastic

In the long run,

- New firm will enter the market due to the abnormal profits

- As a result market price will fall

- Then the firms will not be able to earn abnormal profits

- They will earn normal profits

- The normal profit is the minimum amount necessary for the firm to remain in the business

- It is the opportunity cost of entrepreneurship

- It is included in the cost

- Furthur the output will be optimum

- The average cost will be minimized

- There is productive efficiency

- The price is equal to MC

- It means that there is allocative efficiency

Industry
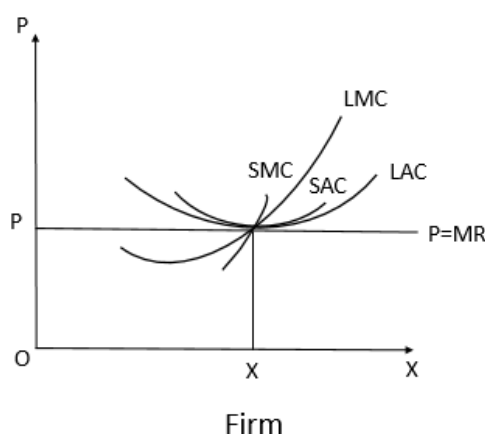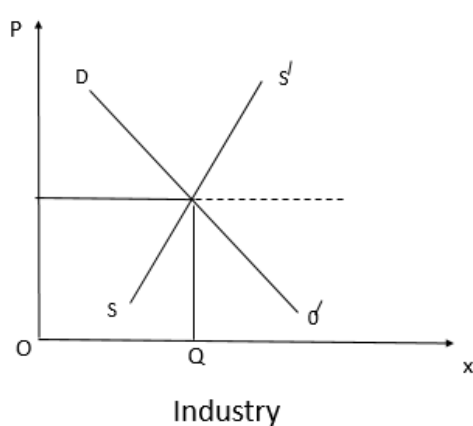
Firm

Supply Curve in Perfect Competition
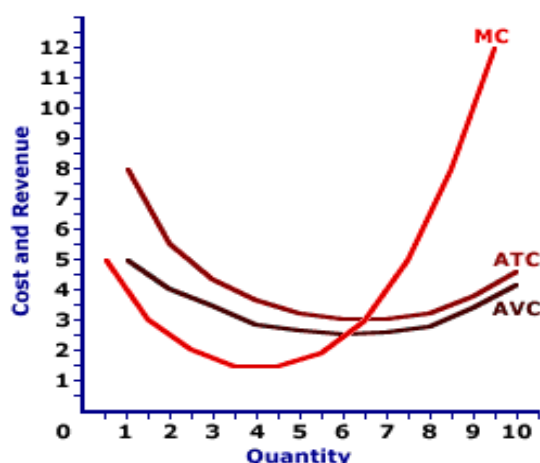
- In perfect competition, P=MR
- When MR=MC the price is directly related to the quantity
- Therefore the MC curve indicates the supply
- But firms do not produce goods when they cannot cover even their variable costs
- It means that price should be at least equal to the AVC
- Therefore the supply curve is the MC curve above the AVC cost

Advantages of perfect competition
- The best form of market structure
- Competition will improve the quality and reduce the price
- Reasonable price (price = MC)
- In the long run produce optimum output at the lowest AC
- There is allocative efficiency and production efficiency

11.1.2 Monopoly

- This is a market structure where a single firm controls the industry. Eg: CTC, Petrolium etc
- Therefore the industries demand and the firms demand are equal
- When the firm increases the output, the market supply will rise and the market price will fall
- Similarly the firm produces less there will be shortage of goods in the market and the price will rise

- Therefore the firm is a price maker
- The monopolistic can not increase the price and the quantity at the same time
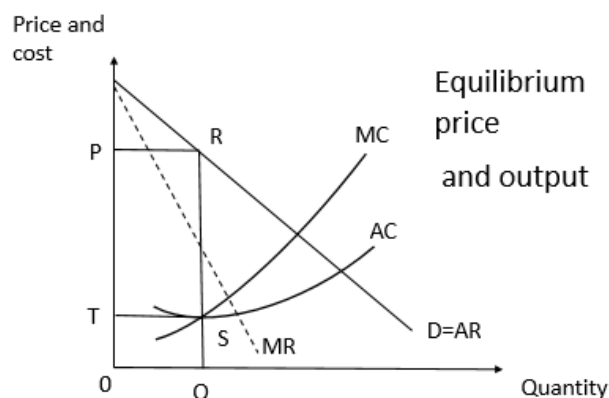
Disadvantages of monopoly

1. Usually price is higher than the MC
2. Output is less than the optimum
3. Impose barriers to new firms
4. Less choice for the consumers
5. Can use their large profits to influence the government
6. There will be more inequalities in the distribution of income and wealth

Price Discrimination

- This occurs when the same product is sold to different buyers in different in markets at different prices, while the cost of production remains the same

Types of discrimination

- Different prices may charge on the basis of the different factors
  - Income   Age
 - Use   Place
  - Stocks   Type of consumer

11.1.3 Monopolistic Competition

- This is a mixture of monopoly power and competition
- It means that the firms are price makers but there is more than one firm in the market
  1. There are number of firms
  2. No barriers to entry

3. The products are differentiated or branded (the firms can influence the prices of their product, they are similar but not perfect subsitutes)

4. These firms spend large sums of on advertising and sales promotion

5. The decisions of one firm may not affect the others so much

Short run

- Firms earn abnormal profits
- Firms are price makers AR is sloping downwards
- Price>MC
- Output less than maximum

Equilibrium price and output
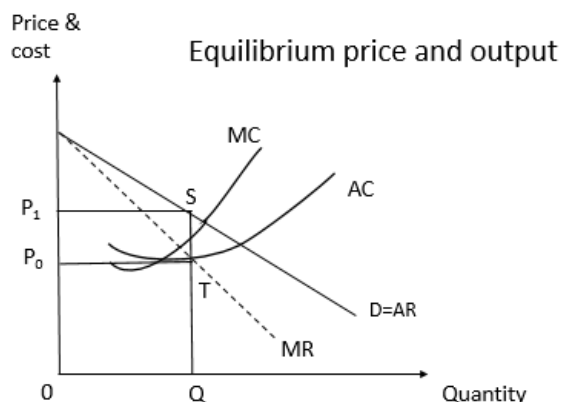
Long run

- New firms enter the market and introduce new brands, as a result there will be reduction in demand for the existing brands

- No abnormal profits AR=AC

- Price>MC

- Output is less than optimum
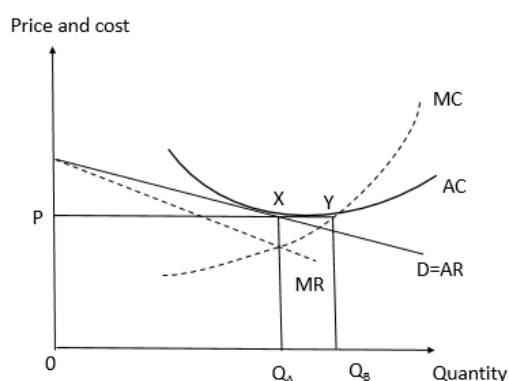
11.1.4 Oligopoly

1. The market is controlled by firms. The concentration ratio is high
    Eg : 5 big firms may be producing the 80% of the output
2. Therefore is a very high degree of inter dependence
3. The decision of a firm will affect on others
4. A firm has to consider the possible reactions of others
5. It is difficult predict other's reactions. Thereby uncertainty is there in the oligopoly market.

LECTURE 12
Introduction to Macroeconomics

12.1 Key Concepts of Macroeconomics

12.1.1 Gross Domestic Product (GDP)

- Gross domestic product (GDP) is the total monetary or market value of all the finished goods and services produced within a country's borders using domestically own factors of production in a specific time period.

- As a broad measure of overall domestic production, it functions as a comprehensive scorecard of a given country's economic health.

12.1.2 Gross National Product (GNP)

- GNP is the value of all finished goods and services owned by a country's residents over a period of time.

- GNP measures the value of goods and services produced by only a country's citizens but **both domestically and abroad**.

12.1.3 Per capita GDP

- Per capita GDP is a measure that breaks down a country's economic output per person and is calculated by dividing the GDP of a country by its population.

- GDP per capita in Sri Lanka was expected to reach 3950.00 USD by the end of 2020, according to Trading Economics global macro models and analysts' expectations.

- In the long-term, the Sri Lanka GDP per capita is projected to trend around 4100.00 USD in 2021 and 4300.00 USD in 2022, according to econometric models.

12.1.4 Inflation

- In economics, inflation is a rise in the general level of prices of goods and services in an economy over a period of time.

- When the general price level rises, each unit of currency buys fewer goods and services.
- As of April 2022, it is 33.8%.

Effects of inflation

| Investment | Interest rates | Exchange rates | Unemployment |

| Stocks | Decreasing in the purchasing power | Change the allocation of income. |
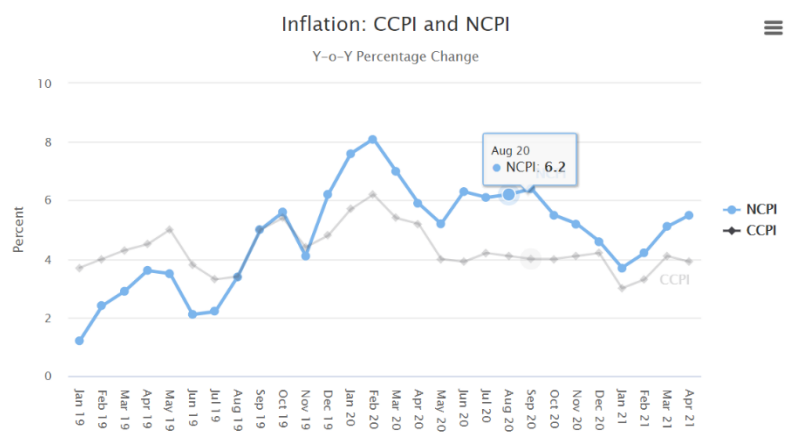
Controlling inflation

➢ Two broader measures

    Monetary measures

- The most important commonly used method is the monetary policy of the central bank.
- Use of high interest rates is the traditional way to prevent inflation.

    Fiscal measures

- Include taxation, government expenditure, and public borrowings.
- Increase in taxes
- Increase in savings
- Surplus budgets

Effect of higher interest rates (monetary measure to control inflation)

Personal	Economy
• Increased cost of borrowing • Improved return for savers • Higher mortgage interest payments • Increased cost of bank loans. • Banks may be more willing to lend. • Could reduce confidence of borrowers	• Currency will appreciate • making exports less competitive, imports cheaper • Inflation – will tend to be lower • Economic growth – will tend to be slower • Unemployment – could rise • Government will see rising borrowing costs

12.1.5 Unemployment

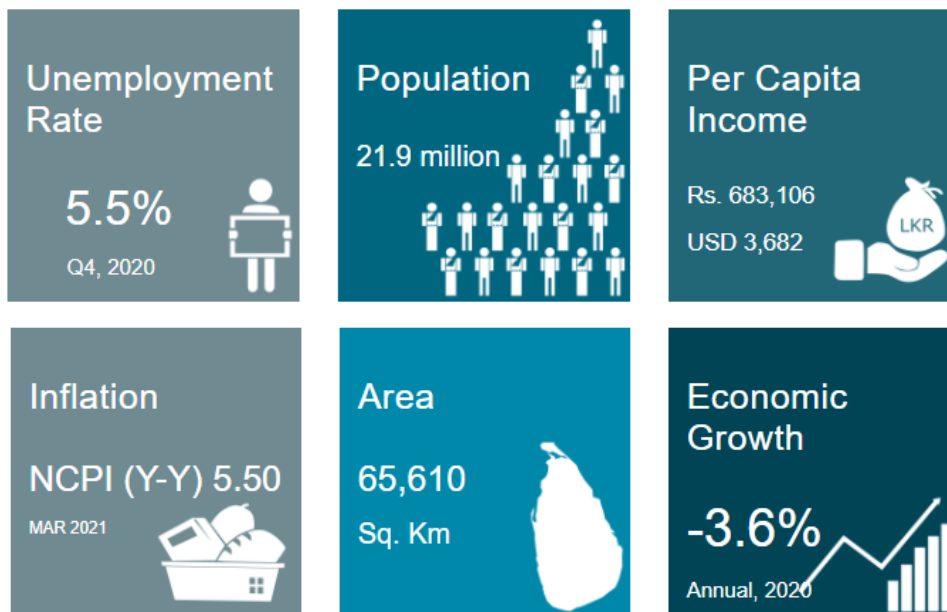- Also known as joblessness

- A situation of actively looking for employment, but not being currently employed.

- Unemployed person – one who having potentialities and willingness to earn, is unable to find a remunerative work.

- **Elements of unemployment**
  - An individual be capable of working

  - An individual should be willing to work

  - An individual must make an effort to find work
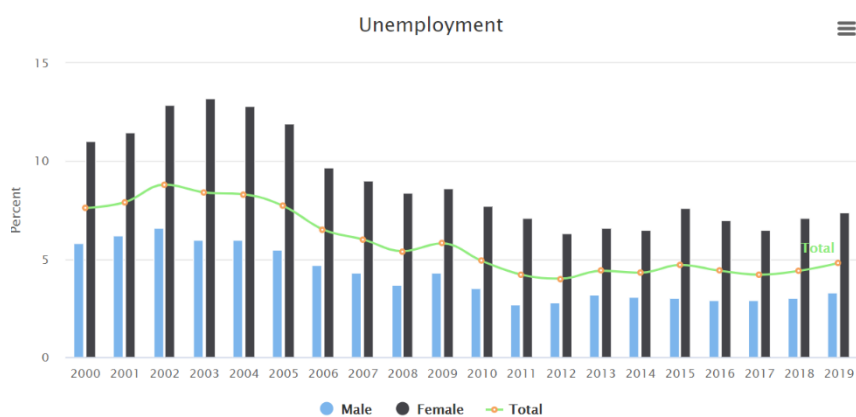
Agricultural unemployment

- The landholding are so small that even the family members of the working age groups are not absorbed by the land.

- Subdivision of land or land fragmentation is a cause for agricultural unemployment as land becomes an uneconomic holding.

Sri Lanka Economy Snapshot

Unemployment Rate	Population	Per Capita Income
5.5% Q4, 2020	21.9 million	Rs. 683,106 USD 3,682
Inflation NCPI (Y-Y) 5.50 MAR 2021	Area 65,610 Sq. Km	Economic Growth -3.6% Annual, 2020

# 12.2 National Income Accounting

- NIA is the measurement of the indicators of national output/income
  - *i.e. GDP, GNP*

12.3 Circular flow diagram

- Summarizes the transactions between different agents in the economy.
- Agents :
  - Households
  - Firms (Businesses)
  - Government
  - Foreign Trade

- Assumptions
    - The economy is composed of households and firms only
    - Households : own factors of production
    - Firms : hire factors of production to produce goods and services
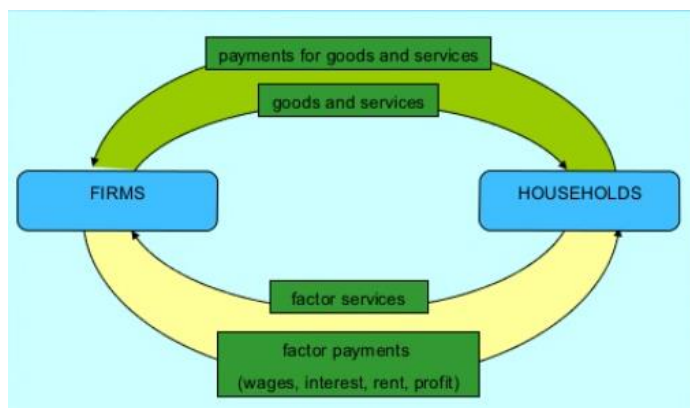
- Upper loop of the circular flow diagram, transactions in the goods and services markets.
- Lower loop: transactions in the factor markets.
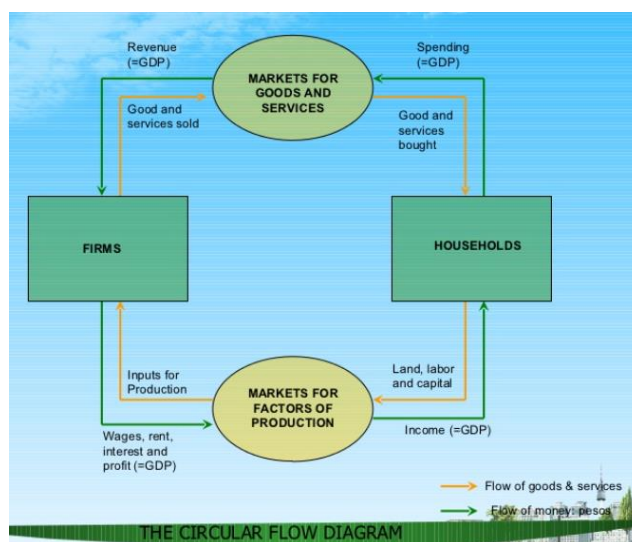
Circular diagram with government and foreign agents

- Need to account for,
    - Government purchases of goods and services.
    - Government payments for factor services (i.e. wages, rent, interest).
    - Transfer payments between different agents (i.e. retirement benefits, scholarships, donations).

- Firms and households pay taxes to government.

- Taxes paid on income, property, goods and services.

- Transactions with foreign sector (i.e. exports, imports).

Measurement of Economy's output: GDP

> GDP measures the market value of all final goods and services produced within an economy in a given period.

> GDP only measures current production.

> Transfer payments and transactions involving goods produced in other periods are NOT included in the calculation.

> GDP is usually expressed in the currency of a particular country.

Definition of GDP (Mathematical explanation)

- The market value of good i (Vi) is equal to Pi.Qi.

    - $V_i = P_i \times Q_i$

- GDP = sum of the market values of all final goods and services produced within the year.

    - $GDP = \sum_{i=1}^{n} V_i = \sum_{i=1}^{n} P_i \times Q_i$

- GDP includes final goods and services only.

- Final goods – goods and services that are NOT purchased for the purpose of producing other goods.

    - *i.e. Rice (final) and unhusked rice (intermediate product)*

- Including intermediate goods and final goods will result in "double counting".

Approaches for measuring GDP

- **Expenditure approach (upper loop)**

    - Measures GDP as the sum of expenditures on final goods and services.

- **Income approach (lower loop)**

    - Measures GDP as the sum of incomes of factors of production (wages, rent, interest, and profit).

- **Value-added approach**

    - Measures GDP as the sum of value added at each stage of production (from initial to final stage).

12.4 Expenditure Approach
- Uses the upper loop of the circular flow diagram.

- The expenditure approach to calculating GDP takes into account the sum of all final goods and services purchased in an economy over a set period of time. That includes all consumer spending, government spending, business investment spending, and net exports.

- i.e. Suppose the economy has only one product namely, Rice.

Good	Price per unit	Quantity sold	Expenditure
Rice	20	1000	20,000
GDP			20,000

12.5 Income approach
- Uses the lower loop of the circular flow diagram.

    - *Sum of payments to the various factors of production.*

- Suppose that in the production of rice the sales and expenditure details are as follows.

Sales		20,000
Expenses:		
Wages	8,000	
Rent	4,000	
Interest	2,000	
Total	14,000	
Profit	6,000	
GDP = Sum of payments to factors of production	**20,000**	**20,000**

12.6 Value Added Approach
- Suppose that rice is the only final product of an economy.

- It goes through several stages of production.

    - *Here we assumed there are three stages of production.*

Stage of production	Value of intermediate good	Value of sales	Value-added
Farmer - Paddy		12,000	12,000
Rice miller – Milled rice	12,000	15,000	3,000
Retailers - Rice	15,000	**20,000**	5,000
GDP – Total Value Added			**20,000**

Summary of Three Approaches

- All three approaches (expenditure, income, and value-added) obtained the same estimate of the GDP.

- Hence, they are equivalent approaches.

- In the income approach, profits are considered as a payment to the entrepreneur.

- In the value-added approach, only the value added in each stage of production are included.

  - *Incomes considered – wages, rent, interest, and profit*

- If we add the value of intermediate product with the value of the final product, then it is double counting.

- At each stage, value-added is equal to wages, interest, rent, and profit.

- Therefore, the value of the final product is the sum of all payments to the factors of production.

12.7 Macroeconomic identity

- We know from the expenditure approach that everything produced in a country in a period is „consumed", in the wider sense, as private consumption, government consumption, investment, and net exports.

- This can be expressed in a basic formula:

  - $GDP = Y = C + I + G + NX$

- Approaching from the income side, we see that all income is spent on consumption, savings, or taxes. Accordingly, we receive:

  - $GDP = Y = C + S + T$

Equilibrium conditions

- Both are identities that have to hold all the time.
- We can therefore always combine them to get
    - $C + I + G + (X - M) = C + S + T$
- Which can obviously be rewritten as
    - $(S - I) + (T - G) = (X - M)$
- In a closed economy:
    - *No trade.*
    - *X-M=0*
    - *Private savings are invested or pay a government budget deficit.*
- Without a government:
    - *Simple economy*
    - *T-G=0*
    - *Private savings are invested at home or abroad.*
- Closed economy without government
    - *S=I*

Reference Textbooks

Principles of Economics, (2020). NG Mankiw. Cengage Learning, USA.

Principles of Microeconomics, (9th ed), (2021). NG Mankiw. Cengage learning, USA.

Economics, (11th ed), (2019) David C. Colander, Middlebury College.