
Managerial Economics

Lecture Notes

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For comments

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Chapter 1

INTRODUCTION

Definition of Economics

Economics is a SOCIAL SCIENCE discipline. It is primarily concerned with HOW to use SCARCE resources to meet UNLIMITED human wants. In other words, it relates to the CHOICES of how scarce resources could be OPTIMALLY used to produce RELEVANT GOODS and SERVICES that satisfy human wants.

A systematic study of human economic behavior is only possible due to the reasonable degree of consistency and general tendencies in people's economic behavior that tend to be reasonably stable over time. This consistency and stability in human economic behavior is believed to spring from human RATIONALITY. Indeed much of neoclassical economic theories are underpinned by RATIONAL CHOICE THEORY.

Rational choice theory makes the fundamental assumptions that individual economic agents are RATIONAL, SELF INTERESTED, UTILITY MAXIMIZERS – that is, they seek to maximize their satisfaction or gain albeit within the bounds of available information (BOUNDED RATIONALITY). This assumption underpins the observed ORDER and PREDICTABILITY in human economic behavior.

Economics has traditionally been divided into “MICRO” and “MACRO” economics with microeconomics focusing on the economic decisions of individual economic agents such as individuals, households, firms, markets and industries, while macroeconomics addressing aggregate economic phenomena such as unemployment, the general price level, growth in national income, the balance of payments and macroeconomic policy among others.

The discipline of economics has however now grown into many branches that address various relevant aspects of human economic behavior. Some of these branches include Development Economics, International Economics, Welfare economics, Monetary Economics, Industrial Economics, and Labor Economics.

Managerial economics is the branch of economics that deals with the application of economic principles in management decision making. The roots of managerial economics are in microeconomics and its RELEVANCE to management stems from the fact that MANAGERS OPERATE IN THE CONTEXT OF SCARCITY in attempting to ACHIEVE the GOALS and OBJECTIVES of the business or organization.

Definitions of Managerial Economics

Managerial economics is the study of economic theories, logic and tools of economic analysis used in the process of business decision making. Economic theories and techniques of analysis are applied to analyze business problems, evaluate business options and opportunities with a view to arriving at appropriate business decisions (Dwivedi 2004).

Managerial economics is concerned with the application of economic concepts and economics to the problems of formulating rational decision making (Mansfield 1966).

Managerial economics is the integration of economic theory with business practice for the purpose of facilitating decision making and forward planning by management (Spencer and Seigelman 1969).

Managerial economics is concerned with the application of economic principles and methodologies to the decision making processes within the firm or organization. It seeks to establish rules and principles to facilitate the attainment of the desired economic goals of management (Douglas 1987).

Managerial economics applies the principles and methods of economics to analyze problems faced by management of a business or other types of organizations and to help find solutions that advance the best interests of such organizations (Davis and Chang 1986).

Fundamental Economic Questions

A central issue in economics is SCARCITY. It refers to the limitation of natural and man-made resources used in meeting the needs and wants of humans. Scarcity leads to CHOICE or PRIORITIZATION and choice in turn implies OPPORTUNITY COST if the options are mutually exclusive.

Society has to make the decisions of WHAT goods and services, HOW, WHEN and FOR WHOM to produce. In a large measure these choices are made by firms and businesses in the production sector in response to market demand and signals.

The importance of production sector is not limited to the choice of “what”, “how”, “when” and “for whom” to produce but encompass the effect of the choices on economic development. For example small labor intensive enterprises are known to contribute significantly to employment creation, growth in national income and poverty reduction in many countries.

The resolution of the fundamental economic choices of what, when, how much and for whom to produce largely depend on the role of competitive market forces or PRICE MECHANISM. The market forces are believed to ensure optimal resource allocation in accordance with the principle of

CONSUMER SOVEREIGNTY. Consumer sovereignty refers to the influence of consumer demand on the structure of production. The choices of consumers are relayed and coordinated by the price mechanism, thus, the importance of functioning markets.

The **PRICE MECHANISM** is the process that **COORDINATES** the **FORCES** of **DEMAND** and **SUPPLY** moving the system toward equilibrium in the market. The central issues in economics may be restated as follows:

- Human wants are **UNLIMITED**;
- Resources to satisfy them are limited or **SCARCE**;
- Our **CAPACITY** to meet the wants is limited;
- Scarcity necessitates **PRIORITIZATION** and **CHOICE**;
- Choice in turn leads to **OPPORTUNITY COST** (the value of the best alternative foregone in making the choice).

The recognition of the fundamental questions of economics in turn begs the question of how societies are to **ORGANIZE** themselves **POLITICALLY**, **SOCIALLY**, and **ECONOMICALLY** to meet the unlimited human wants. This is the question of “**POLITICAL ECONOMY**” or “**ECONOMIC SYSTEM**” and primarily relates to: a) the nature of ownership of the means of production, b) the role of markets and c) the role of the state in the welfare of the society.

Economic Systems

The term “economic system” refers to the system of ownership of the means of production; the allocation of natural resources; the role of the market and the role of state in the society. It refers to the organization of production in an economy and the socioeconomic and political system underpinning the allocation of the benefits, opportunities and burdens in the society. Historically there have been three main types of political economies, namely:

- Liberal Market capitalism
- Centrally planned economic systems
- Mixed economic systems

In practice most economies tend to be mixed with varying degrees of market orientation and government social interventions. The parameters of economic systems may therefore be stated as:

- The nature of ownership of the means or factors of production such as land, labor capital and entrepreneurship;
- Private Property Ownership – free market capitalist societies allow private property ownership while command societies have collective ownership of the means of production;
- Role of State – free market economies define a minimal role for the state while command economies have a greater role for state;
- Role of Markets – the market is the most central institution in free market societies and plays a big role in the allocation of resources.

The most predominant economic philosophy in the world today is liberal market capitalism but with varying degrees of social interventions by the state.

This system permits the private ownership of the means of production, market competition and minimal regulatory role for the state. Adam Smith (1776) compared the “SELF-ORGANIZING” effect of the DECENTRALIZED, “SELF-INTERESTED” decisions of individuals to that of an “INVISIBLE HAND” and asserts that it leads to optimal resource allocation. “It is not by the benevolence of the baker that we get our bread...” rather it is through his pursuit of his own self interest!

Economic Ideologies and Businesses

The appropriateness of the economic system for enterprise activity and its morality to the society may be assessed in terms of “economic freedoms” available to individuals and “social justice” in the society. Social justice is the general principle that individuals should receive what they deserve – in other words, it involves giving each person his or her due.

“Merits” of Liberal Capitalism

Liberal capitalism is often argued to:

- Promote individual economic freedom and initiative taking;
- Rewards enterprise and hard work;
- Results in efficient resource allocation;
- Increases productivity of workers and the efficiency of production sector;
- Allows competition which has positive effect on quality of goods and services;
- Allows competition which leads to competitive final prices to the benefit of consumers;
- In a functioning competitive market there is no need for a huge (and often inefficient) “central planning” bureaucracy.

Demerits of Market Capitalism

- Susceptible to worker exploitation;
- May permit gross inequalities in incomes;
- Can promote individualism and self-centeredness;
- May promote “unhealthy” competitive attitudes in the society.

The command or centrally planned model

- Is characterized by centralized planning;
- Social ownership of the means of production;
- Rationing of the benefits of labor among the population;
- Promotes equality;
- Does not promote individual worker exploitation;
- Characterized by high nominal employment;
- Offers relative economic and social security.

Critique of the centrally planned economic system

- Does not permit nor reward individual enterprise;
- There is an absence of profit motive and incentives for personal enterprise and drive.
- Susceptible to collective exploitation;
- Characterized by inefficient resource allocation;
- Characterized by low productivity and lack of individual motivation.

At present there seems to be some degree of consensus on “appropriate” role of government in the economic development of societies. This role is largely seen to include: the correction of market failures; the production of public goods such as defense, infrastructure, law and order; the regulation of especially negative externalities; the equity and redistribution to address concerns for the disadvantaged in the society (social security for the unemployed, disabled, elderly or minorities); and the maintenance of macroeconomic stability.

Relevance of economics to management

The subject matter of economics is relevant for managers of businesses and organizations in the following respects:

- In analyzing the market conditions for a firm’s product;
- In minimizing production costs;
- In optimizing output levels;
- In optimizing productivity;
- In making other appropriate choices in factor markets;
- In efficiently managing the human and material resources of the organization;
- In understanding and responding appropriately to monetary and fiscal policy initiatives by government;
- In dealing effectively with domestic and global market conditions.

Influences relevant for management

Businesses and management activities take place in the wider economic context of the country and so are affected by things like:

- Input market conditions;
- Structure of market for the product;
- Cost of utility and other services;
- Reliability of utility services;
- Rate of inflation;
- Level of unemployment;
- Growth rate of the economy;
- Fluctuations in the growth of the economy;
- Interest rates;
- Exchange rates;
- Balance of payments;
- Position of government budget;

- Level of government's borrowing requirement;
- Investment policy and procedures;
- The wider political system and the functioning of the government bureaucracy.

Assumptions Underlying Economic Behavior

- Rational self interest and utility maximizing behavior;
- Choices of individuals constitute a "vote" for the good supplied;
- Cumulative choices have a "self organizing effect" (as if by invisible hand – Adam Smith);
- Choices of individuals lead to efficient resource allocation;
- The true cost of products and resources are their "opportunity cost" values.

Methodology of economic analysis

The methodology of economic analysis has:

- Traditionally been positivistic;
- Involves deductive theorizing;
- Data-based empirical testing;
- Moves from hypothesis to theory and to law;
- Employs partial analysis but strives toward more generalized conclusions.
- Has traditionally placed more emphasis on static equilibrium rather than transitional dynamics.

Partial equilibrium

Prediction becomes very complex when all the variables are followed simultaneously! To abstract from the complexity of considering a multiplicity of variables, economists use partial analysis. This looks at a limited set of variables while assuming other variables are constant. Even though this implies incomplete models, extremely useful results are nonetheless possible.

Partial equilibrium examines specific decision making units and abstracts from the interconnections that exist between them and the rest of the economy. It assumes that changes in equilibrium conditions in the market under study do not affect any of the other markets in the economy.

General equilibrium

Examines the interconnections that exist among all decision making units and markets and shows how all parts of the economy are linked together into an integrated system. Thus a change in the equilibrium conditions in one market will affect the equilibrium conditions in every other market, and these will themselves cause additional changes in or affect the market in which the process originally started.

Questions

1. Discuss how different societies have organized themselves to address the question of what, how, when and for whom to produce goods and services making reference to the three main **ideological systems** of economic organization, namely: **centrally planned** system – **free market capitalism** and the **mixed** economic systems.
2. Discuss the relevance of Economic Systems (Ideology) in the development of nations with reference to such countries as North and South Korea, Former East and West Germany, Former Soviet Union, China, Cuba and early post independence Tanzania.
3. Discuss Marx's prediction that capitalism will lead to the widening of the gap between the rich and poor and ultimately the overthrow of the capitalists by the workers (or "proletariat") with the ushering in of a CLASSLESS SOCIETY (COMMUNISM).
4. Discuss the balance in emphasis between market based private sector driven economic development and the role of government in economic development.
5. Monetarism puts emphasis on small non-interventionist government, while Keynesianism acknowledges the important role of governments in maintaining full employment. Discuss.
6. Contrast the appropriate role of the state and of the private sector in more developed societies and in less developed countries.
7. Discuss why you think centrally planned economies have fared poorly and largely collapsed around the world in the late eighties?

Chapter 2

CONSUMER DEMAND

Consumer Demand

Demand in economics is EFFECTIVE demand (Keynes 1936) characterized by two key dimensions:

- a) The DESIRE for the good or service,
- b) The ABILITY to acquire the good (purchasing power).

The satisfaction (UTILITY) expected from consuming a good or service is a key driving force underlying consumer demand for the good or service.

Demand Functions

A function is a mathematical equation that expresses the relationship between two or more variables. For example, the quantity demanded of a good by a consumer is influenced by the price of commodity, price of other goods and services, the consumer's income, the consumer's taste, and social, psychological, cultural, and religious factors. This relationship is often represented as,

$$Q_A = \phi(P_A, P_O, Y, T, S, P_S, C, R...)$$

Where,

P_A	=	Price of good A
P_O	=	Price of other goods
Y	=	income of consumer
T	=	tastes and preferences
S	=	Sociological factors
P_S	=	Psychological factors
C	=	Cultural factors
R	=	Religious factors

This is an IMPLICIT demand function for a good A in terms of the underlying determining factors since the exact equation is not indicated. To simplify the analysis we normally focus on the key factors and especially those that are easily measurable while controlling for the rest (Ceteris Paribus).

Change in any variable other than price of commodity for example the income of the consumer leads to a change in demand and SHIFT of the demand

curve, while change in price of good under consideration leads to change in quantity demanded and movement **ALONG** the demand curve.

Demand Curve

The actual shape of the demand curve is an empirical issue. It can be LINEAR, EXPONENTIAL, HYPERBOLIC, or some other functional form.

Changes in the independent variable represented on a two dimensional axes will cause MOVEMENT “ALONG” the demand curve. Changes in the factors not represented on the axes, that is, assumed given (*ceteris paribus*) will cause SHIFTS in the demand curve.

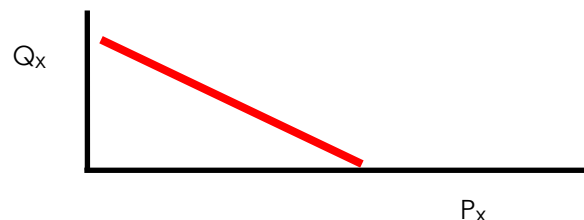
Law of Demand

For most goods, demand tends to increase as price falls and vice versa – this is referred to as the LAW OF DEMAND. In general, for most goods higher prices lead to higher levels of supply as higher prices constitute an incentive for producers.

An example of an EXPLICIT linear demand function is,

$$Q_x = 4000 - 5P_x$$

Figure 1 Linear Demand Curve

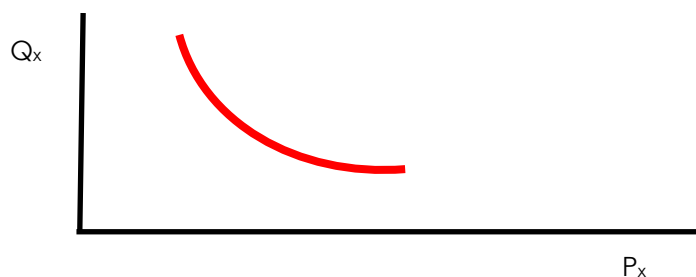


An example of a non-linear demand is the hyperbolic demand function given by,

$$Q_x P_x = 7500$$

Q_x = The quantity of good x demanded
 P_x = Price of good x

Figure 2: Non-linear demand curve



A demand function may also assume an exponential form of the type,

$$Q_x = BP^a$$

Where,

Q_x	=	The quantity of good x demanded
P_x	=	Price of good x
B	=	Constant
a	=	The price elasticity of demand

For example,

$$Q = 32P^{-2}$$

From which it can be seen that as the price P of the commodity increases, its quantity demanded falls.

Demand Estimation

Partial equilibrium analysis is used to estimate a specific demand function for a limited number of the different determinants of the quantity demanded. In a demand function the key determinants are price of the good and consumers income. A relationship is “deductively” hypothesized and tested using empirical data.

To estimate demand, we can use the econometric technique of Ordinary Least Squares (OLS) regression. For a linear demand curve of the form,

$$Q_x = a + bP_x$$

Through OLS, we can obtain the intercept term “a” and slope coefficient “b” as follows,

$$b = \frac{\sum_{i=1}^n (Q_i - \bar{Q})(P_i - \bar{P})}{\sum_{i=1}^n (P_i - \bar{P})^2}$$

And

$$a = \bar{Q} - b\bar{P}$$

To estimate the demand from function of the form $Q = BP^a$ we need to carry out a log transformation of the demand function as follows,

$$\ln Q = \ln B + a \ln P$$

Which is now of the form $Y = a + bX$, where, $\ln Q = Y$; $\ln B = a$; $\ln P = X$; we can easily obtain the intercept “a” and “b” and slope coefficients from the usual OLS formulas,

$$b = \frac{\sum_{i=1}^n (Y_i - \bar{Y})(X_i - \bar{X})}{\sum_{i=1}^n (X_i - \bar{X})^2}$$

$$a = \bar{Q} - b\bar{P}$$

Alternatively the following computational formula can be used to compute the slope coefficient b:

$$b = \frac{(\sum X^2)(\sum Y) - (\sum X)(\sum XY)}{N\sum X^2 - (\sum X)^2}$$

Once the slope and intercept coefficients have been estimated, we can predict the demand given price and any other parameters of the demand function included from:

$$\hat{Q} = a + bP$$

The corresponding formulas for the a three variable multiple regression analyses are given by,

$$b_1 = \frac{(\sum x_1 y)(\sum x_2^2) - (\sum x_2 y)(\sum x_1 x_2)}{(\sum x_1^2)(\sum x_2^2) - (\sum x_1 x_2)^2} \quad b_2 = \frac{(\sum x_2 y)(\sum x_1^2) - (\sum x_1 y)(\sum x_1 x_2)}{(\sum x_1^2)(\sum x_2^2) - (\sum x_1 x_2)^2}$$

$$b_0 = \bar{Y} - b_1 \bar{X}_1 - b_2 \bar{X}_2$$

Finally accurate and adequate data on price and demand influencing variables will be necessary to estimate effective demand for a given good.

Utility and Utility Functions

Consumers demand a commodity for the use or satisfaction it gives them. This use or satisfaction is referred to as UTILITY or “usefulness” and depends on the property of the commodity to satisfy a want or need in the consumer. The desire for the satisfaction (utility) that will be derived from a good constitutes a key driving force in consumer demand.

A utility function is an expression of the level of utility in terms of the quantities of the consumed goods providing the satisfaction, for example:

$$U = \phi(Q_1, Q_2, \dots, Q_n)$$

For example,

$$U = Q_1 \cdot Q_2$$

Total Utility (TU)

Total utility is the overall satisfaction a consumer derives from consuming a given quantity of a good or service or goods and services.

Marginal Utility (MU)

Marginal utility is the change in total utility (satisfaction) for every additional unit of the good consumed. Marginal utility (MU) is expressed as

$$MU = \frac{d}{dQ}(TU)$$

Total Utility (TU) is taken to be a function of the quantity of the good the consumed, that is:

$$TU = \phi(Q)$$

TU attains a maximum when MU is zero. That is,

$$MU = \frac{d}{dQ}(TU) = 0$$

Law of Diminishing Marginal Utility

The principle of Diminishing Marginal Utility states that in consuming a good, the marginal utility derived from consuming additional units of a good decrease as more and more units of the commodity are consumed. This

means that subsequent units of the good offer less and less satisfaction as the consumer continues to consume the commodity in a given period of time.

Utility and Indifference Curves

An Indifference curve:

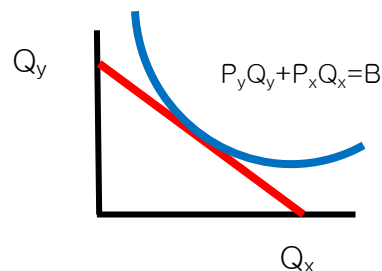
- Shows various combinations of two goods which yield equal satisfaction to the consumer;
- Shows that consumer can remain at the same level of satisfaction by giving up one good in exchange for another;
- The marginal rate of substitution MRS_{XY} is the amount of commodity Y the consumer is willing to give up to gain one additional unit of X while remaining at the same level of satisfaction.

Budget constraint line

Is the locus of all the different combinations of two commodities X and Y that a consumer can purchase, subject to a given money income and the prices of the two commodities as represented on a two dimensional Y-X axes.

Fig 3 Consumer Equilibrium

The consumer attains equilibrium when his or her budget constraints line is tangential to the highest possible indifference curve as shown below.



Consumer equilibrium

The consumer equilibrium is the point where the consumer maximizes his or her total utility or satisfaction subject to a given income and price constraints. The following assumptions underpin the derivation of the consumer Equilibrium:

- The consumer is rational and self interested;
- Consumer aims to maximize his or her total satisfaction derived from spending personal income;
- Different goods and services contribute to total utility;
- The consumer is in equilibrium when his or her marginal utility for every last shilling spent on all goods or services are the same;

- Consumer has access to relevant market information on the goods and services he or she consumes.

Condition of equilibrium

Consumer equilibrium refers to the situation where the consumer maximizes utility subject to his or her budget constraint. "Equilibrium" means the consumer is stable and has no desire to change or adjust the state of affairs as he or she cannot increase the level of utility.

Let the consumer's utility in consuming two goods X and Y be denoted as, $U(x, y)$ where $U_x, U_y > 0$ subject to money budget constraint given by, $xP_x + yP_y = M$, then the Lagrangian function for optimizing the consumer utility,

$$Z = U(x, y) + \lambda(M - xP_x - yP_y)$$

Where is " λ " the Lagrangian function

The first order condition is given by the following set of simultaneous equations,

$$Z_\lambda = M - xP_x - yP_y = 0$$

$$Z_x = U_x - \lambda P_x = 0$$

$$Z_y = U_y - \lambda P_y = 0$$

From which we obtain the condition,

$$\lambda = \frac{U_x}{P_x} = \frac{U_y}{P_y}$$

Or simply,

$$\frac{U_x}{P_x} = \frac{U_y}{P_y}$$

Alternatively the consumer is in equilibrium when his or her budget line is tangential to the highest possible indifference curve. Similarly it can be shown that on the basis of the equality of the slopes of the budget constraint line and the indifference curve the above condition can be extended to the n-good case as,

$$\frac{MU_1}{P_1} = \frac{MU_2}{P_2} = \dots = \frac{MU_n}{P_n}$$

Utility theory under uncertainty

Economic choices are sometime made under conditions of uncertainty and risk. The fact that considerable amount of goods are returned to suppliers by consumers shows that choice was made under conditions of imperfect (or asymmetric) knowledge or uncertainty. Aggressive advertising can affect consumer choice and equilibrium.

New approach to consumer demand theory

- A consumer demands a good because of the characteristics or properties of the good
- It is these characteristics and not the good itself that gives rise to satisfaction or utility for example sugar is desired for its sweetness which can also be obtained from such things as honey;
- It is possible for a good to possess more than one characteristic and a given characteristic may be in more than one good;
- This approach offers better explanation for substitutes in terms of the similarity of the characteristic they possess;
- In addition the effect of changes in quality can be analyzed on the basis of the specified characteristic.

Questions

- (1) Explain what you understand by the term “Function” and suggest three types of demand functions.
- (2) Given the following demand and supply functions, determine the equilibrium price and quantity in the market: $Q_d = 10 - 2P$ and $Q_s = -5 + 3P$
- (3) Find the equilibrium price and quantity in the following market: $Q_s = -20 + 3P$; $Q_d = 220 - 5P$
- (4) Find the equilibrium price and quantity given the demand function, $P + Q^2 + 3Q - 20 = 0$ and supply function, $P - 3Q^2 + 10Q = 5$.
- (5) Given a consumer who has a money budget of $M = 360$ and the following utility function $U(x, y) = x^{\frac{3}{4}}y^{\frac{1}{4}}$. If she consumes two goods X and Y with prices $P_x = 10$; $P_y = 30$, find the quantities of X and Y that maximize the utility of the consumer.

Chapter 3

DEMAND ELASTICITY

Concept of Elasticity

Elasticity is the degree of responsiveness in one variable due to changes in another variable. Specific examples of elasticity include price elasticity of demand (change in demand occasioned by change in price of the good); income elasticity of demand (change in demand occasioned by change in income); price elasticity of supply (change in supply due to change in price of the good); and input elasticity of output (change in production output due to change in input level).

Elasticity may be derived from the original functional relationship for example given the demand function,

$$Q_A = \phi(P_A, P_O, Y)$$

which expresses the quantity demanded as a function of the three of the key (quantifiable) factors, price of the good, price of other goods and the income of the consumer, we can define three concepts of elasticity – namely: Price elasticity of demand (PED), Cross elasticity of demand (CED), and income elasticity of demand (IED) by looking at the effect of each of the independent factors on the dependent factor “quantity demanded” of the good.

Price Elasticity of Demand

Price Elasticity of Demand refers to the responsiveness in quantity demanded of a good due to changes in the price of the same good. Using one of the simplest formulas of elasticity, we express the change in quantity as a ratio of the original change in price of the good that triggered it to obtain the elasticity coefficient. This is referred to as ARC elasticity of demand as it measures elasticity over an interval,

$$\varepsilon = \frac{\frac{\Delta Q}{Q} \cdot 100}{\frac{\Delta P}{P} \cdot 100} = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

Alternatively arc elasticity may be obtained by expressing the change in quantity demanded as percentage of the average quantity and average price respectively,

$$\varepsilon = \frac{\frac{\Delta Q}{\left(\frac{Q_1 + Q_2}{2}\right)} \cdot (100)}{\frac{\Delta P}{\left(\frac{P_1 + P_2}{2}\right)} \cdot (100)} = \frac{\Delta Q}{\Delta P} \cdot \frac{(P_1 + P_2)}{(Q_1 + Q_2)}$$

Sign and Magnitude of Elasticity

The sign and magnitude of elasticity are very important and meaningful. It is not necessary to “force” the sign of the elasticity to be positive in the formula. If interest is in the magnitude, we can refer to the absolute value of the elasticity by using the expression $|\varepsilon|$.

A negative elasticity sign means that the two variables are inversely related, while the magnitude indicates the strength of the relationship. Theoretically elasticity can assume any value, that is, $-\infty \leq \varepsilon \leq \infty$.

However there are some special values of elasticity that we may refer to and these are:

Perfectly inelastic	$ \varepsilon = 0$
Inelastic	$ \varepsilon < 1$
Unitarily elastic	$ \varepsilon = 1$
Elastic	$ \varepsilon > 1$
Perfectly elastic	$ \varepsilon = \infty$

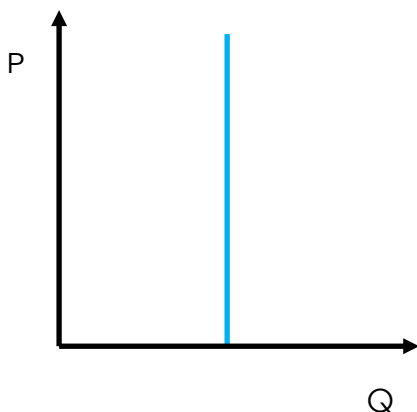


Figure 4: Perfectly inelastic demand

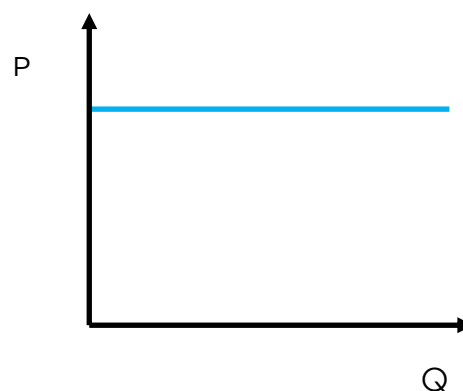


Figure 5: Perfectly elastic demand

Inelastic PED

The demand for NECESSITIES, PRESCRIPTION DRUGS and ADDICTIVE goods tend to be PRICE INELASTIC, that is $|\varepsilon| < 1$. This means that the responsiveness in the demand is proportionately less than the price change that triggered it.

Elastic PED

The demand for LUXURY GOODS that a person can really do without or for which there are alternatives tend to be PRICE ELASTIC, that is, $|\varepsilon| > 1$. This means that the response in demand is proportionately greater than the change in price that triggered it.

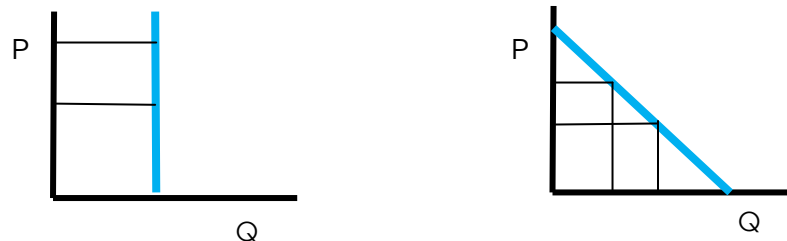
Price elasticity of demand for a good is therefore the percentage change in quantity demanded of the good resulting from a given percentage change in the price of the good.

Elasticity and Total Revenue

As the price of a commodity falls, the **total revenue** obtained from the sale of the commodity **increases** when the demand is elastic, that is, $\varepsilon > 1$; remains **unchanged** when the elasticity is unitary, that is, $\varepsilon = 1$; and **falls** when the demand is inelastic, that is, $\varepsilon < 1$.

- What happens to total revenue of a business in the event of price changes if the elasticity of the product $|\varepsilon| < 1$, $|\varepsilon| = 1$ or $|\varepsilon| > 1$.
- What happens to total expenditure of a consumer if the elasticity of product $|\varepsilon| < 1$, $|\varepsilon| = 1$ or $|\varepsilon| > 1$.
- What would you advise a business manager in determining his prices if his product is price elastic, inelastic or unitarily elastic

Figure 6: inelastic demand Figure 7: elastic demand



Cross Elasticity of Demand

Cross elasticity of demand for a good X with respect to change in price of another good Y is the percentage change in quantity demanded of good X resulting from a given percentage change in the price of good Y. Symbolically,

$$\varepsilon_{xy} = \frac{\left(\frac{\Delta Q_x}{Q_x} \cdot 100 \right)}{\left(\frac{\Delta P_y}{P_y} \cdot 100 \right)} = \frac{\Delta Q_x}{\Delta P_y} \cdot \frac{P_y}{Q_x}$$

When two commodities are related their cross elasticity will be non-zero, that is, $\varepsilon_{xy} \neq 0$, if they are unrelated their cross elasticity will be zero, that is, $\varepsilon_{xy} = 0$.

Sign of Cross Elasticity of Demand

Thus, cross elasticity of demand ε_{xy} , the responsiveness in the demand for a good (X) as a result of changes in the price of another good (Y) has the following characteristics:

- (1) Cross elasticity is 0 for unrelated goods
- (2) Cross elasticity for substitutes is positive (+)
- (3) Cross elasticity for compliments is negative (-)

Magnitude of Cross Elasticity of Demand

The magnitude of the cross elasticity is meaningful and may be interpreted separately from the sign of the elasticity. Basically the magnitude of the elasticity signifies the closeness or weakness of the substitutes or compliments. An inelastic cross elasticity signifies “WEAK” relationship between the two goods and an elastic cross elasticity signifies “STRONG” relationship between the two goods.

- (1) $|\varepsilon_{xy}| = 0$ implies that the two goods x and y are not related (or demand for x is not influenced by price of y);
- (2) $|\varepsilon_{xy}| < 1$ implies that the two goods x and y are weakly related or price of y has weak effect on the demand of x (they can be substitutes or compliments);
- (3) $|\varepsilon_{xy}| > 1$ implies that the two goods x and y are strongly related or more accurately the price of y has a strong effect on demand for x (they can be substitutes or compliments);

What are the implications of the cross elasticity of demand for businesses that produce complimentary and substitute goods? How advisable is it for an entrepreneur to diversify into the production of substitute or complimentary goods?

Substitutability and industry

- Substitutability implies similarity of product and use of product
- Industry is usually defined in terms of the similarity of products and uses of product
- Thus, the degree of substitutability among products is sometimes used to define the boundaries between industries e.g. soft drinks industry, automobile industry, and so on.

Substitutes and Compliments

A substitute good is one that can be used in the place of another for example the detergents *omo* and *nomi*, *Colgate* and *Close-up*, or coffee and tea for those who are indifferent between the two. The degree of substitutability depends on the scale of preference of the consumer.

Compliments are goods that are used together such as bread and butter, tea and sugar, guns and bullets, and car and fuel. “Strong compliments” may be used to refer to goods that are almost always used together for example car and fuel or guns and bullets.

The sign of the cross **elasticity** of **SUBSTITUTE goods** is **POSITIVE** while that of two **COMPLIMENTARY goods** is **NEGATIVE**. For substitutes, a change in the price of one leads to a change in the same direction in the quantity of the other consumed. For instance if there is a rise in the price of *omo*, other things equal, some consumers may switch from *omo* to *nomi* and so there is likely to be an increase in the quantity of *nomi* demanded by consumers.

Compliments on the other hand are used jointly and so an increase in the price of one will lead to a decrease in the quantity consumed of the other and vice versa as the two goods are consumed together.

Income Elasticity of Demand

Income elasticity of demand for a good refers to the change in the quantity demanded of the good resulting from a change in the consumer's income. Symbolically,

$$\varepsilon = \frac{\left(\frac{\Delta Q}{Q} \cdot 100 \right)}{\left(\frac{\Delta Y}{Y} \cdot 100 \right)} = \frac{\Delta Q}{\Delta Y} \cdot \frac{Y}{Q}$$

If the income elasticity of a good is negative, it means that the consumer consumes less of it as his income rises and vice versa. We refer to such a good as an **inferior good**.

Thus, if the consumer demands more of the good when his or her income rises the good is referred to as a NORMAL GOOD; however if demand falls with increase in income the good is referred to as INFERIOR GOOD

- Sign of income elasticity of demand is positive (+) for normal goods.
- Sign of income elasticity of demand is negative (-) for inferior goods.
- The magnitude of the elasticity gives indication of EXTENT to which a good may be seen as “normal” or “inferior”.
- An ENGEL curve relates demand for goods to changes in income.
- Interpretation of the income elasticity for businesses
- Assess the implication of income elasticity for entrepreneurs in the selection of activity or industry to operate in.

Underlying Determinants of Elasticity

The following are some of the key underlying determinants of the “Elasticity” of demand for goods:

- Availability of substitutes
- Closeness of substitutes
- Nature of goods or services, that is, (necessities / luxury)
- Time for adjustment especially in price elasticity of supply or demand
- Total expenditure on product relative to income
- Level of price for commodity
- Number of uses for product
- Season or condition
- Habits, cultural, and social factors
- Consumer demand Theory

These factors singly or jointly underlie the elasticity of demand for goods and services traded in the market.

Questions

- (1) Given the demand function $Q=100-2P$, compute the price elasticity of demand (PED) when the price of the good changes from \$10 to \$20 and give appropriate interpretation for the sign and magnitude of the elasticity.
- (2) If the price of good changes from \$10 to \$20 and the quantity consumed by a consumer changes from 200 tons to 100 tons, find the price elasticity of demand (PED) for the good. Is the good a “necessity” or “luxury”?
- (3) Suppose the income of a consumer changes from Shs 400 to Shs 500 (in thousands) and her consumption of a good changes from 40 units to 20 units, find the income elasticity of demand for the good and comment on the nature of good in question.

- (4) State the formula for the cross elasticity of demand of a good x with respect to a good y. calculate the cross elasticity given a change in the price of good y of Shs 5 to Shs 10 and change in the quantity consumed of good x from 20 to 25 units. What kind of goods are these?
- (5) Give appropriate interpretations for the following elasticity of demand for good x with respect changes in the price of y: $e_{xy} > 0$; $e_{xy} < 0$; $e_{xy} = 0$; $|e_{xy}| = 2$; $|e_{xy}| = 0.01$.
- (6) Find the point elasticity of demand (PED) for the demand curve given by at the point where $P=20$: $PQ= 200$
- (7) Identify five factors influencing the price elasticity of demand for goods and services.
- (8) Explain what you understand by “Giffen” goods and goods of “Ostentation”, sketch their demand functions on Q-P axes and predict the signs of their elasticities of demand.
- (9) Define cross elasticity of demand E_{xy} of a good (X) with respect to a good (Y). Explain what a cross elasticity of $E_{xy} < 0$ and $E_{xy} > 0$ mean and give interpretations for the magnitudes of cross elasticities given by:
 - (i) $|E_{xy}| = 0$
 - (ii) $|E_{xy}| < 1$
 - (iii) $|E_{xy}| > 1$
- (10) Assess the implications of Engel’s law for developing countries in relation to the “Comparative Advantage” and “Heckscher-Ohlin” theories.

Chapter 4

MARKET MODELS

Concept of Market

A market is an exchange mechanism which brings together sellers and buyers of a product, factors of production or financial assets.

Basic market concepts

Market demand is the summation of the demands of individuals in the market. Thus,

$$Q_{Market} = Q_1 + Q_2 + + Q_n = \sum_{i=1}^n Q_i$$

Where,

Q_{Market} = Market demand for the good

Q_i = Demand of individual consumer i

n = Number of consumers in the market

Total revenue function is given by

$$TR = P \cdot Q$$

Where,

P = Price per unit of the commodity

Q = Quantity of the commodity sold

Average revenue which is one of the concepts of price represents the price per unit of the good as if all units of the good have been sold at uniform price, is given by,

$$AR = \frac{TR}{Q}$$

On the other hand marginal revenue (MR) is the additional revenue obtained by selling an extra unit of the good. It may therefore be considered as the rate of change in total revenue with respect to output sold and is given by,

$$MR = \frac{d}{dQ}(TR) \text{ or } MR = \frac{\Delta TR}{\Delta Q}$$

Where,

P	=	Price per unit output
Q	=	Output quantity
TR	=	Total Revenue (P.Q)

Market structures

Market structure refers to the type of market in which a firm operates especially in regards to NUMBER of firms, SIZE of firms, DISTRIBUTION of firms, ENTRY conditions, and the extent of product DIFFERENTIATION.

- Perfect Competition – the ideal market structure with numerous buyers and sellers of identical products. Perfect competition is a theoretical market structure that features unlimited contestability (or no barriers to entry), an unlimited number of producers and consumers, and a perfectly elastic demand curve;
- Monopolistic competition, also called competitive market, where there are a large number of firms, each having a small proportion of the market share and slightly differentiated products;
- Oligopoly, in which a market is dominated by a small number of firms that together control the majority of the market share.
- Duopoly, a special case of an oligopoly with two firms.
- Oligopsony, a market, where many sellers can be present but meet only a few buyers.
- Monopoly, is a market model where there is only one provider of a product or service.
- Natural monopoly, a monopoly in which economies of scale cause efficiency to increase continuously with the size of the firm. A firm is a natural monopoly if it is able to serve the entire market demand at a lower cost than any combination of two or more smaller, more specialized firms.
- Monopsony, is a market structure where there is only one buyer in a market.

The imperfectly competitive structure often reflects more realistic market conditions where some monopolistic competitors, monopolists, oligopolists, and duopolists exist and dominate the market conditions.

Market structure determines some but not all details of a specific concrete market system where buyers and sellers actually meet and trade.

In analyzing the effect of market structures, we look at the level of competition as this reveals actual nature of consumer demand and induces the seller to provide service quality levels and price levels that buyers want. Competition therefore tends to align the interests of sellers and.

In the absence of adequate competition, government regulation may be necessary to control market power and correct information asymmetry often

by: (a) subjecting the operators to competitive pressures, (b) gathering information on the operator and the market, and (c) applying incentive regulation.

Table 1 Summary of Key Market Characteristics

Market Structure	Seller Entry Barriers	Seller Number	Buyer Entry Barriers	Buyer Number
Perfect Competition	No	Many	No	Many
Monopolistic competition	No	Many	No	Many
Oligopoly	Yes	Few	No	Many
Oligopsony	No	Many	Yes	Few
Monopoly	Yes	One	No	Many
Monopsony	No	Many	Yes	One

The sequence of the market structure from the most competitive to the least competitive is: perfect competition, imperfect competition, oligopoly, and pure monopoly.

Perfectly Competitive Markets

- (1) Large number of sellers and buyers;
- (2) The level of output of each firm relative to market output is small;
- (3) Products of all firms are homogenous;
- (4) There are no transaction costs or perfect mobility of resources;
- (5) Consumers, resource owners, and firms in the market have perfect knowledge of nature and costs and prices of all relevant resources;
- (6) There is freedom of entry and freedom of exit into the industry;
- (7) Individual firms have zero market power and are price takers.

Price Determination

In a perfectly competitive market, the price of the commodity is determined by the forces of demand and supply illustrated by the intersection of the market demand curve and the market supply curve for the commodity. The firm in the competitive market is a “PRICE TAKER”.

Monopoly Market Structure

- There is a single firm in the industry supplying the market – that is, the firm is the industry;
- Firm sells a commodity for which there are no close substitutes;
- There are barriers to entering into the industry;
- Firm is price setter but cannot at the same time set quantity;
- Quantity depends on the elasticity of demand which is the only constraint to the monopolist's price setting power.

Cases of Monopoly

- The granting of a patent with exclusive right to an inventor to produce and sell product;
- Control of strategic raw material by firm;
- Natural monopoly resulting from economies of scale and allowed by government for example in utilities (water, gas and electricity supply);
- Private monopoly granted by government for strategic or security reasons;
- Government owned and regulated monopolies;
- Sole manufacturing who adopts a limit pricing policy to prevent entry by others;
- Demand curve facing the Monopolist.

MR and AR (Price)

Total revenue is the product of price and quantity sold.

$$TR = AR \cdot Q$$

Differentiating the above function with respect to output Q, we obtained the following,

$$\frac{d}{dQ}(TR) = AR + Q \frac{dP}{dQ}$$

$$MR = AR \left(1 + \frac{Q}{P} \cdot \frac{dP}{dQ} \right)$$

$$MR = AR \left(1 + \frac{1}{\varepsilon} \right)$$

Thus,

$$MR = AR \left(1 - \frac{1}{|\varepsilon|} \right)$$

This relationship shows that for the region where the demand is price elastic, the marginal revenue (MR) will always be less than the average revenue or price (P) and consequently a firm facing a downward sloping demand curve will operate in the elastic region of the demand curve and will supply less than the competitive equilibrium level of output.

An industry with significant economies of scale where only one large-scale firm would derive the necessary economies of scale to minimize costs sufficiently in such a way as to supply the entire market is referred to as a **NATURAL MONOPOLY**. Examples of industries that are commonly characterized by natural monopolies include providers of utility services like, electricity, water, telephone, and public transportation.

Demand and Marginal Revenue

While the perfectly competitive firm is price taker, the pure monopoly is a **PRICE MAKER**. It sets the level of output and price that will **maximize** its **profit**. The only **constraint** to the monopoly pricing is **demand elasticity**.

The **demand curve** for a **monopoly** firm's product is the **demand curve** for the **industry**. This demand curve is **downward sloping** – indicating that consumers are **willing** to purchase **larger quantities** at **lower prices** and **smaller quantities** at **higher prices**

In contrast, although the market demand curve for a **purely competitive** industry is also downward sloping, the demand curve facing a single **competitive firm** is horizontal as the firm supplies only **small proportion** of the **market**. The demand curve for the monopolist is downward sloping, and **marginal revenue** is **less** than **price** because to **sell extra units** of its output, the firm must **lower** its **price**.

Freedom of **entry** and **exit** ensure that firms in the **perfectly competitive** market setting derive **no economic profit** in the **long run**. On the other hand, a **monopolist** can **continue** to receive **economic profits** in the long run depending on the effectiveness of entry barriers to the industry.

As a result of the **downward sloping demand curve**, a **monopoly** firm in a **profit maximizing equilibrium** produces at a point where **marginal cost** (= marginal revenue) is **less** than the **price** charged by the firm.

Joseph Schumpeter (1883-1950) pointed out that in the very long run, other firms will circumvent monopolistic entry barriers through the innovation of new processes and products – a process he called creative destruction. Schumpeter also believed that monopoly profits constituted a major source of economic growth through (often-costly) technological innovation.

Governments usually allow natural monopolies to exist because of efficiency consideration but regulate their activities through policy. Alternatively, some governments have provided the goods and services of natural monopolies through public sector corporations.

Short Run Equilibrium of the monopolist

In the short run the monopolist firm can:

- Operate at shut down point
- Minimize losses
- Breakeven
- Make pure economic profit

Long Run Equilibrium

In the long run the monopolist will remain in business only if he or she can make a profit or at least break even by producing the best level of output with the most appropriate scale of plant. The best level of output in the long run is given by the point where the LMC curve intersect the MR curve from below and the most appropriate plant scale is where the SAC is tangential to the LAC at the best level of output.

Barriers to entry

- Technological barriers arise from economies of scale – argument for “Natural Monopolies”
- Lumpy initial investment can be prohibitive to entry
- Policy created barriers in terms of exclusive rights for proprietary technology and production or franchise
- Price manipulation by the monopolist
- Others

Price discrimination

Price discrimination is an attempt by the monopolist to extract the “consumer surplus” from consumers.

Examples

- Differential rates for cinema or concert shows for children, students and adults
- Differential rates for electricity use, telephone calls and other services according to time of use or first few units
- Variable flight fares for adults, children or students

Conditions for price discrimination

- Markets must be separable
- The elasticity of demand must be different in the different markets
- There must be imperfect competition in the market

Degree of Price Discrimination

Monopolist may attempt to extract the whole of the consumer surplus if he has reasonable knowledge of the willingness of his consumers to pay (first degree discrimination) or some of the consumer surplus by dividing potential consumers into blocks (second degree discrimination) or indeed by setting different prices in different markets having different demand curves (third degree discrimination).

Threats to the Monopolist

In the final analysis, the monopolist is constrained in price setting by:

- Threat of rivals entering industry if profits margins are too high;
- Governmental intervention if profit margins are too high;
- Technological progress innovated by potential rivals to get share of profits.

Measures of Monopoly Power

- Number of firms criterion – simple count of the number of firms in industry
- Concentration ratio – the share of market supplied by a given number (3, 4) of the largest firms in the industry
- Excess profit criterion – divergence between actual profit and opportunity cost
- Cross elasticity criterion – cross elasticity between the firm's product and closest substitute

Monopolistic Competition

The characteristics of this market model are:

- There are many firms
- The firms produce slightly differentiated products
- No or negligible barriers to entry
- New entrants take custom from existing firms
- Every firm has some degree of market power over its product

Illustrate the demand curve facing firm in the MCM structure

Equilibrium Positions under MCM Structure

- In the short run the firm can make profit, break even or minimize its losses
- In the long run the firm will endeavor to make pure economic profit or at least cover the opportunity cost of its capital

Oligopoly Market Structure

The assumptions underlying this market model include

- There are a few firms in the industry
- The firms recognize their mutual interdependence
- There are substantial barriers to entry into the industry
- The firms produce either identical or differentiated products

Reasons for Oligopoly

These are similar to those of monopoly namely:

- Huge capital investment
- Economies of scale
- Patent rights
- Control over raw materials
- Merger and takeover

Price and output determination

It is not easy to determine price and output for firms operating in oligopolistic markets because there are many possible models of interaction and counteraction for example:

- Cournot model
- Edgeworth model
- Kinked demand curve model
- Leadership model
- Chamberlin model
- Centralized cartel model

Cournot and Edgeworth Duopolists

A key characteristic in the above two models is the non realization by the two firms (duopolists) of their interdependence. This makes the two models less realistic than the other models.

The Kinked Demand Curve Model

- This postulates that if the oligopolist tries to increase its price other firms in the industry will not increase their prices.
- However if the firm cuts its price the other firms will match the price cut
- There is strong compulsion for oligopolist to refrain from price competition in favor of market share and other non price competition

Price leadership

Is a form of imperfect collusion between the firms which decide to set the same price as the “price” leader often the dominant or low cost firm in the industry.

Long Run Equilibrium

While in the short run, a firm can make profit, break even or minimize losses, in the long run the firm will leave industry unless it can make a profit or at least break even by constructing the best scale of plant to produce the anticipated best long run level of output.

Oligopolistic market structure is believed to be the most widely **pervasive** in the **real world**.

The **demand curve** for the oligopoly market structure is **downward** slopping implying that marginal revenue is less than price. There are several models of **interdependent** Oligopolistic reactions. In one model, if one Oligopolist raises the price of its good, the rest will not raise leading to **elastic** response. The Oligopolistic loses customers. If the Oligopolist lowers his price, the other Oligopolists will follow suit leading to an **inelastic** response.

Oligopolists are concerned about a **price war** that is detrimental to all of them and so normally prefer to use **non-price** techniques to compete with one another. They often compete through **quality, product design, advertising, and service**.

In the **short run**, an Oligopolistic firm can make **profit, break even** or make a **loss**. In the long run, the Oligopolist will make **profit** or **break-even** by **restricting entry** or **leave industry** if it cannot make **profit** or **break-even**.

Microeconomic policy

Microeconomic policies include: regulation of individual firms and industries through competition policy, subsidization and selective taxes, anti-trust policy relating to such things as collusion and cartels.

Microeconomic policy is normally undertaken to create favorable production conditions, regulating monopolistic behavior and enhancing competition.

Questions

- (1) Sketch the short-run equilibrium positions of a firm operating in a perfectly competitive market.
- (2) With the help of clear illustrations, determine the long run equilibrium position of a firm operating in a perfectly competitive market.
- (3) Explain what you understand by the term “market structure” and the parameters employed in determining the structure of a market.
- (4) Why is the demand curve facing the monopolist represented with separate AR and MR curves with the latter tracing a path below the former?
- (5) Use a sketch to determine the minimum price beyond which the monopolist will not reduce his / her price.
- (6) What are the characteristics of a monopolistic competition market structure?
- (7) Mention and briefly discuss three models of an oligopolistic market structure.

- (8) An oligopoly is characterized by INTERDEPENDENCE and STRATEGIC BEHAVIOR. Elaborate and explain.

Chapter 5

PRODUCTION THEORY

Concept of Production

Production refers to the transformation of input materials or resources into output goods and services using the “factors of production”; land, labor, capital and entrepreneurship”. Alternatively production can be seen as the process of adding value to a resource or asset. Production theory addresses the SUPPLY SIDE of the economy.

The Firm

A firm is the basic unit of production. Alternatively it is an organization that makes decisions relating to production the sale of goods and services. The firm hires productive resources and organizes the resources to produce and sell goods and services. A firm may be organized as a sole proprietorship, partnership or public limited company.

The Industry

An industry is a branch or sector of commercial activity engaged in the production of related goods or services. It can also be seen as a collection of firms that produce similar goods or services. An example of an industry is the automobile industry which produces automobiles; or the beer industry comprising of all firms that produce bitter and mild ales, lagers, stouts, and ciders; or the pharmaceutical, textile, and the transportation industries producing respective goods and services.

Objectives of the Firm

Traditionally the objective of the firm has been considered to be profit maximization. However additional objectives may be ascribed to a firm. All in all the objectives of the firm are normally seen to include:

- Profit maximization
- Maximization of sales revenue
- Maximization of firm's growth rate
- Making a satisfactory rate of profit

- Long run survival of the firm
- Entry prevention and risk avoidance
- To create and retain a market share or customer base
- Quality improvement
- Boosting market share
- Establishing customer base and confidence
- Providing employee job satisfaction
- Maximizing managerial utility function

The firm's **economic profit** is the **difference** between the firm's **receipts** and the **opportunity costs** of all the resources committed to the production in the firm. Symbolically,

$$\pi = TR(Q) - TC(Q)$$

The firm's **OPPORTUNITY COSTS** comprises two types of costs namely, the firm's **EXPLICIT COSTS** (involving the spending of money that could be put to alternative use), and the firm's **IMPLICIT COSTS** (where no money payment is involved but where the firm commits its own resources and entrepreneurial resources of the entrepreneur to the firm instead of renting it out). Accordingly we can draw a distinction between economic and accounting profits.

The conflict between short-term and long term objectives of the firm can be largely resolved by the wealth maximization or maximization of long run profits expressed as,

$$W = \pi_0 + \frac{\pi_1}{(1+i)^1} + \frac{\pi_2}{(1+i)^2} + \dots + \frac{\pi_n}{(1+i)^n} = \sum_{t=0}^n \frac{\pi_t}{(1+i)^t}$$

Where,

W = present value of wealth

π_t = profit in year t

i = the average interest rate or rate of return on capital

The wealth formula represents the present value of all future profit flows and takes into account any short term adjustments in the firm's production system which leads to higher profits in the long run.

In case of a firm owned by shareholders and managed by a team of professional managers, there can be divergence between the interests of the shareholders and the team of professional managers. The latter may aim to maximize their benefits in terms of bonuses, membership in exclusive clubs, allowances, travel, and many other benefits costly to the firm and shareholders. This is the **PRINCIPAL-AGENT** problem.

Strategic Decisions of the Firm

The fundamental questions production managers may ask in realizing the objectives of the firm include

- How does output behave when quantity of inputs are increased?
- What is the effect of technology on production costs?
- How can the least cost combination of inputs be achieved?
- For a given technology what will be effect of increasing the scale of production?

These questions are asked in order to establish how the firm can optimize its production in order to maximize profits in the long term.

Competitive Advantage

Competitive advantage refers to the SUPERIORITY gained by a firm when it can provide the same value as its competitors but at a lower price, or can charge higher prices by providing greater value through differentiation. Competitive advantage is realized by matching core competencies to the opportunities.

Competitive advantage may also be seen as the means by which a firm manages to keep making money and sustaining its position against its competitors; it is that which places a company or a person ABOVE the competition and may arise from the possession of various assets and attributes - natural resources, location and or skilled workforce which gives a competitive EDGE over other competitors.

According to Porter (1994), competitive advantage arises from discovering and implementing ways of competing that are unique and distinctive from those of rivals, and that can be sustained over time. It is a condition which enables a company to operate in a more efficient or otherwise higher-quality manner than the companies it competes with, and which results in benefits accruing to that company; It is the provision of a product or service in a way that customers value more than that of the competition's; Competitive advantage exists when there is a match between the distinctive competences of a firm and the factors critical for success within the industry that permits the firm to OUTPERFORM its competitors.

Competitive advantage is gained by exploiting the unique blend of activities, assets, attributes, market conditions, and relationships that differentiates an organization from its competitors. These may include: access to natural resources, specific location, or skilled workforce.

Time frame in production theory

Because time imposes a constraint on the range of strategic interventions production managers are able to undertake, it is necessary to define "TIME FRAME" and analyze the possibilities available to production managers within the respective frameworks.

- Short run: period over which firm can only make limited adjustments to its resource factors;
- Long run: period long enough for firm to vary all input factors;
- Very long run: period long enough for firm to innovate new techniques and processes.

Strategies for profit maximization

- In the short run, the firm needs to see how best to use existing plant and equipment.
- In the long run, the firm needs to assess what new plant, equipment and production processes to select and acquire in the context of existing technology.
- In the very long run the firm needs to examine how to innovate new techniques and processes.

Production Function

A production function refers to the equation describing the relationship between the quantity of output produced and the amount of input factors employed to produce the output per period of time. The production function may also be seen as the technological relationship that shows the maximum quantity that can be produced per unit of time for each input combination.

The firm's input categories may comprise of plant equipment and machinery (K), skilled managerial and technical staff (M) and (H), unskilled labor (L), material inputs (N), power or fuel (F) and so on. Thus, an "implicit" or general form of a long run production function may expressed as,

$$Q = \phi(K, L, M, H, N, T)$$

Where,

- Q = output per period of time
- ϕ = denotes function/relationship
- K = capital
- L = Labor
- M = Management or organization
- H = Human capital
- N = Natural resources
- T = State of technology

Assumptions of production functions

- Perfect divisibility of inputs and outputs
- Limited substitutability of one factor for another
- A given state of technology
- Inelastic supply of fixed factors in the short run
- Elastic supply of variable factors in the short run
- Elastic supply of all factors in the long run

Supply Function

Quantity of good (A) supplied is hypothesized to depend on price of the good, technology, prices of the factors of production, other factors (e.g. weather in agricultural supply) and so on. This is a general form of the production or supply function for good. To simplify modeling and analysis, we can assume all other factors except price of good are constant. Variation in the price of good (A) will cause change in quantity demanded of the good.

Change in technology and other factors affecting supply will lead to shift of the entire supply curve. Price Mechanism coordinates the forces of demand and supply leading to equilibrium price in the market of good A.

While the production function relates the maximum level of output for a given set of input factors, firm's do not always realize the maximum output for a given set of input factors due to various internal inefficiencies.

X-Inefficiency

X-inefficiency occurs when the maximum possible output shown by the production function is not attained. This may be due to lack of motivation caused by lack of incentives, difficulty of specifying the amount and quality of effort by employees and management.

Technical (Productive) Efficiency

A firm that produces more quantitative output for given levels of input factors is technically more efficient than a firm that produces less output for the same set of input factors. Technical or productive efficiency therefore refers to the degree to which quantitative input factors are optimally utilized to produce quantitative output. A firm is technically inefficient if it does not attain the maximum possible level of output possible with given amounts of input factors.

Economic Efficiency

A firm's production is economically efficient when it is using the least cost combination of technically efficient inputs. Economic efficiency takes into account the cost of the inputs besides their real quantities.

Productivity concepts

The following are the key concepts of productivity:

- Total product (TP): This is the total amount of output per period of time
- Average product (AP): This is the total product per unit of factor concerned e.g. AP_L for labor per period of time;

- Marginal product (MP): This is the change in total product per unit change in the factor concerned e.g. MP_L for labor per period of time;
- Total factor productivity (TFP) is the productivity of all input factors combined. Total factor productivity change refers to productivity changes due to improvements in technical (productive) efficiency and technological change (shift of the production function).

Illustrate the following on two dimensional charts.

- TP, AP and MP Curves
- MP and AP Curves

Short-run Production Theory

Law of diminishing returns

The law of diminishing returns is also referred to as the law of VARIABLE PROPORTIONS and states that as increasing amounts of a variable input such as labor (L) are used per period of time with a fixed amount of a fixed input such as capital (K), the marginal product of the variable input eventually declines. This decline is really due to change in the K to L ratio implying that there is an optimum ratio that maximizes the average productivity of the variable factor. It should be emphasized that this is a short run phenomenon as only limited adjustments (to L but not K) can be made.

Short run production functions

The slope of the production function

- The slope of the production function in which capital is fixed and labor is variable is the marginal product of labor, $MP_L = \frac{dQ}{dL}$.
- Similarly the slope of the production function in which labor is fixed and capital is variable is the marginal product of capital, $MP_K = \frac{dQ}{dK}$.

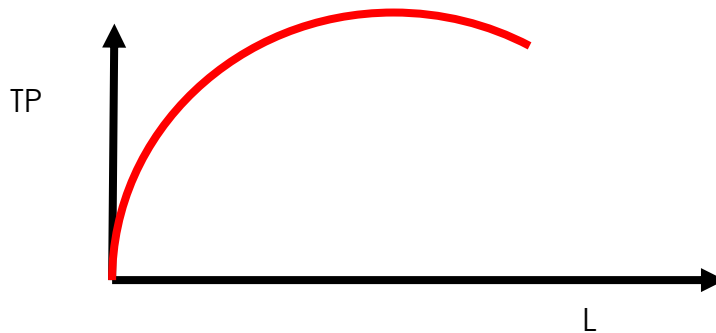
In the **short run**, the firm can only **adjust** the **variable factors** for example labor. To make production more efficient in the short run, the firm would be interested to know:

- The **productivity** of the **variable factor** – or level of output per variable factor and;
- The **cost** incurred in hiring the **variable factors** per unit of the output

To analyze the firms performance and expected profitability, it is necessary to define some concepts to measure the two elements of output per variable factor and unit cost. These concepts include:

Total product: is the total amount of output produced during some given period of time (Q)

Figure 8: Total product of labor



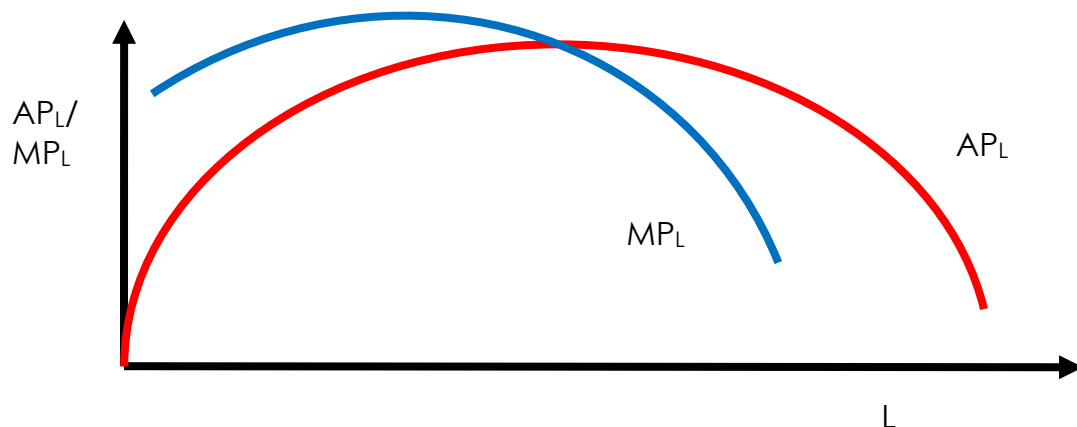
Average product: Total product per unit of the variable factor for example the average product of labor,

$$AP_L = \frac{Q}{L}$$

Marginal product: change in total product resulting from the use of one more unit of the variable factor for example marginal product of labor,

$$MP_L = \frac{dQ}{dL} \quad \text{Or} \quad MP_L = \frac{\Delta Q}{\Delta L}$$

Figure 9: APL and MPL



Thus, the supply function

$$Q = \phi(P, P_1 \dots P_N, T, C, N)$$

Where,

$P_1 \dots P_N$	=	Price of input factors
T	=	Technology
C	=	Climate
N	=	Natural factors

Specific Supply Function

The actual shape of the supply curve is empirically determined. It can be a curve, straight line or some other functional form depending on the data. Changes in the independent variable considered and represented on the axes will cause movement “along” the supply curve, while changes in the factors assumed to be given will cause shifts in the supply curve.

Short-Run Production Costs

There are two main categories of Production costs:

FIXED COSTS are costs that do not vary with level of output for example routine maintenance, trading license, security, salaries of contractual managerial and administrative staff, depreciation. Fixed costs that are already incurred or must be met regardless of production status are considered **SUNK COSTS**. Nothing can be done to prevent them. A very important principle in business and economics is not to make future production decisions based on sunk costs. Fixed costs include payment obligations that do not depend on the level of output, for example **OVERHEADS** and may include – rent for land and buildings, loan interest, part of depreciation, maintenance expenditures, insurance, and property taxes and salaries of top management and cost of capital equipment spread over the lifetime of the equipment.

VARIABLE COSTS are costs that vary with the level of output for example cost of labor, cost of raw materials, cost of fuel and power and transportation costs to mention a few. Thus, variable costs refer to costs that vary with the level of output.

Illustrate the following on a two dimensional chart.

- Shape of Cost TFC and AFC
- Shape of ATC, AVC, and MC

Total cost (TC)

Total Costs refers to the overall cost of producing any given rate of output in a given period of time. $TC = TFC + TVC$.

Average Fixed Cost (AFC)

Managerial Economics

Refers to the total fixed cost per unit of output, since fixed costs do not increase, average fixed cost decreases with the level of output,

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

Average Variable Cost (AVC)

Refers to the variable cost per unit of output and may be expressed as,

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

Marginal Cost (MC)

Marginal Cost is the increase in total cost resulting from raising increasing the rate of production by one unit expressed as,

$$MC = \frac{d(TC)}{dQ}$$

Or over small changes,

$$MC = \frac{\Delta TC}{\Delta Q}$$

With the exception of the AFC all the unit cost curves such as ATC, AVC, and MC are “U” shaped. The reason for the U shape is the principle of diminishing returns. And diminishing returns reflects the change in the variable factor relative to the fixed factor. It is important to note that for fixed input factors, the productivity and unit costs are inversely related. When productivity is high, unit costs are low and vice-versa. This is explained further below.

Marginal Product and Marginal Cost

A firm's **marginal product** curve is related to its **marginal cost** curve marginal product refers to the additional output of an extra worker and marginal cost, the cost of the same extra worker.

- If its marginal product rises, marginal cost falls – why?
- If marginal product is maximum, then marginal cost is minimum – why?
- If marginal cost product diminishes, marginal cost rises – why?

The relationship between productivity and unit costs may be explored as follows,

$$AVC = \frac{TVC}{Q} = \frac{P_L \cdot L}{Q} = \frac{P_L}{Q/L} = \frac{P_L}{AP_L} = \overline{P_L} \cdot \frac{1}{AP_L}$$

The above relationship shows that AVC is inversely related to productivity for a given (constant) price of labor (wage rate).

$$MC = \frac{\Delta TVC}{\Delta Q} = \frac{\Delta(P_L L)}{\Delta Q} = \frac{P_L}{\Delta Q / \Delta L} = \frac{P_L}{MP_L} = \overline{P_L} \cdot \frac{1}{MP_L}$$

The equation shows that MC is inversely related to marginal product, that is, unit costs are inversely related to productivity for given (constant) cost of input (wage rate).

In the short run, the firm should **continue** in production as long as the **price** offered for an extra unit of the commodity (marginal revenue) is **greater** than it costs to produce the extra unit (**marginal cost**) that is the cost of hiring an additional unit of the factor of production.

$$MR > MC$$

The firm should not increase the level of output further when **marginal cost** of production rises to the level of **marginal revenue**, that is,

$$MR = MC$$

Production Decision Rules

The fundamental questions in production theory are the following – a) should the firm produce at all? b) If so what level of output will maximize the firm's benefit?

Should firm produce at all?

Thus, the condition for firm to go into production is that the price of the firm's good (P) is greater than the average variable cost (AVC).

A firm should not produce if, at all levels of output, the TOTAL VARIABLE COSTS (TVC) of producing the output exceeds the TOTAL REVENUE (TR) derived from selling it or, equivalently if the AVERAGE VARIABLE COST (AVC) of producing the output exceeds the PRICE (or AVERAGE REVENUE) at which it can be sold. So in the short run, the firm may:

- (1) Operate at the shut-down point
- (2) Be minimizing losses
- (3) Be at the break-even point
- (4) Be making pure economic profit

In particular if the price of the firm's good "P" is such that,

- $P = AVC$ the firm is operating at the shut-down point
- $AVC < P < ATC$, firm is minimizing losses
- $P = ATC$, firm is at breakeven point
- $P > ATC$, firm is making pure economic profit

The Shut Down Point is the point at which price (P) or average revenue of the firm's product equals its average variable cost (AVC) and the firm just covers its variable or operating costs, that is, $P = AVC$ or $TR = TVC$.

What level of output should firm produce?

In general, if the $P \geq AVC$, and firm decides to go into production, then it should produce the output level corresponding to the point where $MC = MR$. Given the prerequisite condition $P \geq AVC$ is fulfilled; the condition for firm to maximize profit can be derived by maximizing the profit function as follows:

$$\pi = TR(Q) - TC(Q)$$

At the turning point of the profit function,

$$\frac{d}{dQ}(\pi) = 0$$

Therefore,

$$\begin{aligned}\frac{d}{dQ}(TR(Q) - TC(Q)) &= 0 \\ \frac{d}{dQ}(TR(Q)) - \frac{d}{dQ}(TC(Q)) &= 0\end{aligned}$$

$$\frac{d}{dQ}(TR(Q)) = \frac{d}{dQ}(TC(Q))$$

$$MR = MC$$

According to the second order condition $\frac{d^2\pi}{dQ^2} < 0$ the preceding condition must in addition correspond to situation where MC is rising.

The following are the short run equilibrium positions of the firm in a Perfectly Competitive Market:

- Firm may operate at the shut down point and only cover its variable costs;
- Firm may be minimizing its losses $AVC < AR < ATC$;
- Firm may be breaking even and covering both variable and fixed costs at the point $AR = ATC$;
- Firm may be making pure economic profit $AR > ATC$;
- The short run equilibrium positions of the firm under PCM structure.

Long-run Production Theory

In the long run all the factors of production are variable. The analysis of the relationship between output and the inputs is therefore done on the basis of the assumption that all the input factors can be adjusted.

Isocost

The isocost shows the different combinations of two inputs that a firm can purchase or hire, given the total outlay or expenditure (E) of the firm and input prices of P_L and P_K of labor and capital. The equation of the isocost is given by:

$$\begin{aligned}P_K K + P_L L &= E \\P_K K &= E - P_L L \\K &= \frac{E - P_L L}{P_K} \\K &= \frac{E}{P_K} - \left(\frac{P_L}{P_K} \right) L\end{aligned}$$

The slope of the isocost line is the ratio of the price of labor and capital.

Isoquant

- Shows the different combinations of two inputs a firm can use to produce a specific quantity of output
- Isoquants have a shape that is convex to the origin

Marginal Rate of Technical Substitution

$MRTS_{LK}$ is the amount of factor K that a firm can give up by increasing the amount of factor L used by one unit and still remain on the same isoquant

The $MRTS_{LK}$ is equal to the ratio of the marginal products of the two factors L and K, that is,

$$MRTS_{LK} = \frac{MP_L}{MP_K}$$

Producer equilibrium

- Is the position where the producer maximizes output for the given total outlay;
- Equilibrium is attained when the firm produces at the point where the isocost is tangential to the highest isoquant;
- The equilibrium condition may be expressed as $MP_L / P_L = MP_K / P_K$

Returns to scale

- Decreasing returns to scale – refers to the case where output grows proportionately less than inputs;
- Constant returns to scale – refers to the case where output grows in the same proportion as inputs;
- Increasing returns to scale – refers to the case when output increases proportionately more than the increase in inputs.

For a Cobb Douglas production function of the type below, the various returns to scale are implied by the following respective conditions

$$Q = AK^{\alpha}L^{\beta}$$

If we let the inputs be changed by a factor of λ , we can show that the returns to scale for the given production function depends on the sum of the elasticity α and β .

$$Q' = A(\lambda K)^{\alpha}(\lambda L)^{\beta}$$

$$Q' = A\lambda^{\alpha}K^{\alpha}\lambda^{\beta}L^{\beta}$$

$$Q' = \lambda^{\alpha+\beta}AK^{\alpha}L^{\beta}$$

$$Q' = \lambda^{\alpha+\beta}Q$$

The new output Q' is $\lambda^{\alpha+\beta}$ times the original output Q . Thus whether this represents increasing, constant or decreasing returns depends on the conditions below:

Increasing returns to scale $\alpha + \beta > 1$

Constant returns to scale $\alpha + \beta = 1$

Decreasing returns to scale $\alpha + \beta < 1$

Economies of Scale

Reduction in unit production costs due to increase in scale of production. Economies of scale are of two categories:

- Internal economies – economies in production especially in relation to the fixed costs which do not increase with increase in the level of output; due to specialization and division of labor which lower unit costs; due to less than proportionate change in marketing, research and development; ability to raise and use capital efficiently, optimal use of managerial team and optimal use of transportation and storage facilities;

- External economies – due to large scale acquisition of materials, advertising, social infrastructure, concentration of similar industries, and ease of accessing external financing.

Minimum Efficient Scale (MES)

A firm may experience economies of scale up to some level of output. Beyond that level, it moves into constant returns to scale or diseconomies of scale. The firm's Minimum (or Most) Efficient Scale (MES) is the smallest quantity of output at which long-run average cost reaches its lowest level. Alternatively, the MES of the firm refers to the minimum plant size corresponding to minimum long run unit costs.

Long Run Production Conditions

In the long run, the firm can adjust all inputs so all costs are variable. So the distinction of fixed and variable costs does not apply. We only talk of **long run total cost (LTC)**, **long run average costs (LAC)** and **long run marginal costs (LMC)**.

Long run average cost curve is an “envelope” of the **short run average cost** curves for continuously **rising plant sizes**. It may also be looked at as the boundary between attainable level of units costs and unattainable unit costs given the state of existing technology.

As firm **increases plant size**, it may experience **economies of scale** that lead to lower unit costs. **Economies of scale** – refers to the **reduction in unit costs** of producing and distributing a product as the size of firms operations is increased. Reduction in unit cost may come about due to economies of scale resulting from such things as, automation, labor efficiency through specialization and smaller rise in managerial costs relative to plant expansion.

Depending on whether a firm is experiencing **economies** or **diseconomies** of scale, it may experience, **increasing returns to scale** – case when output grows **proportionately more** than inputs; **decreasing returns to scale** – case then output grows **proportionately less** than inputs as the firm expands the scale of its production. A firm may also experience **constant returns to scale** – that is when output produced increases in exactly the **same proportion** as any increase in inputs.

The firm's ability to **lower unit costs** is an important source of market **competitiveness**. If by **diversifying** into **several products** the firm can reduce its unit costs, this will be a case of **Economies of Scope**. Thus economies of scope exist if the production of several different products within one firm leads to the unit costs of production of each product being lower than if independent firms had produced them.

The firm's unit costs may continue to fall with increase in size of plant until it levels off or eventually starts to rise again when **diseconomies of scale** set

in. These may include rising planning, managerial and coordination costs and inefficiencies as the scale of production increases beyond the optimum plant size.

A firm may experience economies of scale up to some level of output. Beyond that level, it moves into constant returns to scale or diseconomies of scale. The firm's **Minimum Efficient Scale** is the **smallest** quantity of **output** at which **long-run average cost** reaches its **lowest** level. Alternatively, the **Minimum Efficient** scale of the firm also refers to the minimum plant size corresponding to minimum long run unit costs.

Isoquants

An **isoquant** shows the different **combinations** of **labor** and **capital** with which a firm can **produce** a **specific quantity** of output. A **higher** isoquant refers to a **greater** quantity of **output** and a **lower** one, to a **smaller** quantity of **output**.

Marginal Rate of Technical Substitution

The marginal rate of technical substitution of labor (L) for capital (K), that $MRTS_{LK}$ refers to the amount of K that a firm can give up by increasing the amount of L used by unit.

$$MRTS_{LK} = \frac{MP_L}{MP_K}$$

In the long run, the firm is able to adjust all factors. Thus in order **to maximize profits**, the firm must select the most **economically efficient** method. This is the method, which while being technically efficient, is also the **least cost** combination. The firm will continue to make adjustments to its inputs until the following long run condition (denoted for the two inputs capital and labor) is met.

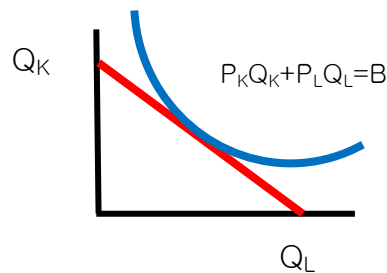
$$\frac{MP_K}{P_K} = \frac{MP_L}{P_L}$$

This is the condition for the **long run equilibrium** of the **producer**. It is obtained by assuming perfect substitutability between the factors of production K and L. Whenever the two sides of the above equations are not equal, there are possibilities for input substitution that will reduce costs.

The figure below shows a firm's isocost and isoquant and the equilibrium position of the firm.

Figure 10: Producer Equilibrium

Is achieved when the producer's isocost is tangential to the highest isoquant as shown below.



Profit maximizing firms will adjust the combination of their inputs until they cannot produce a given level of output any cheaper. At this point, the ratio of the MP_K and MP_L will equal the ratio of their respective prices P_K and P_L . This is true for any number of inputs.

The principle of substitution refers to the change in the relative proportions of input factors resulting from a change in their relative prices. Relatively **more** of the **cheaper** input and relatively **less** of the more **expensive** input will be used.

Expansion Path

Refers to the **locus** of points of **producer equilibrium** resulting from **changes in total outlays** while keeping **factor prices constant**.

Elasticity of Technical Substitution

Is a measure of the percentage change in capital labor ratio per unit percentage change in their price ratio.

$$\varepsilon = \frac{\Delta\left(\frac{K}{L}\right) / \left(\frac{K}{L}\right)}{\Delta\left(\frac{P_L}{P_K}\right) / \left(\frac{P_L}{P_K}\right)} = \frac{\Delta\left(\frac{K}{L}\right) / \left(\frac{K}{L}\right)}{\Delta(MRTS) / (MRTS)}$$

Long run equilibrium in Perfectly Competitive Market

- If firms in industry are making profits, other firms will enter the industry as there are no barriers
- Industry's output rises and applies downward pressure on prices
- This will continue until all the profits have been competed away
- Equilibrium is finally attained at the breakeven point where $TR = TC$
- If firms in industry were making losses, those whose fixed capital investment wear down will not replace and so leave industry
- Number of firms remaining decreases and industry output falls putting an upward pressure on prices

- Equilibrium is attained at the breakeven point where $TR = TC$

The Very Long Run

Changes in technology are often **endogenous responses** to changing **economic signals**; that is, they result from responses by firms to the same things that induce the substitution of one input for another within the confines of a given level of technology. For example, the sharp rise in petrol prices in the 1970s provided motivation for research into alternative forms of energy and lesser fuel consuming cars.

Questions

- (1) Explain with clear illustrations the long run equilibrium position of the firm operating in a perfectly competitive market
- (2) Given two firms, A with production function $Q_A = 100K^{0.8}L^{0.2}$ and B with production function $Q_B = 100K^{0.5}L^{0.5}$.
 - (a) If both firms use 25 units of capital and 25 units of labor what is the output rate of each firm?
 - (b) If the input prices are $PK = \$1$ and $PL = \$1$, comment about the efficiency of the given input combinations for the firms A and B.
 - (c) Determine the efficient ratio of the two inputs for each firm.
- (3) Given the production function $Q = AK^\alpha L^\beta N^\delta$

Where Q is the rate of output and K , L , and N represent inputs of capital, labor and land respectively, determine:

- (a) The specific conditions under which returns-to-scale would be increasing, constant and decreasing.
 - (b) The equation for the marginal product functions for each input.
- (4) Production of a firm is given by $Q = 600K^2L^2 - K^3L^3$ and $\bar{K} = 10$ (capital is fixed).
 - (a) Find the units of labor employed at extensive and intensive margins of production.
 - (b) Find the elasticity of production at the intensive and extensive margins of production

Managerial Economics

- (5) A company producing pocket calculators have a fixed amount of plant and equipment can vary the number of workers it employs in a given month its production function is given by $Q = 98L - 3L^2$ (L = units of labor).
- (a) Find the number of workers the company should employ at intensive and extensive margins of production.
 - (b) Find the elasticity of production when 16 workers are employed.
- (6) Given the data below on output and on inputs for 10 production periods.
- (a) Estimate the parameters A , α , β of a Cobb-Douglas production function using the Ordinary Least Squares (OLS) method;
 - (b) Use the estimated parameters to determine returns to scale, equations for the marginal product of labor and capital;
 - (c) Calculate the marginal product of capital and of labor for the input combination $K=20$ and $L=30$.

	OUTPUT	CAPITAL	LABOR
PERIOD	(Q)	(K)	(L)
1	225	10	20
2	240	12	22
3	278	10	26
4	212	14	18
5	199	12	16
6	297	16	24
7	242	16	20
8	155	10	14
9	215	08	20
10	160	08	14

- (7) Suppose the total cost function for Mokisa Enterprises is given by $TC = 100Q - 3Q^2 + 0.1Q^3$.
- (a) Determine the average cost function and the rate of output that will minimize average cost;
 - (b) Determine the marginal cost function and the rate of output that will minimize marginal cost;
 - (c) At what rate of output does average cost equal marginal cost?

- (8) A firm sells its output for \$20 per unit and has a total cost function $TC = 16 + 17Q - 9Q^2 + Q^3$.
- (a) State the firm's fixed costs;
 - (b) Determine the firm's marginal cost function;
 - (c) Determine the firm's average cost function;
 - (d) Determine the firm's total profit function;
 - (e) Determine the profit elasticity at an output rate of 8 units

Chapter 6

MACROECONOMIC ENVIRONMENT

The Macroeconomic Context

Business organizations operate in the context of the wider macroeconomic environment. Macroeconomics deals with the **whole economy** and focuses on aggregate economic variables like the level of output or GDP in the economy, the general price level, the level of unemployment, the growth rate of the economy, balance of payments and exchange rates and how these aggregates could be influenced through **policy instruments**. The following are the key phenomena of interest in macroeconomics:

- Unemployment
- Inflation
- Economic Growth
- National Income
- Business Fluctuations
- Balance Of Payments And Exchange Rates
- Global macroeconomics
- Monetary And Fiscal Stabilization policy

Every society aims to create favorable economic conditions to ensure welfare and good living conditions for its citizens. The following are some of the important macroeconomic **objectives** or **targets** that governments try to attain through appropriate **policy** measures or **instruments**.

Macroeconomic Policy Objectives

The macroeconomic policy objectives of most societies include the following:

- Macroeconomic stability
- Rapid and sustainable economic growth
- Low unemployment
- Low inflation rate
- Stable exchange rates
- Sustainable government budget deficit
- Sustainable balance of payments position

Instruments of Macroeconomic Policy

- Monetary policy – government's powers to control the supply of money, interest rates, and exchange rates in economy

- Fiscal policy – the government's power to tax and spend part of the national income
- Supply side policy – government's power to influence conditions of production and supply in the economy

National Income Concepts

Gross Domestic Product (GDP)

Gross Domestic Product (GDP) refers to the **monetary value** of all **final** goods and services produced in an economy over a one-year period. GDP may be estimated from three different perspectives

- Based on **value added** - as the sum of all **values added** by all producers of both intermediate and final goods and services;
- Based on **factor income claims** - as the **income claims** by factors of production on the value of total production of goods and services in the economy;
- Based on **expenditure** - as the **expenditure** needed to purchase all final goods and services produced during in the country the period.

In the first two approaches, it is necessary to **add taxes** and **subtract subsidies** in order to arrive at nominal GDP

Value added is the value of the **output** of a firm **minus** the value of **inputs** that the firm purchases from other firms. It measures the firm's own **contribution** to total output.

Estimates of **Real GDP** measure changes in **real volumes** of output and income based on constant prices of a selected base year

Estimates of **Nominal GDP** reflect changes in both **prices** and **quantities** of output based on currently prevailing market prices

GDP does **not** measure

- **Unreported activities** – especially those in underground or black economy
- **Non-marketed activities** – such as housework, and do-it-yourself activities
- **Economic bads** – such as pollution and other negative externalities. Where possible these need to be valued and deducted from GDP
- **Positive externalities** – these represent positive outputs that may be difficult to quantify but conceptually should form part of the “goods” produced in a country
- **Leisure** – These are becoming important requirements of modern well being. Conceptually their value should be incorporated into estimates of GDP.

Measures of National Income

As GDP is the basis for estimating standards of living and well being, it should theoretically incorporate the output of all beneficial “things” including but not limited to goods and services.

To move from measures of national output and income to measures of personal “disposable” income, that is, from a concept of income that applies to the nation, to a concept that applies to individuals, the following steps are involved.

Gross Domestic Product (GDP)

+ (Plus) Net Factor income from abroad

Gross National Income (GNI)

- (Less) Capital consumption allowance (depreciation)

Net National Income (NNI)

- (Less) Indirect Taxes

National Income (NI)

- (Less) Corporate Profits and Social Security Contributions

+ (Plus) Government and Business Transfers to Individuals

+ (Plus) Interest Adjustments

+ (Plus) Dividends

Personal Income (PI)

- (Less) Personal tax and non-tax payments

Personal Disposable Income

An important aspect of growth in GDP is that the growth in output is not smooth but characterized by fluctuations referred to as **business fluctuations** or **cycles**. These are discussed below.

Questions

1. Distinguish between the concepts GDP, GNP, National Income, and Disposable Income.
2. What are the underlying factors of long term growth in GDP?
3. Mention and explain the three perspectives in the measurement of GDP.
4. GDP represents an imperfect measure of the “good things” produced in a society. Elaborate and discuss.

Chapter 7

BUSINESS CYCLES

Business Fluctuations

Business cycles refer to **FLUCTUATIONS** in business activity and economic **OUTPUT** that are attributed to a range of macroeconomic factors. Business cycles or fluctuations are short run deviations from **POTENTIAL GDP**, which is the long run, normal resource employment level of output. **STABILIZATION** policy is the macroeconomic policy that aims at moderating the fluctuations and their impact. In the long run the economy is expected to return to potential GDP.

Potential GDP = **long term** trend in GDP that results from the “normal” utilization of the country’s productive capacity

Actual GDP = **real** or **prevailing** level of GDP resulting from the actual or prevailing rate of utilization of the country’s productive resources

GDP GAP = **Potential GDP** – **Actual GDP**

If **potential GDP** > **actual GDP**, the **GDP gap** is **positive** and referred to as a **recessionary gap**

If **potential GDP** < **Actual GDP**, then the **GDP gap** is **negative** and referred to as **inflationary gap**

At any level of GDP at which **aggregate** desired **expenditure exceeds** total **output**, there will be **pressure** for **GDP** to **rise**.

Similarly at any level at which **aggregate** desired **expenditure** is **less** than output there will be **pressure** for **GDP** to **fall**.

Economics growth refers to growth in actual output resulting from increases in the country’s productive potential and therefore potential output. Economic growth shifts the vertical long run aggregate supply curve outwards as the potential GDP level rises.

The following are some of the terminologies used in describing the uneven pattern or fluctuation in GDP growth:

Recovery

An **upturn**, or start of a **rise** in **investment** or the **replacement** of worn out **capital**, **employment**, **income**, **spending**, business **confidence**, **production**, **sales**, and **profits**.

Recession

Contraction, **downturn**, fall in GDP for two successive quarters. Demand falls off and as a result, production and employment fall.

Depression

Deep and long **lasting recession** - an example is the depression of the 1930s when unemployment reached 20% and over in most of the industrial countries of Western Europe and North America.

Peak

A **peak** refers to the **top** of **cycle** of boom. At the peak, existing capacity is utilized to a **high** degree; labor shortages may develop amidst a situation of **excess demand**.

Trough

Is period of **low economic activity** characterized by **high unemployment**, **low demand**, **less than full capacity** output, **low profits**, **low confidence**, and **reluctance** on the part of firms to make **new investment**.

Booms and Slumps

These non-technical terms are sometimes used. A **boom** refers to the **rising half** of the cycle, that is, the **top** of an abnormally **strong recovery**. A **slump** refers to the **bottom** of an abnormally **deep recession**.

Time Frame

Short run

The short run is the period over which actual GDP may deviate from potential GDP. That is, a period over which there may be a "GDP GAP"

Long run

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The long run is a period sufficient enough to allow time for the automatic adjustment mechanisms to return output to the potential or normal employment level of output.

It is important for businesses to understand the workings of the **macroeconomic environment** as this **affects** their own **performances**. Of particular concern are conditions of **recession**, rapid **inflation**, higher **interest rates**, growth rate of the economy, and changes in the **exchange rates**.

Business Cycles

GDP = Total monetary **value** of all **goods** and **services** produced in an economy over a **period** of one year.

Potential GDP = **long term** trend in GDP

Actual GDP = **prevailing** level of GDP at a given time

GDP GAP = **Potential GDP** – **Actual GDP**

Concept of **full employment** (of labor and resources) refers to **normal** levels of **utilization** of **resources** within the economy with inherent “natural” rate of unemployment largely of frictional nature (people in between jobs or new job seekers).

Business cycles refer to **fluctuations** in business **activity** and economic **output** that may be attributed to a range of macroeconomic factors including changes in autonomous expenditure, shortfalls in production due to drought, technological shocks and so on. Business cycles or fluctuations are **short run** deviations from **potential GDP**. Macroeconomic **stabilization** policy is aimed at **moderating** the **fluctuations** or swings of the economy and their impact on people’s livelihoods. In the **long run** the economy is expected to return to **potential GDP**.

Macroeconomic Policy Objectives

The macroeconomic objective of most countries is to maintain macroeconomic **stability**, stimulate **growth**, control **inflation**, and reduce **unemployment**.

Unemployment

An economic **downturn** is often accompanied by **UNEMPLOYMENT** or less than optimal use of **RESOURCES** and **PRODUCTIVE CAPACITY** of the **country**. Unemployment is the proportion of the total labor force that is out of work but willing to work. Reducing **unemployment** is a **central objective** of macroeconomics. **EXPANSIONARY** fiscal measures (lower taxes, higher

government spending and programs) and or expansionary monetary policy (lower interest rates, increased money supply) are normally recommended.

Inflation

Inflation is disruptive to businesses and makes business planning difficult. Inflation is brought about by a diversity of economic conditions including **EXCESS DEMAND** over and above supply, rise in input costs and rise in production costs. To recommend policy measures to curb inflation, it is important to know the **SOURCE** of the **inflationary PRESSURES**. **For example inflation triggered by excess demand** is normally controlled by policy targeted at **CURBING aggregate DEMAND**.

Both **monetary** and **fiscal** policy can be used to **curb demand** pressure. Fiscal measures of higher taxation, reduction in money supply, higher interest rates can curb demand pressure.

Transmission Mechanism

At equilibrium, output Y equals aggregate demand, $C+I+G+(X-M)$, thus,

$$Y = C + I + G + (X - M)$$

The higher the real **interest rate**, the higher the **cost** of **borrowing** for investment. **Mortgage** owners have less to spend due to higher payments on house loan. **Residential construction** using borrowed money also **decline**. Thus **high** interest rates **affect** output through **investment (I)** and **consumption (C)**.

Business **investment** depends in part on the **forecast** of **future prospects** of the economy by firms.

At any level of GDP at which **aggregate** desired **expenditure exceeds** total **output**, there will be **pressure** for **GDP** to **rise**.

Similarly at any level for which **aggregate** desired **expenditure** is **less** than output there will be **pressure** for **GDP** to **fall**.

FISCAL and **MONETARY STABILIZATION** policies are used to **DAMPEN** the **FLUCTUATIONS** from **potential GDP**. Usually the **direction** of required change is easy to determine. However the **timing**, **magnitude** and **mix** of policy **instruments** are not so easy to determine.

If desired aggregate **expenditure** far **EXCEEDS** aggregate **OUTPUT** (supply), it will create **INFLATIONARY** pressures. Government can use **FISCAL** policy to **DAMPEN** the aggregate **DEMAND**. It can reduce the

component of **government** expenditure (G) and increase **taxes** to reduce disposable income or purchasing power and subsequently aggregate demand. This will affect **consumption** (C) and **savings** (S).

Government can also **reduce** the **money supply** through **open market operations** – that is, **selling** and buying of government **bonds** (such as Treasury Bills) to **withdraw money** from circulation or to inject money into the economy. It can also raise **interest** rates to increase the **cost** of **holding** real balances.

Keynesian Model of Income

For convenience, overall spending or demand in the economy is broken down into four categories. These categories are internally **homogenous** and **distinct** and include:

Private Consumption Expenditure (C)

Expenditure by individuals on **consumption goods** and **services** like **hair cut, medical care, legal advice, food, clothing, TV sets, cars, microwave ovens, and flowers**. Consumption expenditure **excludes** the purchase of **newly built houses**, which are considered under **investment**.

Government expenditure (G)

This refers to direct expenditure by government on things like **street lighting, health care, expenditure on national defense, road paving** and **salaries of public employees**. Government expenditures are typically valued at **cost**, as they are normally not traded in the markets.

Investment (I)

Spending by firms that add to the physical stock of capital such as **housing construction, machinery, construction of factories**, and additions to **inventory**

Net exports (X-M)

Exports minus imports, that is, the difference between foreign spending on domestic goods and domestic spending on foreign goods.

Together these spending categories contribute to **AGGREGATE DEMAND** or **DESIRED AGGREGATE EXPENDITURE (AE)**. This is the level of demand for goods produced in the economy. Aggregate Expenditure is the total

spending on goods and services produced in the economy. It is made up of private consumption by households, investment spending by firms, direct expenditure by government on goods and services, and net exports over imports. Thus, aggregate demand (AD) or desired expenditure (AE) is given by,

$$AE = C + I + G + (X - M)$$

Modeling GDP Determination

Aggregate output is normally considered to be a response to aggregate demand. If there is an increase in aggregate demand, firms will raise output to meet the increased demand and GDP will rise. If there is a slump in demand, firms will cut production and GDP will fall. This type of instability will continue until output rises or falls to the level of aggregate demand and equilibrium is attained.

As GDP catches up with demand however, the pressure for it to change diminishes. At the point where aggregate spending (AE) equals GDP, the economy is in equilibrium. At equilibrium, there is no tendency for the level of output (GDP) to change, as it is exactly equal to demand.

To develop a model to analyze the conditions for such equilibrium, it is necessary to develop behavioral functions for consumption by households, investment by firms, government spending, and net exports. For simplicity, it is further assumed that:

- The resources in the economy are not fully utilized, that is, there is excess capacity;
- The price level remains constant.

Consumption Function

Relates consumption to the DISPOSABLE INCOME of households, that is, income households are free to spend. It is hypothesized that consumption is made up two parts – an autonomous part, and a part that is induced by changes in disposable income. This may be expressed as,

$$C = \bar{C} + cYD$$

Where, $\bar{C}$ is consumption that is autonomous of the level of disposable income. When income is zero, households can sell property, consume out of past savings, or borrow. Any variable denoted with a bar is considered autonomous with respect to income even though it may change due to other factors. c is referred to as household's marginal propensity to consume out of disposable income. It is defined as,

$$c = \frac{\Delta C}{\Delta Y}$$

Disposable income (Y_D) is income possessed by households. It is equal to national income (Y) less taxes paid to the government plus transfer payments paid to households by government. If allowance is made for two types of taxes, lump sum taxes ($\bar{T}X$), which are autonomous of income, and income taxes that are proportional to income say a percentage (t) of the national income Y . In a model with both lump sum taxes and income tax, disposable income (Y_D) is the difference between national income and “net taxes” that is, taxes less transfers ($\bar{T}R$) from government to individuals,

$$Y_D = Y - \bar{T}X - tY + \bar{T}R$$

Investment Function

For simplicity assume investment is **independent** of changes in **income** or GDP, that is, it is **autonomous**. This is expressed as,

$$I = \bar{I}$$

Government Spending

Government spending is also assumed to be **independent** of changes in income as governments programs are normally pursued **independent** of fluctuations in **GDP** levels, thus

$$G = \bar{G}$$

Net Exports

Net exports are given by exports minus imports, that is, $X - M$. Exports are assumed independent of domestic GDP as it is based on foreign demand that is determined by foreign circumstances. On the other hand imports are purchases of foreign goods by nationals and very much depends on the level of domestic income. The net export function is therefore hypothesized to be,

$$X - M = \bar{X} - mY$$

m is the MARGINAL PROPENSITY TO IMPORT defined by,

$$m = \frac{\Delta M}{\Delta Y}$$

From the above specifications, it is possible to solve for the EQUILIBRIUM INCOME for an economy involving all four sectors, or for an economy

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assumed to have only two (households and firms), or three sectors (households, firms, and government).

For an economy with all four sectors, the equilibrium level of income can be obtained by equating aggregate demand (AD) or desired expenditure (AE) in the economy to the value of the total output of the economy,

$$Y = AD$$

$$\Rightarrow Y = C + I + G + X - M$$

$$\Rightarrow Y = \bar{C} + c \left(Y - \bar{T}X - tY + \bar{T}R \right) + \bar{I} + \bar{G} + \bar{X} - mY$$

$$\Rightarrow Y = \frac{\bar{C} + \bar{I} + \bar{G} + \bar{X} + c\bar{T}R - c\bar{T}X}{1 - c + ct + m} \dots\dots\dots(1)$$

The equation above gives the EQUILIBRIUM CONDITION for a four-sector model that includes the government and foreign sectors.

Denoting total change in the autonomous components of spending by $\Delta \bar{A}$, it is clear from equation (1) that,

$$\Delta Y = \Delta \bar{A} \cdot \frac{1}{1 - c + ct + m}$$

That is, change in equilibrium income is the product of change in **autonomous** spending and a “**multiplier**” given by,

$$\frac{1}{(1 - c + ct + m)}$$

The MULTIPLIER is defined as the **change** in **equilibrium income** for one unit change in AUTONOMOUS SPENDING, that is,

$$Multiplier = \frac{\Delta Y}{\Delta A} = \frac{1}{1 - c + ct + m}$$

If autonomous change occurs in some but not all of the components of aggregate expenditure, the appropriate multiplier can be extracted from equation (1). For example, the lump sum TAX MULTIPLIER in the four-sector equilibrium model in (1) is given by,

$$multiplier_{TX} = - \frac{c}{1 - c + ct + m}$$

The MULTIPLIER FOR GOVERNMENT SPENDING “G” is given by,

$$multiplier_G = \frac{1}{1 - c + ct + m}$$

Relationship with Savings

Households either consume or save their disposable income, that is, $YD = C + S$. From which,

$$\Delta Y_D = \Delta C + \Delta S$$

Dividing through by ΔY_D ,

$$\frac{\Delta Y_D}{\Delta Y_D} = \frac{\Delta C}{\Delta Y_D} + \frac{\Delta S}{\Delta Y_D}$$

The expressions to the right are the marginal propensity to consume and marginal propensity to save respectively. Thus, we can derive the following important relationship

$$1 = MPC + MPS$$

From this relationship, it is clear that the marginal propensity to consume out of disposable income and the marginal propensity to save out of disposable income sums up to one, that is, equal to the total change in income.

The Assets Market

Assets

An asset is an item or property that has monetary value and owned by an individual, an enterprise or an organization. Assets are categorized into **real**, **financial**, and **intangible** assets.

Real Assets

Physical assets are assets such as plant, equipment, land, and consumer durables.

Financial assets

Financial assets comprise money and money market instruments such as bonds, stocks and equities.

Money is any accepted medium of exchange. Money is also a unit of account and takes the form of currency, notes, coins and bank deposits.

Bonds are interest bearing securities, that is, a promise by a borrower to pay a lender the principal at some specified (maturity) date plus (annual) interest. Bonds are credit instruments issued by governments, corporations or municipalities.

Stocks and equities are claims on share of profits of enterprises. Claims may be in form of dividends and or capital gains.

Intangible assets

These are things like GOOD WILL, BRAND NAMES, and KNOW HOW.

For purposes of GDP determination, assets market may be divided up into two categories, money, and bonds. Money is an asset that carries no interest, and bonds as the type of asset carry interest. There is therefore an opportunity cost to holding money, which is the interest foregone – interest that could have been earned if bonds were held. This is true whether the money is part of personal savings or a bank loan.

The assets market then involves the demand and supply of money and bonds. People demand money for **transaction**, **precautionary** and **speculative** purposes. When people want to make **payments** they need money and so the demand for money rises. As aggregate demand is a key factor in the determining the level of GDP, it is clear that money, which forms a crucial part of demand as it provides the purchasing power backup for demand, is a very important factor in the determination of national income.

The decision by households as to how much liquid money and how much worth of bond assets to hold, is referred to as portfolio decisions. When people have **idle** cash they are better off buying **bonds** and earning the **interest** on the money. In a simplified model it can be assumed that households make the “**portfolio**” decision or choice of how much of their assets to hold in form of **money** and how much to hold in form of **bonds** depending on their level of transactions and precautionary tendencies.

Money Supply

Money supply refers to the **amount** of **money** in **circulation** in an economy. This can be specified using various measures of money – measures mainly based on the liquidity of the monetary asset. The narrowest definition of money is the MONETARY BASE or HIGH-POWERED **money** that comprises **notes** and **coins** in circulation and with banks. A narrow definition of money includes assets readily convertible into **liquid** form or those that can be used **directly** to make transactions. A broader definition of money will include time deposits in banks, building society deposits and credit instruments like bonds (for example treasury bills). **Money supply** affects the level of **GDP** as it

BACKS UP aggregate **demand** with the necessary PURCHASING POWER. The monetary authorities can control the money supply by:

- Increasing or reducing the monetary base,
- Raising or lowering interest rates,
- Buying or selling government bonds,
- Regulatory control of credit creation by commercial banks.

The money supply can have significant impact on the level of output or GDP. This is mostly through its effect first on aggregate demand but ultimately aggregate supply.

Questions

- (1) Distinguish between LONG TERM GROWTH IN GDP and BUSINESS FLUCTUATIONS.
- (2) Explain the terms RECESSION, RECOVERY, BOOM, PEAK, and TROUGH.
- (3) What do you understand by INFLATIONARY GAP and RECESSIONARY GAPS
- (4) Sketch a linear Keynesian consumption function of the form $C = a + bY$ and give the economic interpretation of “a” and “b”.
- (5) Explain the terms - Nominal GDP, Real GDP and GDP at factor cost.
- (6) Given a three sector economy described by the equations: $C = 200 + 0.8 YD$; $YD = Y - T + TR$; $I = 50$; $G = 100$; $T = 50$; $TR = 20$. Find equilibrium income, consumption, and savings as percent of national income.
- (7) Sketch the linear Keynesian consumption function $C = a + bY$ and give the economic interpretation of a and b .
- (8) Given $Y = C + S$ and a consumption function $C = a + bY$, obtain the savings function in terms of a , b and Y and sketch it on Savings-income axes.
- (9) Define MPC, APC and MPS and derive the relationship between MPC and MPS.
- (10) In a two sector model, given $C = 850 + 0.80Y$ and $I = 100$, compute the equilibrium income and savings as percent of national income.
- (11) If the autonomous consumption in question (4) above rises to 1000, compute the equilibrium income and the value of the multiplier for the economy.
- (12) Given a three sector economy in which $C = 20 + 0.80YD$, $I = 50$, $G = 20$, and lump sum tax $TX = 10$ and no transfers. Compute the equilibrium level of income.

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- (13) If transfer $TR=10$ is introduced in the economy in (6) above, calculate the equilibrium income and comment on your result.
- (14) If government in (6) above increases the lump sum tax T_X to 25 and maintains zero transfers calculate the equilibrium income. What is the effect of higher taxes on the level of income.
- (15) On the basis of the results in (8) compute a tax elasticity of national income for the economy in (6).
- (16) Briefly explain the relationship between unemployment and national income

Chapter 8

INFLATION

INFLATION refers to A RISE IN THE GENERAL PRICE LEVEL. A fall in the general price level is termed DEFLATION. The measures of inflation include the CONSUMER PRICE INDEX (CPI) or RETAIL PRICE INDEX (RPI), the WHOLESALE PRICE INDEX (WPI), the PRODUCER PRICE INDEX (PPI) or the GDP DEFLATOR. Inflation is undesirable because it

- Distorts the working of the price mechanism or system;
- Can distort the efficiency of resource allocation;
- Creates incentives for speculative rather than productive activity;
- Creates arbitrary redistribution of wealth between borrowers and lenders.

Causes of inflation

Inflation is generated from two main sources; the supply side, and the demand side. On the supply side, SUPPLY SHOCKS or changes in production conditions such as increase in production costs, or reduction in productivity can lead to inflation. On the other hand DEMAND SHOCKS in form of changes in autonomous expenditure especially those leading to excess demand over and above supply also lead to inflation especially near full employment output.

Supply shocks

The following SUPPLY SHOCKS can create inflationary pressures:

- Increase in cost of material inputs
- Increase in wage rate
- Other increases in the cost of production
- Decreases in productivity

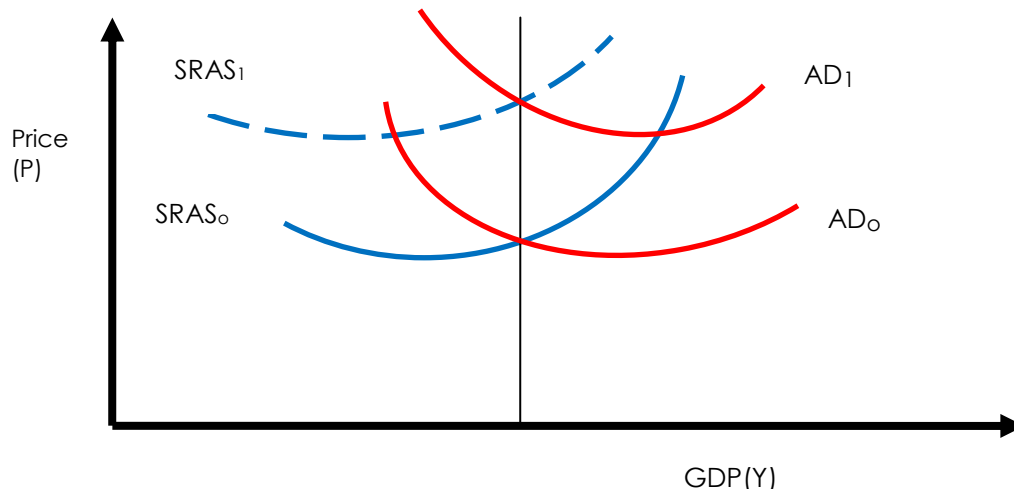
The supply shocks have the effect of shifting the SRAS to the left. This has the effect of raising the price level and reducing output – a situation referred to as STAGFLATION (stagnation with inflation). The monetary authorities can respond in various ways.

Monetary accommodation

As reduction in output resulting from a supply shock sometimes constitutes a more urgent priority than inflation, the authorities may opt to deal with the recession or output decline aspect rather than control inflation. There is a trade off between inflation and unemployment as shown by the Phillips curve.

In such a case, the monetary authorities could relax monetary policy, that is, reduce interest rates and allow the supply of money to grow. This will support aggregate demand and higher level of output or GDP.

Figure 11: Monetary Accommodation



The expansionary monetary policy will shift the aggregate demand outwards to the right and move equilibrium back towards potential output but at a higher price level. In employing this approach the emphasis is on dealing with the recession and decline in output rather than inflation.

No monetary accommodation

Alternatively, the monetary authorities may refrain from propping up aggregate demand through monetary “accommodation”. They can do this by allowing the recessionary process to continue until the decline in output causes a slack in the factor market. Low demand in the factor market applies a downward pressure on the prices of factor inputs like wage rate and cost of input materials. When factor prices decline relative to productivity, the SRAS shifts back outward to the right because production costs have declined relative to productivity. Firms are willing to supply more at prevailing prices. The macroeconomic equilibrium will move towards the potential level of GDP. If the process continues, potential GDP is restored at the original price.

The approach of no monetary accommodation would restore the original price level but because of the asymmetry in adjustment caused by stickiness of factor prices, the process is slow. Many governments consider economic recession to be an equally serious threat to the economy and may be under pressure to do something about the condition of stagflation.

If the government wishes to eliminate the recession, the monetary authorities will try to prop up aggregate demand and accommodate any monetary demand. If recession does not constitute a serious problem and inflation is

thought to be a bigger threat, the authorities would most probably refrain from propping up demand.

Demand Shocks

Demand shocks can result from:

- Increase in demand and especially in autonomous expenditure
- Increase in money supply.

A demand shock leads to a rightward shift in aggregate demand. This opens up an inflationary gap and leads to increased demand for money. The monetary authorities may or may not “validate” this increased demand for money.

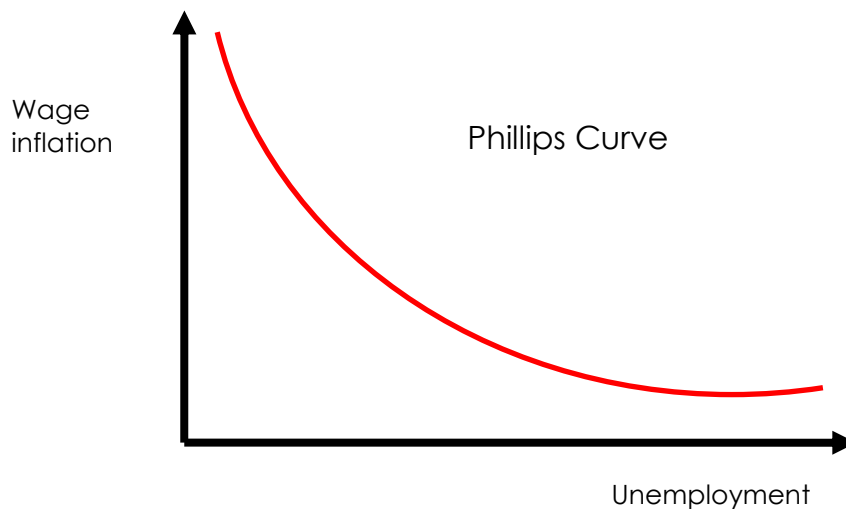
If demand for money is not “validated” (by raising interest rates and selling bonds to discourage demand for money), then the SRAS curve will shift to the left and can close GDP gap at a higher price.

If monetary authorities validate the ensuing demand for money, by allowing the money supply to rise, the high demand pressure will continue and lead to repeated AD shocks and an upward spiral of inflation.

Phillip's Curve

The Phillips curve relates wage inflation to the level of unemployment. The relationship between the two is inverse as shown in the curve below. When there is low unemployment, it means there is high demand for factors in the factor market. This will apply an upward pressure on factor prices that feeds in the general price level of products and services. Conversely when there is high unemployment, it means that there is low demand in the factor market and a downward pressure on the prices of factor inputs is likely to characterize the factor market.

Figure 11: Phillips Curve



The Phillips curve relationship naturally leads to the discussion of unemployment, which refers to the proportion of the labor force willing to work but is unable to find work or is in the process of searching for paid employment.

Questions

- (1) Define INFLATION and explain how it is MEASURED.
- (2) Discuss the importance of inflation in the growth of GDP.
- (3) What does the Phillip's curve show? Illustrate with an appropriate sketch.
- (4) Identify and briefly explain the various types of INFLATION.
- (5) Explain the INFLATION situation in your country
- (6) Discuss the policy measures to CONTROL INFLATION.
- (7) IDENTIFY and EXPLAIN the underlying causes of inflation.

Chapter 9

EMPLOYMENT

Concept of Unemployment

Unemployment is the **PERCENTAGE** of the labor force that is **INTERESTED** and **SEEKING** to work but is **CURRENTLY OUT OF PAID WORK**. There are three main forms of unemployment, namely, **CYCLICAL (KEYNESIAN)**, **FRICTIONAL**, and **STRUCTURAL** unemployment. Employment represents a very important policy objective of many societies. On the other hand unemployment is a major economic, social and political issue.

Cyclical (Keynesian) Unemployment

This is unemployment associated with business fluctuations and especially economic downturns. This may be due to short-term fluctuation in demand affecting the level of output supplied by firms and subsequently the associated level of labor employment.

Frictional Unemployment

Frictional unemployment is a transitional form of unemployment and refers to unemployment due to the normal labor turnover. People who are moving from one job to another and fresh graduates entering the labor market may be temporarily unemployed for the duration of time it takes to secure a job. This type of unemployment does not necessarily depend on the level of economic activity and as such is sometimes referred to as equilibrium unemployment. This is because frictional or transitional unemployment still prevails even when the macroeconomic equilibrium corresponds to full employment or potential GDP.

Structural Unemployment

Structural unemployment refers to unemployment resulting from the mismatch between the skills supplied by the labor force and the demand for labor. This happens for example when certain industries decline and workers get laid off. Or when an organization innovates new technology and existing staffs do not have the required skills to operate the new technology. An example is when an organization computerizes its production and other activities. It may be necessary to retrain existing workers with the relevant computer skills or

employ workers who possess the required skills. Any unemployment due to such mismatch between skills possessed by potential workers and the skills required in the labor market is referred to as structural unemployment.

Reducing Unemployment

Reducing Cyclical Unemployment

The reduction of cyclical unemployment was the original subject of macroeconomics. Cyclical unemployment is the result of business fluctuations associated with instability in demand, but also sometimes supply shocks.

The main approaches to minimizing the business fluctuation are those of fiscal and monetary stabilization. In this the government attempts to superimpose counter cyclical policy measures. If aggregate demand is low, the authorities will attempt to buttress it through expansionary fiscal and monetary policy measures. The measures act against the declining demand.

Expansionary fiscal policy involves the reduction of taxes, increase in government spending and increase in transfers. These measures should support higher aggregate spending by the household, business and government sectors. The authorities can combine these measures with the corresponding monetary policy measures.

Expansionary monetary policy measures include, lowering interest rates, buying of government bonds, easing on commercial bank credit creation and devaluation of the exchange rates. The monetary measures increase the supply of money by lowering the cost of liquidity in the economy. This will buttress aggregate demand and cause output to rise and cyclical unemployment to fall.

If demand is too high, inflationary pressures are likely to ensue. Government can tighten fiscal policy by raising taxes and reducing spending and transfers. The corresponding monetary policies include raising interest rates, selling bonds, and controlling credit creation.

Reducing Frictional Unemployment

Frictional unemployment is not easy to deal with. Attempts may be made to shorten the time between jobs by making the process of job search easier and more effective. A whole range of suggestions could be made toward achieving this objective. The essential thing is to facilitate the contact between potential employers and employees.

Reducing Structural Unemployment

Efforts aimed at reducing structural unemployment should address the mismatch between skills possessed by job seekers and skills required in the labor market. Possible measures include support for retraining programs, reform of existing educational curricula based on frequent interaction between employers, policy makers, and educational institutions. It is also important that the economy have the flexibility to adjust to changing demand structure and possible decline in certain industries. Policy measures should encourage market oriented economic activities and skill development.

Economic growth refers to growth in the output of goods and services or gross domestic product, in a country. This is growth in the level of “potential” GDP. Economic growth is the single most crucial factor affecting changes in living standards. It measured as changes in the level of GDP. To get a theoretical idea of growth in living standards, growth may be reported as rate of growth in per capita GDP.

At any given time an economy is unlikely to be producing at its production possibility frontier, that is, at its maximum possible capacity given the technology, capital and other productive resources. This is due to inefficiencies or less than full capacity utilization of the productive resources due to structural constraints. It is therefore possible to spur one-off growths in output level by:

- Reducing structural unemployment
- Improving resource allocation in economy

The above one-off growth spurts should be distinguished from continuous growth that can be generated through capital build-up and technological progress. The following are some of the key factors that underlie long-term economic growth:

- Natural resources exploitation
- Growth in labor force
- Growth in physical capital stock
- Growth in human capital stock
- Technological change

Natural resources

Natural resources are an input into production and their exploitation generates a supply of productive inputs into the “aggregate production function” and so constitute an important factor in the growth of the output level in an economy.

Labor

Labor is an important factor of production. Growth in the labor force therefore constitutes an important source of growth in the level of output in an economy. The more people are employed, the higher the absolute level of output that may be expected. Rise in the labor force is therefore an important growth factor.

Human capital

Human capital refers to the education, training, experience, skill and health of the labor force. Human capital may therefore be distinguished from labor. Growth in labor represents growth in quantitative number of people working. Growth in human capital however is qualitative and represents growth in the skill level and by implication the productivity of the labor force. It is clear that growth in human capital contributes to the productivity of employees and so constitutes a separate and crucial factor of the growth of GDP.

Neoclassical Growth models

The emphasis in neoclassical growth modeling is capital accumulation through savings and investment. Neoclassical growth models display diminishing returns to the accumulation of a single factor and constant returns to scale. Diminishing returns to each of the single factors, capital (K) and labor (L) in the process of capital accumulation, is expressed by the Inada conditions of,

$$\lim_{K \rightarrow \infty} \left(\frac{\partial Y}{\partial K} \right) = 0 \quad \text{and} \quad \lim_{L \rightarrow \infty} \left(\frac{\partial Y}{\partial L} \right) = 0$$

On the basis of the assumption of diminishing returns to each factor and constant returns to all factors, neoclassical growth depends on the level of “capital per capita”. Since population growth in most societies tends to stabilize as economic development progresses, the main impetus of growth in output is growth in capital per capita. The marginal productivity of capital is however subject to diminishing returns in neoclassical models. Thus, neoclassical growth models predict “convergence” in the growth rate of countries.

The key neoclassical models of economic growth include Solow (1957) and Swan (1957) models in which the big part of growth was attributed to TECHNOLOGICAL CHANGE which the model however assumes to be exogenously driven. These models therefore had little to say about the real determinants of long run economic growth. The conclusions of the model are CONVERGENCE due to the assumptions of diminishing returns

Endogenous Growth

Endogenous growth refers to growth models that display constant or increasing returns. Endogenous growth models incorporate the determination of the key growth factors in the model and address conditions where simultaneous growth in the factors of production for example physical and human capital could lead to increasing rather than diminishing returns to each of the factors. This can be feasible even when there is diminishing returns to

the single factor as in the neoclassical models but allow for learning by doing (Arrow 1962), learning through investment, the possibility of mutually productive interaction between increasing levels of the factors of production.

Questions

- (1) Define unemployment and explain how it is measured.
- (2) Discuss the importance of employment in the growth of GDP.
- (3) Explain unemployment in relation to the Phillip's curve. Illustrate with an appropriate sketch.
- (4) Identify and briefly explain the various types of unemployment.
- (5) Explain the unemployment situation in your country.
- (6) Discuss the policy measures to reduce unemployment.

Chapter 10

GLOBAL INFLUENCES ON BUSINESSES

Globalization

Globalization refers to the process of integration of the global economy through cross border economic and social activities and the resultant linkage and **interdependence** between countries especially in **trade**, **resource flows**, **investment**, and the **diffusion** of social **values**.

Driving forces of Globalization

- Advances in **information** and **communication** technology (ICT)
- Advances in transportation technology
- Reduction in the cost of communication
- Reductions in the cost of **transportation**
- Market **liberalization** **reduction of tariffs and non-tariff barriers to cross border economic activities**
- Liberalization of the capital account of the BOP and other favorable **policy environment**

For economists, the main “**dynamic**” of **globalization** consists in **trade**, financial flows, **direct investment**, **portfolio** investment, and globally spanning **business organizations**.

Arguments for free trade

Gains from trade resulting from **specialization** based on differing **comparative advantages**. Differences in the **opportunity cost** between countries in producing given goods and services imply the possibility of **specialization** and **trade**.

Arguments of **gains** from trade presuppose **fair trade**. This is not always guaranteed. **Specialization** also carries with it **risks**, such as out competition resulting from technological **innovation** by **rival** producers; risks involving **national protection** and **defense**, etc.

The case for **free trade** has been **negotiated** within the framework of the **General Agreements on Tariffs and Trade (GATT)** and of the World Trade Organization (WTO). The **World Trade Organization** now institutionalizes the GATT resolutions, legal basis and related guidelines.

Many countries are already attempting to institute the conditions envisaged in GATT agreements by forming **regional groupings** with varying degrees of **integration**. Countries may for example form a **Free Trade Area**, which involves the removal of tariff and other barriers between the member countries; **customs union**, which is a free trade area together with common external tariff policy by member countries; and a **common market** which also involves the merger of resource markets of the member countries including labor.

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Strategic Motives of FDI

Foreign direct investment is largely undertaken by transnational corporations (TNCs). FDI may be justified through the following:

- Alternative to **exports**
- Cheap **input sourcing**
- Efficiency of **production organization**
- **Control** of proprietary **technology**
- **Exploitation** of **managerial expertise** and **superiority**

Favorable Host Country Conditions

- **Political Stability**
- Favorable **investment policy**
- **Sizeable market**
- Accessibility to **market**

- **Macroeconomic** stability
- Good **infrastructure**
- **Resource** availability

FDI Benefits to the Host Country

The following are the POTENTIAL benefits of foreign direct investment (FDI) to developing economies (LDEs). The benefits mostly arise as a result of the creation of beneficial linkages with local firms and resources suppliers and especially through. Potential Benefits of FDI to LDCs:

- **Capital** inflow
- **FDI is not a loan so no repayment**
- Inflow of **technology**
- Inflow of **managerial** skills
- Inflow of **marketing** skills
- Connection to global **distribution** and **marketing** networks
- Access to **global export markets**
- Creation of foreign-local **resource linkage**
- Boosting of domestic **tax revenue**
- Injection of **factor income** into the domestic economy
- Employment creation in the local economy
- Use of local **resources**
- Transfer of **exporting skills** and **experience**
- **Export** of domestically produced goods and services
- Supply of **capital** goods and **productive** services
- Creation of other economically **beneficial linkages**

If these conditions can be ensured, the FDI recipient economy is likely to benefit from the activities of inward FDI. The policy implications of ensuring these are however very challenging to say the least.

Potential Disadvantages from FDI

- Adverse balance of payments impact if **dividend** and **royalty repatriation** exceed inflows of capital and factor income to domestic factors
- **Loss** of tax **revenue** through the practice of **transfer pricing** to reduce declared profits
- Creation of TNC **enclaves** with **few ties** to the domestic economy
- Impaired development of domestic firms through **direct competition**, **abuse of market power**, and **political influence**
- Loss of **economic sovereignty** through dependence on the actions of foreign investors
- Possible negative environmental impact

Strategic Motives of TNCs in Direct Investment

Foreign direct investment (FDI) is largely undertaken by transnational corporations (TNCs). FDI is important because:

- It can be an alternative to **exports**
- It can improve access to cheap **input sourcing**
- It can improve the efficiency of **production organization**
- It allows for **control** of proprietary **technology**
- It offers an opportunity for the **exploitation** of **managerial expertise** and **superiority**

Ensuring Favorable Returns To Host Country

How can foreign direct investment be made to benefit host developing countries? Benefits mostly occur through the creation of beneficial linkages with local firms and resources suppliers but more especially through,

- Local **employment**
- Use of local **resources**
- Transfer of **technology**
- Transfer of **managerial skills**
- Transfer of **marketing skills**
- Transfer of **exporting skills** and **experience**
- **Export** of domestically produced goods and services
- Supply of **capital** goods and **productive** services
- Creation of other economically **beneficial linkages**

Balance of Payment Framework

Global economic interactions between countries such as trade, financial flows and others are better understood and analyzed within the Balance of Payments (BOP) framework.

Definition of BOP

The balance of payments is a statement of a country's **TRADE**, direct **INVESTMENT** and **FINANCIAL TRANSACTIONS** with the **REST OF THE WORLD** over a given period, usually a year. In the current era of increased globalization and global interaction between countries, The BOP is increasingly becoming an important framework for analyzing cross border trade, investments and financial movements. The balance of payments account is divided into three main parts, namely the **CURRENT ACCOUNT** and the **CAPITAL** and **FINANCIAL account** and the **RESERVE account**.

The Current Account

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The current account is made up of records of trade in **MERCHANDISE** and **SERVICES**. Merchandise or visible trade is made up of trade in tangible goods. On the other hand the second component of the current account, trade in **invisibles** comprises **trade in services** such as **insurance, shipping, tourism**, and of current payments and receipts of **interest** and **dividends** relating to international loans and investment.

The Capital Account

The financial and capital account records flows of capital and investment between the domestic economy and the rest of the world. These include **FOREIGN DIRECT INVESTMENT (FDI)**, that is, money spent by companies in acquiring or setting up overseas production plants and sales networks; and **PORTFOLIO INVESTMENT**, which is money, spent largely by financial institutions in purchasing overseas stocks, shares and government bonds.

The normal convention of the balance of payments records is that payments **received** are **CREDITS** and recorded as **POSITIVE** entries while payments **made** by domestic economy to foreigners are **DEBITS** and recorded **NEGATIVE**.

A deficit in the current account implying more outward payments than receipts from external sources by the domestic economy does not necessarily signify poor performance of the economy. It may well be that imports in the current account are financed by capital and financial inflow into the country recorded in the capital and financial of the balance of payments.

Table 2 Balance of Payments Statement

ITEM		CR	DR	NET
CURRENT ACCOUNT				
VISIBLE TRADE				
	IMPORTS	0.00	1,143,700.00	1,143,700.00
	EXPORTS	637,140.00	0.00	637,140.00
VISIBLE TRADE BALANCE		637,140.00	1,143,700.00	-506,560.00
INVISIBLE TRADE				
	FREIGHT AND INSURANCE	46,040.00	3,900.00	42,140.00
	OTHER TRANSPORTATION	137,840.00	27,980.00	109,860.00
	TRAVEL	111,000.00	15,400.00	95,600.00
	INVESTMENT INCOME	24,740.00	141,680.00	-116,940.00
	GOVT TRANSACTIONS	28,120.00	24,420.00	3,700.00
	OTHER SERVICES/INCOME	31,400.00	35,920.00	-4,520.00
	PRIVATE TRANSFERS	22,660.00	15,880.00	6,780.00
INVISIBLE TRADE BALANCE		401,800.00	265,180.00	136,620.00
BAL ON CURRENT ACCOUNT		1,038,940.00	1,408,880.00	-369,940.00

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CAPITAL ACCOUNT				
	PRIVATE LONG-TERM INVESTMENT	98,360.00	4,940.00	93,420.00
	LONG-TERM INTERGOVT LOANS	161,160.00	0.00	161,160.00
	GOVT CORPORATION	500.00	3,300.00	-2,800.00
	SHORT TERM	63,020.00	14,460.00	48,560.00
BAL ON CAPITAL ACCOUNT		323,040.00	22,700.00	300,340.00
BALANCE ON CURRENT AND	CAPITAL ACCOUNTS	1,361,980.00	1,431,580.00	-69,600.00
RESERVES / RELATED ITEMS				
A) CHANGES IN OFFICIAL	GROSS RESERVES	52,140.00	44,700.00	7,440.00
B) USE OF FUND CREDIT		44,640.00	0.00	44,640.00
C) CHANGES IN OTHER	LIABILITIES	2,060.00	0.00	2,060.00
D) COUNTERPART SDR	ALLOCATIONS	4,380.00	0.00	4,380.00
TOTAL SDR ALLOCATIONS		103,220.00	44,700.00	58,520.00
ERRORS AND OMISSION	(BALANCING ITEM)			-11,080.00
OVERALL BALANCE				-58,520.00

Source: Hypothetical Data

It is however important that a country's balance of payments performance be sustainable. For example a country cannot sustain a deficit trade balance unless it is accompanied by inflow of finance and capital in this account. Thus, the balance of payments will in the long run have to balance even when there is deficit in the current or capital accounts. Sometimes the balance is brought about by changes in the country's international reserves in form of build up or run down, necessary to correct any imbalance in the two accounts.

Questions

- (1) Explain what you understand by the term GLOBALIZATION.
- (2) What are the FACTORS that DRIVE the process of globalization?
- (3) Discuss some of the obvious consequences of globalization on BUSINESSES.
- (4) Trace the roots of the WORLD TRADE ORGANIZATION (WTO) through GATT and earlier efforts at reducing trade barriers.
- (5) What is COMPETITIVENESS and COMPETITIVE ADVANTAGE and what are the underlying determinants?
- (6) Discuss the importance of COMPETITIVENESS in a GLOBAL LIBERAL TRADING ENVIRONMENT.
- (7) Identify and explain the stages of REGIONAL INTEGRATION with reference to Africa.
- (8) What do you think are some of the effect of regional integration on business activities in the EAC region?

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Final Examination

Attempt 4 Questions

Time allowed: 3 Hrs

(11) Define what you understand by EFFECTIVE consumer DEMAND. Given a person consumes two goods A and B priced P_A and P_B per unit, in quantities Q_A and Q_B out of a total income Y , illustrate using the concepts of budget constrain line, indifference curves and marginal utilities how you would derive the EQUILIBRIUM position of the consumer.

(12) Identify the main OBJECTIVES of business firms and attempt to reconcile them with the concept of WEALTH MAXIMIZATION. Is the maximization of MANAGERIAL UTILITY consistent with the above? Give reasons for your answer.

(13) Define CROSS ELASTICITY of demand ϵ_{XY} of a good (X) with respect to a good (Y). Explain what a cross elasticity of $\epsilon_{XY} < 0$ and $\epsilon_{XY} > 0$ mean and give interpretations for the magnitudes of cross elasticities given by:

$$|\epsilon_{XY}| = 0; \quad |\epsilon_{XY}| < 1; \quad \text{and} \quad |\epsilon_{XY}| > 1$$

(14) With appropriate illustrations explain what you understand by the concepts PRODUCTION FUNCTION, AVERAGE PRODUCTIVITY and MARGINAL PRODUCTIVITY and clearly distinguish between TECHNICAL and ECONOMIC efficiencies.

(15) Given the following TOTAL COST function for a firm

$$TC = 1000 + 10Q - 0.9Q^2 + 0.04Q^3$$

- (i) What is the Total Fixed Cost (TFC) of the firm?
- (ii) Find expressions for the Total Variable Costs (TVC), Marginal Cost (MC) and the Average Variable Cost (AVC);
- (iii) Given that the MC curve cuts the AVC at its minimum point, find the output value Q corresponding to minimum AVC.

- (16) Contrast the concepts of DIMINISHING RETURNS to a factor and RETURNS TO SCALE clarifying the underlying factors of the two phenomena.
- (17) Given economists favor “competition” for efficient resource “allocation”, clearly show that NATURAL MONOPOLIES present a dilemma in this regard and outline policy measures to deal with the problem.
- (18) Explain COMPETITIVENESS and its underlying factors and discuss why it is critically important for firms and countries to be competitive in a LIBERAL global market regime.

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MANAGERIAL ECONOMICS

MASTER OF BUSINESS ADMINISTRATION

FINAL EXAMINATION

20/10/2010

Answer FOUR Questions, at least ONE from each section TIME: 3 Hrs

Section A

- (1) Explain the following concepts:
 - (a) Productivity
 - (b) Technical Efficiency
 - (c) Economic Efficiency
 - (d) Economic profit
 - (e) Marginal Revenue Product
- (2) With reference to the concept of fixed and variable costs, discuss the contention that “sunk costs” should not influence future economic decisions in the context of a firm’s production.
- (3) With appropriate illustrations discuss the short and long run equilibrium positions of a firm operating in a perfectly competitive market.
- (4) Derive strategic implications for a firm operating in a competitive market with a profit function $\Pi = P \cdot Q - C \cdot Q$, given P = Sales price of the good, C = unit production costs, Q = quantity produced and sold.
- (5) Identify and explain six factors that underlie the elasticity of demand for a good or service.

Section B

- (6) Given the production function $Q = AK^{\alpha}L^{\beta}N^{\delta}$

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Where Q is the rate of output and K , L , and N represent inputs of capital, labor and land respectively, determine:

- (c) The specific conditions under which returns-to-scale would be increasing, constant and decreasing.
- (d) The equation for the marginal product functions for each input.

(7) A firm sells its output for \$20 per unit and has a total cost function given by $TC = 16 + 17Q - 9Q^2 + Q^3$.

- (a) State the firm's fixed costs;
- (b) Determine the firm's marginal cost function;
- (c) Determine the firm's average cost function;
- (d) Determine the firm's total profit function;
- (e) Determine the profit elasticity at an output rate of 8 units

Best Wishes

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Revision Questions

Attempt ALL Questions

- (19) Define and discuss the relevance of the concepts EFFICIENCY, EFFECTIVENESS and PRODUCTIVITY to business managers.
- (20) Explain how PRICE MECHANISM resolves the fundamental questions of what, how, and how much to produce in a free and competitive global market.
- (21) A consumer has a budget of \$200 and consumes two goods X and Y with prices $P_X = \$5$ and $P_Y = \$10$. Derive an expression for the equation of the budget constraint line and sketch it on Q_Y - Q_X plane. Predict the slope of the related indifference curve where the consumer maximizes utility.
- (22) Define cross elasticity of demand E_{XY} of a good (X) with respect to a good (Y). Explain what a cross elasticity of $E_{XY} < 0$ and $E_{XY} > 0$ mean and give interpretations for the magnitudes of cross elasticities given by:
- (iv) $|E_{XY}| = 0$
 - (v) $|E_{XY}| < 1$
 - (vi) $|E_{XY}| > 1$
- (23) Advise a business manager with reasons whether she should increase or reduce the price of her goods if she wants higher revenue given the price elasticity of demand for her goods,
- (i) $|E| = 0$
 - (ii) $|E| = 0.5$
 - (iii) $|E| = 20$
- (24) With appropriate illustrations
- i. Explain the short run equilibrium position of a monopolist.
 - ii. Justify your government's expenditure on controlling monopoly power.
- (25) Business managers are constantly faced with important operational decisions that impact profitability. As a manager, explain why you would choose to continue operating when your business enterprise is incurring losses.

- (26) (a) Explain with an appropriate illustration the law of diminishing factor proportions.
(b) Using relevant illustrations explain producer equilibrium.
- (27) (a) Clearly differentiate between the explicit and implicit costs of a firm.
(b) Given the input, output and costs table below, correctly fill in the missing costs.

- (iv) Total Variable Cost
(v) Average Fixed Cost
(vi) Average Variable Cost
(vii) Average Total cost
(viii) Marginal Cost

L	0	1	2	3	4	5	6	7	8
Q	0	4	14	27	43	58	72	81	81
FC	20	20	20	20	20	20	20	20	20
VC									
TC	20	30	40	50	60	70	80	90	100
AFC									
AVC									
ATC									
MC									

- (c) Correctly illustrate the relationship between the various average costs of production.

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