QUESTIONS THAT MIGHT SAVE YOUR DEGREE

Mean: Average

Median: Most Repeated Values

Mode: Highest Value in data

Q1) What is the difference between Correlation and Covariance?

Both of these two measures the relationship and the dependency between two variables.
Correlation tells us the strength and magnitude of relationship between dependent and independent variable.
Whereas, Covariance tells us the direction of relation that whether they are positive or negative related.

Q2) What is the mean value of 10+10+10+10?
10

Q3) What's Dummy Variable?

Sometime we add some variables in our regression model which has no numeric value. They are dichotomous (can take 2 values only) 0 or 1 to indicate the absence or presence of some categorical effect that may be expected to shift the outcome. For instance, man/woman, and it's on you to decide which gender you encode to be 1 and which to be 0

Q3) What is Dummy Variable Trap?

When we have more than two dummy variables and we use all of them then there will be exact multicollinearity. Since D1 + D2 + D3 + D4 = 1 and therefore they will form a linear relationship with the constant. This is known as Dummy Variable Trap.
To avoid this, the rule is that the number of dummy variables we use will be one less than the total number of possible categories. The omitted dummy variable will define a reference group.

Multicollinearity:

When there is a strong correlation between the independent variables. Multicollinearity is a problem because it undermines (reduce) the statistical significance of an independent variable.

Autocorrelation:

Correlation in the error terms.

Q4) Time series and cross section data?

The difference between cross-sectional data and time-series data is that time-series data considers the same variables over a certain period of time, whereas cross-sectional data uses different data for a given point in time. Cross sectional data means that we have data from many units, at one point in time. Time series data means that we have data from one unit, over many points in time. It means that time-series data are stable, whereas the data used in the cross-sectional analysis are scattered.

Q5) What is the difference between panel data and pooled data?

Panel Data (time series cross section) is the Combination of time series and cross sectional data. Data that is collected sequentially from the same respondents over time. We have data from many units, over many points in time. Panel data, sometimes referred to as longitudinal data, is data that contains observations about different cross sections across time. Examples of groups that may make up panel data series include countries, firms, individuals, or demographic groups.

Pooled Data: Pooled data is a mixture of time series data and cross-section data. One example is GNP per capita of all European countries over ten years. Panel, longitudinal or micropanel data is a type that is pooled data of nature. Cross sectional units will change if new elements are added.

Q6) What is the difference between T-stat and F-stat?

These are hypothesis tests used to decide whether to accept or reject the null hypothesis. If the absolute value of the t-value is greater than the critical value, you reject the null hypothesis.

- T-test is univariate hypothesis test (The T-test is used to compare the means of two different sets while F-test is applied on large sampled population)
- A z-test is a statistical test to determine whether two population means are different when the variances are known and the sample size is large.
- Applied when SD is not known and sample size is small
- Comparing mean of two populations

T-test is used to estimate population parameter and hypothesis testing for population mean.

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

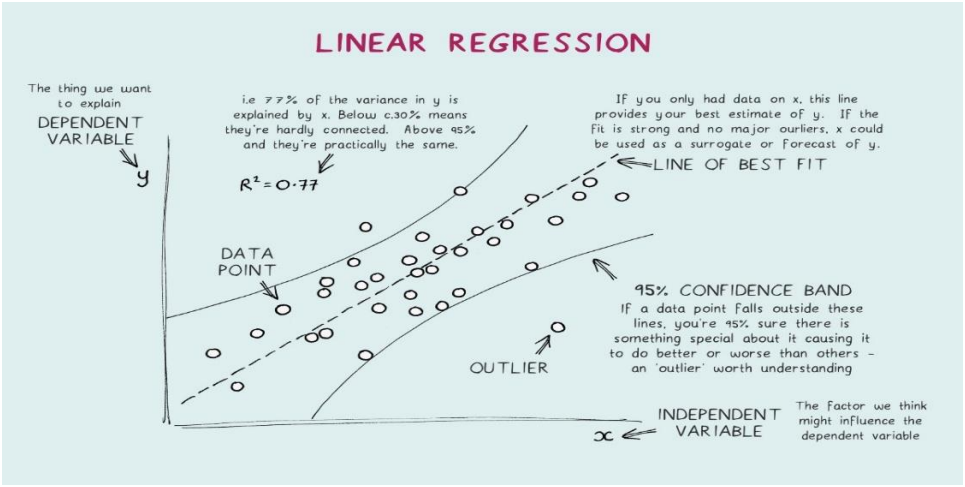
F-test is used to test any variance in population parameters. F-test is the ratio of variance of two samples. F-test is used to compare two population variances.

The test is performed when it is not known whether the two populations have the same variance.

$$\text{F value} = \frac{\sigma_1^2}{\sigma_1^2}$$ (ratio of the variance of the two data sets)

Q7) Regression Line?

A regression line displays the connection between scattered data points in any set. It shows the relation between the dependent y variable and independent x variables when there is a linear pattern.



$$Y_i = f(X_i, \beta) + e_i$$

Y= independent variable

X= Dependent variable

B= Unknown parameter

e = error term

Q8) What is the difference between population regression function (PRF)/conditional expectation function and sample regression function(SRF)?

PRF: It tells how the mean of Y varies with the mean of X. It is the locus of the conditional mean of variable Y(dependent Variable) for the fixed variable(independent Variable)

SRF: The sample regression function is an equation that represents the relationship between the Y variable and X variable(s) that is based only on the information in a sample of the population.

It shows the estimated relation between explanatory or independent variable X and the dependent Variable Y.

Q9) What is the difference between Standard Deviation and Standard Error?

A standard deviation (or σ) is a measure of how dispersed the data is in relation to the mean. Low standard deviation means data are clustered around the mean, and high standard deviation indicates data are more spread out.

The standard deviation, or SD, measures the amount of variability or dispersion for a subject set of data from the mean, while the standard error of the mean, or SEM, measures how far the sample mean of the data is likely to be from the true population mean. The SEM is always smaller than the SD. The formula for the SEM is the standard deviation divided by the square root of the sample size. The standard deviation reflects variability within a sample, while the standard error estimates the variability across samples of a population.

X= each value from pop.

$$\sigma = \sqrt{\frac{\sum(x_i - \mu)^2}{N}}$$

Q10) What is the coefficient of correlation?

Correlation is the degree/strength and type of relationship between any two or more quantities (variables) in which they vary together over a period. Its value ranges from -1 to +1
-1 means perfect negative correlation
+1 means perfect positive Correlation
0 means no correlation

Q11) What is regression?

The dependence of mean value of dependent variable on one or more independent (explanatory) variables is called regression.

Q12) What is the difference between Correlation and Regression?

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Q13) Explain different methods to detect Hetroscedasticity.

1. Breusch Pagan Test (Square of residuals is taken)
2. Glejsar Test (Absolute value of residuals is taken)
3. Harvey Godfrey Test (Log of square of residuals is taken)
4. Park Test (Log is taken of independent variables and of squared residuals)
5. White Test (Only square is taken of the independent variables and of residuals)

Q14) Why do we use White Test?

It is used to detect hetroscedasticity. It is best to use because it treats all the dependent and independent variables equally and neither under estimate nor over estimate them.

Q15) What is Stationarity?

It is a concept of time series data which has a constant mean, variance and covariance. Also, there is no trend in time series, it is also known as stationary series. So, in time series the data should be stationary if the data is not stationary then the regression results will become meaningless.

How do you know if a time series is stationary?

If Test statistic < Critical Value and p-value < 0.05 – Reject Null Hypothesis(HO

If the data is not stationary then to make it stationary either the difference is taken or the log.

Q16) What is Durbin Watson Test? What are its limitations?
Durbin Watson Test is a test used for the detection of Autocorrelation in a data.

If the value of Durbin Watson is 2 then there is no autocorrelation but if the value of Durbin Watson is decreasing below 2 then autocorrelation is increasing.

Limitations:

1. It is appropriate to use in the case of annual data only. If the data is quarterly or weekly or daily then it does not remain valid.

2. If we take dependent's variable lag on independent side then the results become invalid.

Residual value= error term value= difference between the observed value and the predicted value of dependent value.

Homo= uniform distribution of residual=residual values are equally distributed.

Hetro= non-uniform distribution of residual value. It forms clusters at some point and other clusters at some other point.

In regression analysis we take the assumption that the residual values are homoscedastic.

Q17) Explain Autocorrelation and Hetroscedasticity.

Autocorrelation: It is the correlation present between the values of error term.

Hetroscedasticity: The variance of error term/residual is not constant.

Q18) Explain public goods and its characteristics

A commodity or service that is provided without profit to all members of a society, either by the government or by a private individual or organization.
Characteristics:

1. Non rivalry
2. Non excludable
3. Externality

Q19) What is the difference private and public goods?

Private goods are owned by individuals and have private ownership. A commodity or service that is provided without profit to all members of a society, either by the government or by a private individual or organization.

Q20) What is externality?

An externality is a cost or benefit caused by a producer that is not financially incurred or received by that producer. An unintentional consequence of an industrial or commercial activity which affects other parties without this being reflected in market prices, such as pollution.

Q21) Explain Harrod Domar Growth Model.

The Harrod-Domar model is unsurprisingly named after two economists, RF Harrod and ED Domar, who were working in the l930s. The model suggests that the economy's rate of growth depends on:

- The level of saving
- The productivity of investment, i.e. the capital output ratio

The model concludes that:

- Increasing the savings ratio, or the amount of investment or the rate of technological progress are vital for the growth process
- Economic growth depends on the amount of labour and capital.
- As developing countries often have an abundant supply of labour it is a lack of physical capital that holds back economic growth and development.
- More physical capital generates economic growth.
- Net investment leads to more capital accumulation, which generates higher output and income.
- Higher income allows higher levels of saving.

Q22) What Rostows's five stages of growth?

1. Traditional society.
2. Preconditions for take-off.
3. Take-off.
4. Drive to maturity.
5. Age of high mass consumption.

Q) What is Ramsey Model?

In this, consumer behave optimally in deciding his savings. In Solow savings are exogenous and in Ramsey savings are endogenous.

Q) How can we improve our exports?

- By increasing the productivity of infant industries
- Specialization
- Devaluing Currency

Q) Explain Gini Coefficient and Lorenz curve.

The Lorenz curve is a graphical representation of income inequality. The Lorenz curve is often accompanied by a straight diagonal line with a slope of 1, which represents perfect equality in income or wealth distribution; the Lorenz curve lies beneath it, showing the actual distribution.

The Gini Coefficient measures the degree of income equality in a population. The area between the straight line and the curved line, expressed as a ratio of the area under the straight line is Gini coefficient which is can be used as an indicator of economic development in a country.

The Gini Coefficient can vary from 0 (perfect equality) to 1 (perfect inequality). A Gini Coefficient of zero means that everyone has the same income, while a Coefficient of 1 represent a single individual receiving all the income.

Q) What is the difference between growth and development?

Growth is quantitative and value neutral concept. Growth can be both negative and positive. GDP growth rate of country doesnt takes into account the externalities like- ecological foorprint, pollution of water, soil and air etc. Development is a qualitative concept and has always positive value.i.e Development occurs only when the growth is positive but not the other way. eg- social development takes place if te health indicators, literacy rate, standard of living etc improves.

Q) How do we measure income inequality?

- Range
- Mean Deviation
- Relative Mean deviation
- Variance/ Standard Deviation

- Coefficient of Variation
- Eltito and Firgyes Measures
- Disparity Index
- Lorenz Curve
- Gini Coefficient
- Atkinson

Q) What is the difference between absolute advantage and comparative advantage?

Absolute advantage
The ability of an actor to produce more of a good or service than a competitor.

Comparative advantage
The ability of an actor to produce a good or service for a lower opportunity cost than a competitor.
The existence of a comparative advantage allows both parties to benefit from trading, because each party will receive a good at a price that is lower than its opportunity cost of producing that good.

Q) What is the difference between partial and general equilibrium?

The main difference between partial and general equilibrium models is, that partial equilibrium models assume that what happens on the market one wants to analyze has no effect on other markets.

Therefore in partial equilibrium models one only considers a market for one good and assumes that the price of every other good or the wealth one has does not change.

In general equilibrium models every market has an effect on every other market and therefore a change in one market may have changes in another market and therefore one has to model every market simultaneously.

Q) What is the difference between advalorem tariff and specific tariff?

A specific tariff is levied as a fixed charge per unit of imports. For example, the US government levies a 51 cent specific tariff on every wristwatch imported into the US. Thus, if 1000 watches are imported, the US government collects $510 in tariff revenue. In this case, $510 is collected whether the watch is a $40 Swatch or a $5000 Rolex.

An ad valorem tariff is levied as a fixed percentage of the value of the commodity imported. The US currently levies a 2.5% ad valorem tariff on imported automobiles. Thus if $100,000 worth of autos are imported, the US government collects $2,500 in tariff revenue. In this case, $2500 is collected whether two $50,000 BMWs are imported or ten $10,000 Hyundais.

Q) What is the difference between Money Multiplier and multiple deposit creation?

The money multiplier is the amount of money that banks generate with each dollar of reserves. It is the reciprocal of Reserve Ratio.

when cash is deposited into a bank, the bank loans out most of that money, and most of the money loaned gets redeposited into the banking system, and gets mostly loaned out again, and redeposited, and so on.

The chain of deposit creation -- excess reserves (ER) being loaned out and redeposited in the banking system -- continues until the banks have basically no more excess reserves.

Q) What do you know about IMF and World Bank?

The primary difference between IMF, and the World Bank lies in their respective purposes and functions. The IMF exists primarily to stabilize exchange rates, while the World Bank's goal is to reduce poverty.

World Bank is about growth. IMF is about stability. World Bank is for development projects in the developing world. IMF is about balancing the international financial system in both rich and poor countries

Q) What is inflation? Will it be called inflation if the price of a good raises by 5%?

Inflation is the rate at which the general level of prices for goods and services is rising and, consequently, the purchasing power of currency is falling. Current inflation rate is 23.6%.

Q) What is Balanced Budget Multiplier?

If the government increases spending and taxation by the same amount, then equilibrium national income (GDP) rises by the same amount. Like, when the government spends $1,000 and imposes taxes of $1,000, it balances its budget, while increasing equilibrium GDP by $1,000.

The balanced budget multiplier is equal to 1.

Q) Why Phillips curve is vertical in the long run?

It is so because there is no relationship between inflation and unemployment in the long run as unemployment is at its natural rate.

The **natural rate of unemployment** is a combination of frictional and structural **unemployment** that persists in an efficient, expanding economy when labor and resource markets are in equilibrium.

Q) What will be the effect of inflation and in US economy on Pakistan Economy?

Q) Explain different theories of consumption?

1. Absolute income hypothesis (how a consumer divides his disposable income between consumption and saving)
2. Relative income hypothesis (an individual's attitude to consumption and saving is dictated more by his income in relation to others than by abstract standard of living)
3. Permanent income hypothesis (How consumption will be effected with the change in expected income)

Q) Types of Sampling

- **Simple Random Sampling** (the researcher randomly selects a subset of participants from a population)
- **Cluster sampling** (researchers divide a population into smaller groups known as clusters. They then randomly select among these clusters to form a sample)
- **Systematic Sampling** (selecting samples based on a system of intervals in a numbered population. Like puray population ko numbers assign kar kay hr 3rd person ko us line mai say select karna)

- **Multistage Sampling** (a method of sampling that distributes the population into clusters or groups so as to conduct research. This is a complex form of cluster sampling, during which the significant groups from the selected population are divided into subgroups at different stages eg: state, districts, villages, household)
- **Judgmental sampling** (Judgment sample, or Expert sample, is a type of non-random sample that is selected based on the opinion of an expert. Results obtained from a judgment sample are subject to some degree of bias)
- **Snow ball** (selecting participants by finding one or two participants and then asking them to refer you to others)
- **Stratified Sampling** (the division of a population into smaller sub-groups known as strata and then apply random selection to collect data)

Q) What is Bernoulli's Trial?

Any trial of random experiment is called Bernoulli trial if it satisfies following conditions:

Trails should be finite

Trails should be independents

It is a random experiment with exactly two possible outcomes, "success" and "failure", in which the probability of success is the same every time the experiment, is conducted.

Q) What is Binomial Probability distribution?

It is a probability distribution of number of success when fixed number of Bernoulli trials are conducted in which the outcomes are mutually independent and the probability of success is constant across all trials.

If we toss a coin, there could be only two possible outcomes: heads or tails, and if any test is taken, then there could be only two results: pass or fail. This distribution is also called a binomial probability distribution.

Q) What is Poisson distribution?

Is a probability distribution that is used to show how many times an event is likely to occur over a specified period. In other words, it is a count distribution.

Q) What is hyper geometric distribution?

Is a discrete probability distribution that describes the probability of successes (random draws for which the object drawn has a specified feature) in draws, without replacement, from a finite population.

Q) What is a random variable?

It is constructed over a sample which can take at least two distinct values with non zero probability.

Q) What is the difference between Bionomial, Poisson and hypergeometric distribution?

Binomial: Same probability of success

Poisson: n is large, mean and probability is small

Hypergeometric: No replacement.

Q) What is cumulative probability distribution function?

Is the probability that real valued random variable(X) will take a value less than or equal to evaluated variable(x).

The cumulative distribution function (CDF) of a random variable is another method to describe the distribution of random variables.

Q) What is marginal density function?

It is the derivative of cumulative probability density function.

It is the rate of change in probability due to small change in value of random variable of X.

Q) Normal probability distribution

Normal distribution, also known as the Gaussian distribution, is a probability distribution that is symmetric about the mean, showing that data near the mean are more frequent in occurrence than data far from the mean. In graph form, normal distribution will appear as a bell curve.

It can be obtained from binomial distribution if the following modifications are introduced:

Sample size (n) is infinity.

Random variables are transformed into continuous variable.

Q) Properties of normal distribution

1. Probability density is maximum at mean value of X

2. Probability density decreases as we move away from mean. But the rate of decrease gets smaller.

3. The distribution is symmetric around mean.

4. The mean, median, and mode of a normal distribution are equal.

Q) Standardize Variable:

Sometimes called a z-score or a standard score is a variable the mean of which is zero and standard deviation is 1.

How many standard deviation times a particular point is away from mean.

Q) Standardization

The conversion of a random variable into a standard variable is called standardization.

Q) Standardize Normal distribution

The normal distribution of a variable after it is standardized.

Q) Joint probability Distribution

A joint probability is a statistical measure where the likelihood of two events occurring together and at the same point in time is calculated. Joint probability is the probability of event Y occurring at the same time event X occurs.

Q) Sampling

A process used in statistical analysis in which a predetermined number of observations are taken from a larger population.

Q) Types of Sample

1. Random Sample: if each element of the population is given equal chance of being selected

2. Non random Sample

Q) Estimation

Guessing or computing the values of unknown parameters of a population

Q) Estimator and estimates

Estimator: a formula of method or device to estimate a parameter

Estimates: A value obtained by applying the estimator.

Q) Degrees of Freedom

The maximum number of independent values that have the freedom to vary in the data sample.

e.g: Choose numbers that give mean of 10.

9, 10, 11, 12, 13, 14, 15

Once you select 2 numbers of your choice the 3rd number gets fixed. Obtained by subtracting sample size and number of population.

Formula: (n-k) where n – sample size & k – number of obervations.

Q) Point and interval distribution

Point: To estimate a parameter at a single point

Interval: To estimate a parameter in a given range

Q) Sample error and bias error

Sample error: Error of estimation and it is just because of sample size and sample is not the true representative of popoluation.

Bias: A systematic error and it shows the difference between estimated value and actual value.

Q) Estimation techniques:

1. OLS (we use OLS for estimating the unknown parameters in a linear regression model) and it is BLUE (Best Linear Unbiased estimator)

2. Maximum Likelihood method

3. Method of Moments

4. 2SLS (Two-stage least-squares regression uses instrumental variables that are uncorrelated with the error terms to compute estimated values of the problematic predictor(s) (the first stage), and then uses those computed values to estimate a linear regression model of the dependent variable (the second stage).

Q) Head Count Ratio

$$\frac{\text{Number of poor in the population}}{\text{Total Number of population}}$$

Q) Confidence Interval

A confidence interval measures the probability that a population parameter will fall between two set values.
A confidence interval is the probability that a value will fall between an upper and lower bound of a probability distribution.

Q) Statistical Inferences

1. When no information is given then we do estimation either point or interval
2. When there is information about parameters then we do testing of hypothesis

Q) Types of error

1. Type 1 error: Rejecting a true H_o
2. Type 2 error: Accepting a false H_0

They are inversely related

Type 1 error is more severe

Q) Level of Significance

A measure of the strength of the evidence that must be present in your sample before you will reject the null hypothesis (No correlation b/w dependent and independent variables) and conclude that the effect is statistically significant. Rejection of Null Hypothesis means that the correlation exist b/w dependent and independent variable.

Probability of committing Type 1 error when H_0 is true as an equality.

Q) Testing of Hypothesis:

Steps:

1. Formation of Hypothesis
2. Define level of significance
3. Sampling
4. Test statistics
5. Find the critical region
6. Conclusions

Q) Goodness of Fit

A statistical hypothesis test used to see how closely observed data mirrors expected data

Q) Chi Square Test:

It is a test of goodness of fit

Q) What is Business cycle theory?

Business cycle theory states that the economic expansions and contractions are because of different shocks. Example of real shocks is shocks to the production function, labor force, government purchases and spending and saving decision of consumers. These shocks are the ones which effect the IS curve and FE Line. Nominal shocks are shock to money supply or demand which affect the LM curve.

This theory emphasizes productivity shocks (shocks to the production function) as the major sources of business cycle fluctuations.

This theory is against Keynesian and Monetary policy.

Q) What is liquidity trap?

A liquidity trap is a situation, described in Keynesian Economics, in which injections of cash into the private banking system by a central bank fail to decrease interest rates and hence make monetary policy ineffective.

A situation in which the nominal interest rate is very close to zero, making it impossible for monetary policymakers to expand the economy through further reductions in the interest rate.

To reduce the risk of falling into a liquidity trap, the authorities have two options. The first is to raise the inflation target. The second is to lower the zero nominal interest rate floor. When the economy is in liquidity trap then govt can use expansionary fiscal policy to come out of the trap.

Q) Why is Aggregate demand curve negatively sloped?

Aggregate Demand Curve that shows the quantity of goods and services that households, firms, the government and customer abroad want to buy at each price level.

1) Wealth Effect: Lower price level increases real wealth which stimulates spending on consumption. P dec , MS constant →wealth inc → D inc
   Pinc , MS constant →wealth dec →D dec
   *Change in the real value of money holding

2) Interest Rate Effect: P dec ,MS constant →I dec → Investment inc →D inc

   P inc ,MS constant →I inc → Investment dec →D dec

3) Exchange Rate Effect: P dec →i dec →Money Value dec (depreciates) →Net Export inc →D inc

   P inc → i inc→ Money Value inc (appreciates) →Net Export dec → D dec

Q) What will be the effect of an increase in tax on cash and on money supply?

Q) Explain Keynesian consumption function?

Keynes believed that the level of consumer expenditure was a stable function of disposable income where disposable income in our simple model is national income minus net tax payment (Y_D=Y-T). Keynes did not deny that variables other than income effect consumption, but he believed that income was the dominant factor determining consumption.

According to Keynes the consumption function must possess the following characteristics:

(1) Aggregate real consumption expenditure is a stable function of real income.

(2) The marginal propensity to consume (MPC) or the slope of the consumption function defined as dc/dY must lie between zero and one i.e. 0 < MPC < 1.

(3) The average propensity to consume (APC) or the proportion of income spent on consumption defined as C/Y should be decreasing as income increases. From the relation between marginal and average we know that, when average falls, marginal is below average. Thus, when the average propensity to consume (APC) falls, the marginal propensity to consume (MPC) must be lower than the APC.

(4) The marginal propensity to consume (MPC) itself probably decreases or remains constant as income increases.

Q) What is effectiveness of policies? Which do you think is the most effective policy out of three?

Q) Explain the slope factors of ISLM curve?

In a closed economy, the equilibrium condition in the market for goods is that production (Y), is equal to the demand for goods, which is the sum of consumption, investment and public spending. This relationship is called IS. If we define consumption (C) as C = C(Y-T) where T corresponds to taxes, the equilibrium would be given by: Y = C (Y- T) + I + G

We consider that investment is not constant, and we see that it depends mainly on two factors: the level of sales and interest rates. If the sales of a firm increase, it will need to invest in new production plants to raise production; it is a

positive relation. With regard to interest rates, the higher they are, the more expensive investments are, so that the relationship between interest rates and investment is negative. The new relationship is expressed as follows (where i is the interest rate): Y = C (Y- T) + I (Y, i) + G

If we keep in mind the equivalence between production and demand, which determines the equilibrium in the market for goods, and observe the effect of interest rates, we obtain the IS curve. This curve represents the value of equilibrium for any interest rate.

An increasing interest rate will cause a reduction in production through its effect on investment. Therefore, the curve has a negative slope. The adjacent graph shows this relationship.

The LM curve represents the relationship between liquidity and money. In a closed economy, the interest rate is determined by the equilibriu8m of supply and demand for money: M/P=L(i,Y) considering M the amount of money offered, Y real income and i real interest rate, being L the demand for money, which is function of i and Y.

The equilibrium of the money market implies that, given the amount of money, the interest rate is an increasing function of the output level. When output increases, the demand for money raises, but, as we have said, the money supply is given. Therefore, the interest rate should rise until the opposite effects acting on the demand for money are cancelled, people will demand more money because of higher income and less due to rising interest rates.

The slope of the curve is positive, contrary to what happened in the IS curve. This is because the slope reflects the positive relationship between output and interest rates.

Q) What is Solow Growth Model? Explain the assumptions, dynamics, policy implication of Solow growth model?

Key Concepts

- The Solow model adds a theory of capital accumulation. That is, it makes the capital stock an endogenous variable.
- The capital stock is the sum of past investments. The capital stock today consists of machines and buildings that were bought over the last several decades.
- The goal of the Solow model is to deepen our understanding of economic growth, but it's only partially successful. The fact that capital runs into diminishing returns means that the model does not lead to sustained economic growth. As the economy accumulates more capital, depreciation rises one-for-one, but output and therefore investment rise less than one-for-one because of the diminishing marginal product of capital. Eventually, the new investment is only just sufficient to offset depreciation, and the capital stock ceases to grow. Output stops growing as well, and the economy settles down to a steady state.
- There are two major accomplishments of the Solow model. First, it provides a successful theory of the determination of capital, by predicting that the capital-output ratio is equal to the investment-depreciation ratio. Countries with high investment rates should thus have high capital-output ratios, and this prediction holds up well in the data.
- The second major accomplishment of the Solow model is the principle of transition dynamics, which states that the farther below its steady state an economy is, the faster it will grow. While the model cannot explain long-run growth, the principle of transition dynamics provides a nice theory of differences in growth rates across countries. Increases in the investment rate or total factor productivity can increase a country's steady-state position and therefore increases growth, at least for a number of years. These changes can be analyzed with the help of the Solow diagram.
- In general, most poor countries have low TFP levels and low investment rates, the two key determinants of steady-state incomes. If a country maintained good fundamentals but was poor because it had received a bad shock, we would see it grow rapidly, according to the principle of transition dynamics.

Q) Differentiate between Endogenous Growth Model and Solow growth model?

The Solow Growth Model is Exogenous Model. So, first let us understand the basic difference between Exogenous and Endogenous Model of Economic Growth.

Exogenous Models consider external factors to predict the economic growth. For example: Under Solow Model, Solow suggested that without technological progress, economic growth can't be achieved. Similarly, Endogenous Model consider internal factors to predict and analyses the economic growth. For example, Under AK Model, it suggested that without technological progress, with the help of human capital, economic growth can be achieved. The Solow Model identifies the capital level per worker and the effectiveness of labor both as the ability to create permanent growth in the per capita stock per labor of the economy. While, AK Model (Endogenous) doesn't dispute that. It simply state that the factors of effective human capital i.e. the level of knowledge and specialization available and utilized can be determined and improved within the economy without any need to bring the technological progress.

Q) What is Money Demand? Explain with reference to different schools of thought?

The demand for money arises from two important functions of money. The first is that money acts as a medium of exchange and the second is that it is a store of value. Thus individuals and businesses wish to hold money partly in cash and partly in the form of assets. What explains changes in the demand for money? There are two views on this issue. The first is the "scale" view which is related to the impact of the income or wealth level upon the demand for money. The demand for money is directly related to the income level. The higher the income level, the greater will be the demand for money. The second is the "substitution" view which is related to relative attractiveness of assets that can be substituted for money. According to this view, when alternative assets like bonds become unattractive due to fall in interest rates, people prefer to keep their assets in cash, and the demand for money increases, and vice versa.The scale and substitution view combined together have been used to explain the nature of the demand for money which has been split into the transactions demand, the precautionary demand and the speculative demand. There are three approaches to the demand for money: the classical, the Keynesian, and the post-Keynesian.

<u>The Classical Approach</u>: The classical economists did not explicitly formulate demand for money theory but their views are inherent in the quantity theory of money. They emphasized the transactions demand for money in terms of the velocity of circulation of money. This is because money acts as a medium of exchange and facilitates the exchange of goods and services. In Fisher's "Equation of Exchange". MV=PT

Where M is the total quantity of money, V is its velocity of circulation, P is the price level, and T is the total amount of goods and services exchanged for money. The right hand side of this equation PT represents the demand for money which, in fact, "depends upon the value of the transactions to be undertaken in the economy, and is equal to a constant fraction of those transactions." MV represents the supply of money which is given and in equilibrium equals the demand for money. Thus the equation becomes. Md = PT

This transactions demand for money, in turn, is determined by the level of full employment income. This is because the classicists believed in Say's Law whereby supply created its own demand, assuming the full employment level of income. Thus the demand for money in Fisher's approach is a constant proportion of the level of transactions, which in turn, bears a constant relationship to the level of national income. Further, the demand for money is linked to the volume of trade going on in an economy at any time. Thus its underlying assumption is that people hold money to buy goods. But people also hold money for other reasons, such as to earn interest and to provide against unforeseen events. It is therefore, not possible to say that V will remain constant when M is changed. The most important thing about money in Fisher's theory is that it is transferable. But it does not explain fully why people hold money. It does not clarify whether to include as money such items as time deposits or savings deposits that are not immediately available to pay debts without first being converted into currency.

<u>Keynesian Approach:</u>

The modem concept of demand for money is associated with the Keynesian analysis of the demand for money. In his General Theory of Employment, Interest and Money (1936), J.M. Keynes expounded his theory of demand for money.

Essentially, Keynes' theory of demand for money is an extension of the Cambridge cash-balances approach and stresses the asset role (i.e., the store of value function) of money. In contrast to the Fisherian view of what people 'have to hold', the Keynesian view stated that the demand for money is determined by what people 'want to hold'.

To Keynes, demand for money does not mean the actual money balances held by the people, but what amount of money balances they want to hold. Keynes states that the demand for money means demand for money to hold the demand for cash balances. Money is not just meant for spending. It can be held as a form of wealth or asset which commands other forms of wealth in exchange, all the time. Thus, money being the most liquid asset, can serve as an efficient store of value; so it is demanded for its own sake. In this sense, the demand for money is the inverse of the velocity of circulation. We can say either that the demand for money has increased or that the velocity of circulation, the rate of spending, has diminished, and vice versa. In short, the Keynesian approach to the demand for money stresses the public's need for cash or money balances as a store of value at a particular point of time. In this context, it involves evidently the reason for the people's preference to hold liquid cash or money, rather than other assets, as a store of value. This desire for money is described by Keynes as liquidity preference.

Thus, the demand for money, in the Keynesian sense, is a demand for liquidity or "liquidity preference." Hence the modern approach to the demand for money has been designated as the cash balance or liquidity preference approach. Now, viewing the demand for money in its modern terminology, the question may be asked: Why should there be demand for money to hold, or why do people prefer to keep idle cash balances?

An obvious answer is provided by the subjective considerations of individuals regarding liquidity motives for the satisfaction of which they desire to hold money balances. Keynes distinguished three such motives which induce people to hold money. These are:

(1) the transactions motive; (2) the precautionary motive, and (3) the speculative motive.

Corresponding to these motives, thus, Keynes separated the demand for money into three parts:

(i) the transactions demand, (ii) the precautionary demand, and (iii) the speculative demand for money.

He further holds that, the total demand for money implies total cash balances. Analytically, total cash balances may be classified into two parts:

(i) Active Cash Balances; and

(ii) Idle Cash Balances.

1. Active Cash Balances:

Active cash balances relate to the demand for money held under transactions and precautionary motives. In other words, transactions demand for money and precautionary demand for money together constitute active cash balances held by the people.

<u>Transactions Demand for Money:</u>

Money being a medium of exchange, the primary demand for money balances arises directly out of its use for carrying on ordinary trade and business affairs of the economy.

The transactions-prompted demand for money arises on account of the lack of synchronization between receipts and payments. Individuals, in general, do not receive money income as frequently as they make payments. Thus, when income

is received at discrete intervals of time, but is paid out more or less continuously against the exchange of goods and services, it is inevitable that people should need a certain stock of money all the time in order to carry out their transactions.

Keynes' Analysis of Transactions Motive:

Keynes defines transactions motive for holding money as "the need of cash for the current transactions of personal and business expenditure." Thus, both households and firms hold money balances under the transactions motive. Their respective transactions motives may be referred to as income motive and business motive.

(a) The Income Motive: This refers to the transaction motive of the households, i.e., consumers' class. Consumers hold money balances to facilitate their day-to-day purchases of consumption goods. By keeping cash-balances they tend to bridge the gap of time interval between receipt of incomes and its disbursement. The consumer's/individual's demand for money, thus, depends upon:

(i) The level of income:

Usually, the amount of consumption oriented transactions increases with the rise in an individual's income. Thus, a rich man tends to hold more money balances for transactions purposes than a poor man does.

(ii) The price level:

With the rising prices, more money is required to buy a given quantity of goods.

During inflation, thus, the consumers' transactions demand for money tends to rise, corresponding to the rising price level.

(iii) The spending habits:

People's tendency to spend on consumption depends on their habits. A spendthrift obviously needs more transactions demand for money than a saver does.

(iv) The time-interval:

The time gap involved between the receipts of successive income flows and the corresponding expenditure is very important in determining an individual's transactions demand for money.

The longer the time-interval involved, the larger will be the money balances required to be held for transactions purposes and vice versa.

In other words, the transactions demand for money tends to be high when there -is lesser frequency of income receipts over a period of time, and it will tend to be low in case of more frequent income receipts. Assuming, given the habit of spending, the price level, and the length of time interval between the flow of incomes and outlays, the consumer's/individual's transactions demand for money is an increasing function of his level of income. That is to say, the transactions demand for money rises with the increase in income and vice versa.

(b) The Business Motive:

This refers to the transactions motive to the entrepreneur class or business community. Businessmen require money balances in order to meet business expenses like payment for new materials and transport, payment of wages and salaries, and allied current expenditure.

Thus, money held by producers for these purposes is said to be held to satisfy the business motive.

Money balances held under this motive will depend on the turnover of the firm. The larger the turnover, the larger will be the demand for money.

It follows, therefore, that the amount of money balances held under the transactions motive will depend: (i) on the time and size of firms' incomes, and (ii) on the turnover of business. As income rises and the business becomes more prosperous, the amount of money demanded for the transactions motive will rise.

It is commonly stated that the transactions motive for holding money fluctuates with the level of money income. This is justified by the assumption that transactions and hence, transitionary demand for money, fluctuate in proportion to change in money income. It should be noted, then, that the transactions demand for money is income-determined, and is relatively stable because income does not change all of a sudden. Moreover, changes in the rate of interest have no such influence in changing the transactions demand which is determined by the level of income. Thus, the transactions demand for money is interest-inelastic. There may be seasonal variations in the demand for money held under the transactions motive. For instance, during festive seasons, like Diwali and Christmas, or during vacation periods, it may tend to increase at micro as well as macro levels. Similarly, in the busy season, after the harvest, the business community's transactions demand for money tends to increase, while in the slack season, it decreases. Nevertheless, the trend of a community's aggregate demand for money, under the transactions motive, depicts a high degree of correlation of proportionality to the size of money of national income.

Precautionary Demand for Money:

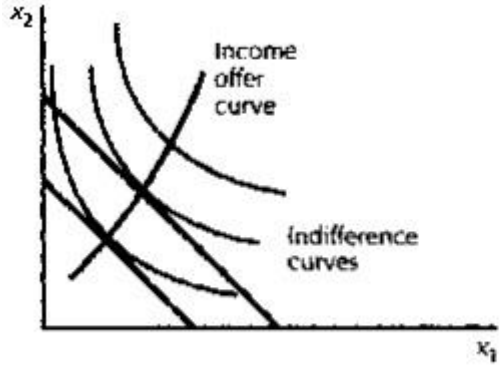
Apart from transactions purposes, people generally desire to hold some additional money balances against unforeseen contingencies. Thus, the second reason for holding money balances is the precautionary motive. The money balances which people hold under the precautionary motive will be devoted to fulfilling the function of a store of value. Out of prudence, people keep some liquid reserves or cash balances to provide for unexpected contingencies for events such as illness, accidents, unemployment, or some ceremonial occasions. The precautionary demand for money depends largely on the uncertainty of future receipts and expenditures. This demand is very sensitive to the anticipation of the level of income. However, future uncertainty is an important factor determining the precautionary demand for money. Therefore, when uncertainty is present, people tend to hold money balances to act as a buffer against unforeseen contingencies. Naturally the precautionary demand for money varies with the type of emergency envisaged. The increased desire for liquidity, related to the precautionary motive, is described by Keynes as "the desire for security as to the future cash equivalent of a certain proportion of total resources." Thus, the precautionary demand for money is income- determined and is relatively stable. Obviously, the larger the income of the individual, the larger the cash balance set aside for future contingencies. Moreover, the estimate of future contingencies is normal under normal circumstances, which do not fluctuate suddenly. Thus, the precautionary demand will be relatively stable. Though money is held under the precautionary demand as a store of value, it is not affected by the interest rates. Therefore, the precautionary demand for money is also interest-inelastic, and is income-determined, but, by and large, it changes in response to the changes of uncertainties. In symbolic terms, by denoting the precautionary demand for money as Lp, we can represent the money- demand function as follows:

$Lp = f(Y)$

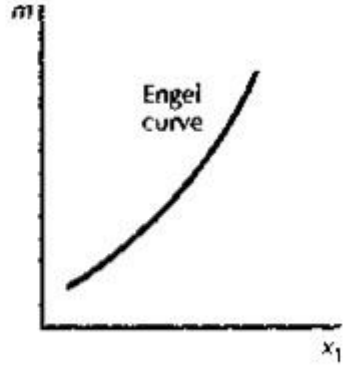
Q) 0?

Q) What is income offer curve?

Income offer curve as a line that depicts the optimal choice of two goods at different levels of income at constant prices. If both goods are normal goods, then the income expansion path will have a positive slope. If we hold the prices of goods 1 and 2 fixed and look at how demand changes as we change income, we generate a curve known as the Engel curve.



A Income offer curve



B Engel curve

yQ) Explain the stages of Production?

Stage I

Short-run production Stage I arises due to increasing average product. As more of the variable input is added to the fixed input, the marginal product of the variable input increases. Most importantly, marginal product is greater than average product, which causes average product to increase. This is directly illustrated by the slope of the average product curve.

Consider these observations about the shapes and slopes of the three product curves in Stage I.

The total product curve has a positive slope.

Marginal product is greater than average product. Marginal product initially increases, the decreases until it is equal to average product at the end of Stage I.

Average product is positive and the average product curve has a positive slope.

Stage II

In Stage II, short-run production is characterized by decreasing, but positive marginal returns. As more of the variable input is added to the fixed input, the marginal product of the variable input decreases. Most important of all, Stage II is driven by the law of diminishing marginal returns.

The three product curves reveal the following patterns in Stage II.

The total product curve has a decreasing positive slope. In other words, the slope becomes flatter with each additional unit of variable input.

Marginal product is positive and the marginal product curve has a negative slope. The marginal product curve intersects the horizontal quantity axis at the end of Stage II.

Average product is positive and the average product curve has a negative slope. The average product curve is at it's a peak at the onset of Stage II. At this peak, average product is equal to marginal product.

Stage III

The onset of Stage III results due to negative marginal returns. In this stage of short-run production, the law of diminishing marginal returns causes marginal product to decrease so much that it becomes negative.

Stage III production is most obvious for the marginal product curve, but is also indicated by the total product curve.

The total product curve has a negative slope. It has passed its peak and is heading down.

Marginal product is negative and the marginal product curve has a negative slope. The marginal product curve has intersected the horizontal axis and is moving down.

Average product remains positive but the average product curve has a negative slope.

Q) What is Engel Curve?

Engel curve describes how household expenditure on a particular good or service varies with household income.

Q) Under what conditions does perfect competition exists?

(i) Large number of buyers and sellers,

(ii) Homogeneous products,

(iii) Free entry or exit of firms,

(iv) Free from checks,

(v) Lack of selling cost, and

(vi) Lack of transport costs.

Q) What is Elasticity?

Elasticity is a measure of a variable's sensitivity to a change in another variable. In business and economics, elasticity refers the degree to which individuals, consumers or producers change their demand or the amount supplied in response to price or income changes.

Q) Explain shaped of AR, MR, MC, Demand curve in perfect competition?

Consult Notes of Principle Micro.

Q) Difference between elastic and inelastic demand curve?

Inelasticity and elasticity of demand refer to the degree to which supply and demand respond to a price change. If the change in demand for a given product corresponds closely to the change in price for that product, the demand is considered to be elastic. If the change in demand for a given product does not correspond closely to a change in price for that product, the demand is considered to be inelastic. The elasticity of demand is calculated by dividing the percent change in quantity demanded by the percent change in price. If the elasticity quotient is greater than or equal to 1, the demand is considered to be elastic. If the elasticity quotient is less than 1, the demand is considered to be inelastic. When the data is graphed, elasticity of demand has a negative slope. An elastic demand is displayed as a more horizontal, or flatter, slope. An inelastic demand is displayed as a more vertical, or steeper, slope.

Q) What is Expenditure function?

A function showing minimum expenditure required to achieve the given level of utility against given prices. It is obtained by substituting Hicksian demand function in the budget equation.

Q) Difference between total cost and total variable cost?

total cost (TC) describes the total economic cost of production and is made up of variable costs, which vary according to the quantity of a good produced and include inputs such as labor and raw materials, plus fixed costs, which are independent of the quantity of a good produced and include inputs (capital) that cannot be varied in the short term, such as buildings and machinery.

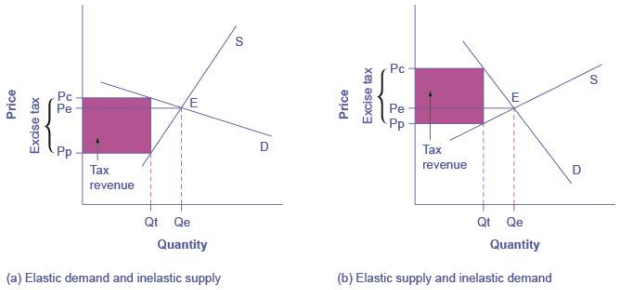
Q) Difference between average variable cost and average fixed cost?

Average fixed cost (AFC) is the fixed costs of production (FC) divided by the quantity (Q) of output produced. Fixed costs are those costs that must be incurred in fixed quantity regardless of the level of output produced.

Average variable cost (AVC) is a firm's variable costs (labor, electricity, etc.) divided by the quantity of output produced. Variable costs are those costs which vary with output.

Q) If demand curve is elastic who will bear the tax burden?

When supply is more elastic than demand, buyers bear most of the tax burden. When demand is more elastic than supply, producers bear most of the cost of the tax.

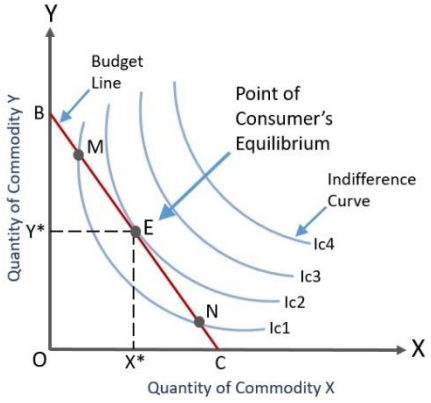


Q) What is indifference curve?

An indifference curve shows a combination of two goods that give a consumer equal satisfaction and utility thereby making the consumer indifferent. Along the curve, the consumer has an equal preference for the combinations of goods shown—i.e. is indifferent about any combination of goods on the curve.

Q) Consumer Equilibrium?

Consumer's Equilibrium in Indifference Curve Analysis is defined as a situation when the consumer maximizes his satisfaction, spending his given income across different goods with the given prices. Here, the indifference curve and budget line are used to determine the consumer equilibrium point.



Q) What is consumer surplus?

Consumer surplus is defined as the difference between the total amount that consumers are willing and able to pay for a good or service (indicated by the demand curve) and the total amount that they actually do pay (i.e. the market price).

Q) What is MRS and MRTS? State their difference?

In economics, the marginal rate of substitution (MRS) is the rate at which a consumer is ready to give up one good in exchange for another good while maintaining the same level of utility. MRS is the slope of the indifference curve at any single point along the curve. Most indifference curves are usually convex because as you consume more of one good you will consume less of the other. So, MRS will decrease as one move down the indifference curve

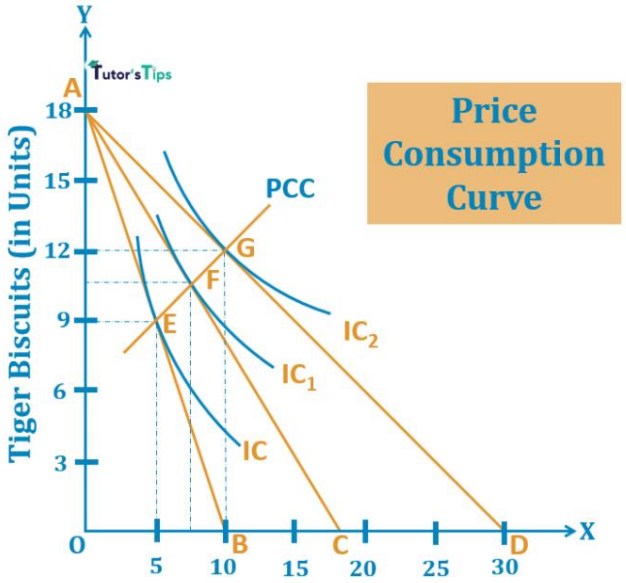
MRS--- slope of indifference curve --- MRSxy = MUx/MUy

The marginal rate of technical substitution (MRTS) is the amount by which the quantity of one input has to be reduced when one extra unit of another input is used, so that output remains constant. The MRTS reveals the give-and-take between factors, such as capital and labor that firms make out of the necessity to maintain a constant output. MRTS differs from the marginal rate of substitution (MRS), because MRTS is focused on producer equilibrium and MRS is focused on consumer equilibrium.

MRTS- Slope of Iso Quant ---- MRTS = ΔK/ ΔL

What is Price Consumption Curve (PCC)?

It indicates the various amounts of a commodity bought by a consumer when its price changes.



Q) What is ISO Quant?

A contour line drawn through the set of points at which the same quantity of output is produced while changing the quantities of two or more inputs. ISO means equal and Quant mean quantity

Q) What is portfolio Allocation of assets?

Asset allocation is an investment strategy that aims to balance risk and reward by apportioning a portfolio's assets according to an individual's goals, risk tolerance and investment horizon. The three main asset classes - equities, fixed-income, and cash and equivalents - have different levels of risk and return, so each will behave differently over time.

- Rate of Return
- Risk

- Liquidity
- Time of maturity

Q) What is Capital budgeting?

Capital budgeting, or investment appraisal, is the planning process used to determine whether an organization's long term investments such as new machinery, replacement of machinery, new plants, new products, and research development projects are worth the funding of cash through the firm's capitalization structure (debt, equity or retained earnings). It is the process of allocating resources for major capital, or investment, expenditures. One of the primary goals of capital budgeting investments is to increase the value of the firm to the shareholders.

Q) What is Investment Cash Flow?

Q) Effectiveness of economics projects:

Cost benefit analysis (CBA), sometimes called benefit cost analysis (BCA), is a systematic approach to estimating the strengths and weaknesses of alternatives (for example in transactions, activities, functional business requirements or projects investments); it is used to determine options that provide the best approach to achieve benefits while preserving savings. The CBA is also defined as a systematic process for calculating and comparing benefits and costs of a decision, policy (with particular regard to government policy) or (in general) project.

Broadly, CBA has two main purposes:

To determine if an investment/decision is sound (justification/feasibility) – verifying whether its benefits outweigh the costs, and by how much;

To provide a basis for comparing projects – which involves comparing the total expected cost of each option against its total expected benefits. CBA is related to (but distinct from) cost-effectiveness analysis. In CBA, benefits and costs are expressed in monetary terms, and are adjusted for the time value of money, so that all flows of benefits and flows of project costs over time (which tend to occur at different points in time) are expressed on a common basis in terms of their net present value. Closely related, but slightly different, formal techniques include cost-effectiveness analysis, cost–utility analysis, risk–benefit analysis, economic impact analysis, fiscal impact analysis, and social return on investment (SROI) analysis.

Q) What is liquidity trap?

The liquidity trap is the situation in which prevailing interest rates are low and savings rates are high, making monetary policy ineffective. In a liquidity trap, consumers choose to avoid bonds and keep their funds in savings, because of the prevailing belief that interest rates will soon rise. Because bonds have an inverse relationship to interest rates, many consumers do not want to hold an asset with a price that is expected to decline.

Q) Twin deficit Hypothesis?

When economy faces both fiscal account deficits (govt expenditure exceeds revenue) and current account deficit (A current account deficit indicates that a country is importing more than it is exporting) rises simultaneously.

The twin deficits hypothesis, also called the double deficit hypothesis or twin deficits anomaly, is a macroeconomic proposition that there is a strong link between a national economy's current account balance and its government budget balance.

Macroeconomic theory points to a link between the budget balance and the current account balance.
This link can be seen from considering the National accounting model of the economy:

Y = C + I + G + (X − M) {\displaystyle Y=C+I+G+(X-M)} where Y represents National Income or GDP, C is consumption, I is investment, G is government spending and X-M stands for net exports. This represents GDP because all the production in an economy (the left hand side of the equation) is used as consumption (C), investment (I), government spending (G), and goods that are exported in excess of imports (NX). Another equation defining GDP using alternative terms (which in theory results in the same value is.
Y = C + S + T {\displaystyle Y=C+S+T} where Y is again GDP, C is consumption, S is savings, and T is taxes. This is because national income is also equal to output, and all individual income either goes to pay for consumption (C), to pay taxes (T), or becomes savings (S).

What is business cycle?

It explains the expansion and contraction in economic activity that an economy experiences over time.

A decline in aggregate economic activity (a contraction or recession) to a low point (a trough), followed by a recovery of activity (an expansion or boom) to a high point (a peak). A complete business cycle can be measured from peak to peak or trough to trough.

What is real business cycle theory?

Real business-cycle theory (RBC theory) are a class of New classical macroeconomics models in which business-cycle fluctuations to a large extent can be accounted for by real (in contrast to nominal) shocks. Unlike other leading theories of the business cycle,[citation needed] RBC theory sees business cycle fluctuations as the efficient response to exogenous changes in the real economic environment. Real business cycle theory categorically rejects Keynesian economics and the real effectiveness of monetary policy.

Explain Ricardian Equivalence.

When government cut the taxes than people think that in order to finance the tax cut today government will re-impose the tax in future. So the people will not invest and they instead save the money which then doesn't change the output I,e output will not change by the tax cut.

A tax cut financed by higher borrowing would have no impact on increasing aggregate demand because consumers would save the tax cut to pay the future tax increases.

This is related to two factors:

1. Income Life-cycle hypothesis
2. Rational expectations on behalf of consumers.

It is argued that if the government borrows money to fund a tax cut, rational consumers realise in the future taxes will have to rise to finance the borrowing. Therefore, they save the extra income so that they can pay future tax rises.

Explain IS-LM framework and shift factors of IS-LM curve.

General equilibrium in the macroeconomy occurs when all markets are in equilibrium. Graphically, the general equilibrium point is where the IS curve, the FE line and the LM curve intersect.

Price level adjustments push the economy toward general equilibrium. Specifically changes in the price level, P, change in real money supply, M/P, which causes the LM curve to shift until it passes through the point at which the FE line and IS curve intersect.

Factors that shift FE line:

Full employment output increases when:

- The labor supply increases (which raises equilibrium equilibrium employment)
- The capital stock increases
- There is a beneficial supply shock

All these factors cause FE line to shift to the right.

Full employment output decreases when:

- The labor supply decreases
- The capital stock decreases
- There is an adverse supply shock

These factors shift the FE line to the left.

Factors that shift the IS curve:

With output held constant, any economic disturbance or policy change that changes the value of goods market clearing real interest rate will cause the IS curve to shift.

For constant output any change that reduces S^d relative to I^d will increase the real interest rate and thus shift the IS curve up and to the right.

For constant output, any change that increase S^d relative to desired investment I^d will reduce the market clearing real interest rate so IS curve shifts down and to the left.

An increase in:

- Expected future output (C^d rises)
- Wealth (C^d rises)
- Government purchases (demand for goods rises)
- Expected future marginal product of capital

Causes the IS curve to shift up and to right because desired saving falls, raising the real interest rate that clears the goods market.

An increase in taxes shifts the IS curve down and to the left (reduced consumption, increase saving, lowers real interest rate) or causes no change in the IS curve (ricardian equivalence).

An increase in effective tax rate on capital shifts the IS curve down and to the left b/c I^d falls lowering r that clears goods market.

Factors that shift LM curve:

1. Changes in real money supply
   Nominal money supply shifts the LM curve down and to the right b/c when real money supply increase it lowers the real interest rate that clears the asset market so money supply and money demand become equal.

Price level: an increase in the price level causes the real money supply to fall, raising the real interest rate that clears the asset market, shifting the LM curve up and to the left.

2. Changes in real money demand
   With output constant an increase in real money demand raises the real interest rate that clears the asset market and thus shifts the LM curve up and to the left.
   - An inc. in nominal interest rate on money, i^m
   - An inc. in wealth
   - An inc in the risk of alternative assets relative to risk of holding money
   - A decline in the liquidity of alternative assets
   - A decline in the efficiency of payment technologies

   With output constant, a drop in the demand for money lowers the real interest rate that clears the asset market so the LM curve shifts down and to the right.

   - An increase in expected inflation

What is crowding out? Explain and differentiate b/w types of crowding out.

G inc. → AD inc. → MD inc. → i inc. → I dec. → part of initial demand cut down i.e. crowding out

When government increases its spending then it borrow money from banks. This will then leads to an increase in the interest rate. So, at this higher interest rate private investment decrease this phenomenon is known as crowding out.

When government expenditure displaces or crowds out an equal amount of private expenditure, the crowding out effect is said to be complete or total. On the contrary, the government expenditure may reduce private expenditure by less than the increase in government expenditure, then the crowding out effect is partial or incomplete. If private expenditures do not fall at all with increase in government expenditure, the crowding out effect is zero.

Types of Crowding Out:

Crowding out is of three types – physical, fiscal and financial.

We discuss them as under:

1. Physical Crowding Out:

Physical crowding out occurs when the government demand for factors and inputs increases in the event of their inelastic supply. This raises their prices and makes private investment schemes unviable and unprofitable thereby reducing private expenditure.

Thus physical crowding out results from a shortage of real productive resources. For example, the government increases direct public sector expenditure by starting new industries. It pays higher wages to attract technical experts from private sector industries and increases the demand for other resources, thereby reducing private investment.

If the economy is at full employment level, any rise in government expenditure will inevitably crowd out an equal amount of private expenditure. Such a situation is depicted in Fig. 1 in terms of the IS-LM model. The original full employment equilibrium is at Y_F .The increase in public sector investment shifts the IS curve to the right to IS_1.

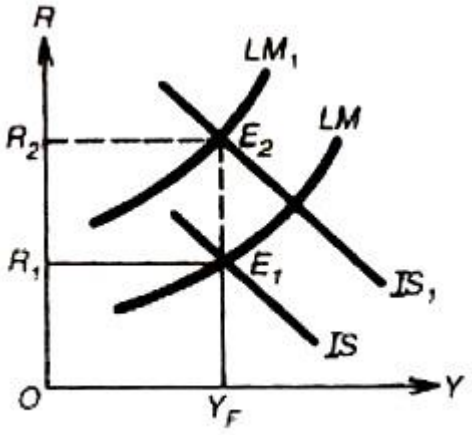


FIG. 1

This increases the demand for labour and other resources which are in inelastic supply. As a result, their prices rise which require larger transactions balances. The rise in prices will continue till the LM curve shifts to the left as LM_1 and intersects the IS curve at E_2Thus the interest rate is raised to R_2 which crowds out private investment.

Physical crowding out is a temporary and short run phenomenon. In the long run, there is the possibility of increasing real resources. The government can also stimulate private investment by selective industrial subsidies and adopting appropriate fiscal and monetary measures.

2. Fiscal Crowding Out:

Fiscal crowding out occurs when a rise in government expenditure from a budget deficit raises aggregate demand. Given a constant money supply, the interest rate rises. The stimulative effect of government deficit (or expenditure) will crowd out in greater or lesser degree a certain amount of private investment. The fiscal crowding out is usually explained in terms of the Keynesian analysis.

The mechanism is that the rise in government expenditure raises the aggregate demand. This sets in motion the multiplier process which raises nominal income. The rise in nominal income requires more money for transaction purposes. Further as investment increases, the demand for labour also rises which increases wages and prices.

The degree to which prices rise depends on the extent of the unemployment prevailing in the economy. The nearer is the economy to the level of full employment level, the higher will be the price level. When the economy is in full employment, the price level rises in proportion to the increase in government expenditure.

The rise in the price level leads to the rise in nominal income which, in turn, diverts money balances for transactions purposes and decreases the quantity of money available for speculative purposes. As the money supply is fixed, the residual money supply contracts and interest rates rise.

The rise in interest rates causes a fiscal crowding out of private investment with the increase in government expenditure. In a full employment situation, the fiscal crowding out is complete because government expenditure equals private expenditure which it displaces. If there is liquidity trap, there is no crowding out.

The fiscal crowding out is explained diagrammatically in Figure 2 where the rise in government expenditure is shown by the shifting of the IS curve to the right to IS_1 when this curve intersects the rising LM curve at E_2 Since the money supply is constant, the equilibrium level of the economy rises from E_1 to E_2 .The multiplier process raises the income level from $OY_1$to OY_2 and the interest rate from R_1 to R_2Higher interest rate crowds out a certain amount of private investment.

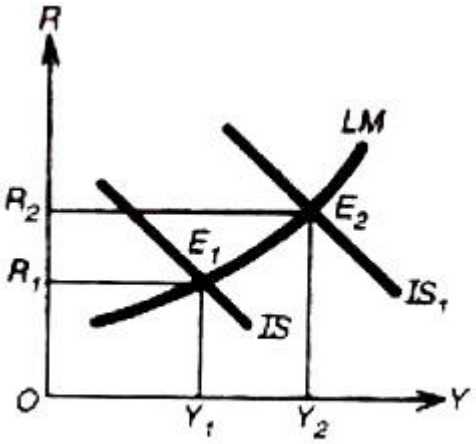


FIG. 2

3. Financial Crowding Out:

Financial crowding out occurs when the government increases its expenditure and finances it by selling new bonds in the money market. When the government sells bonds, the prices of securities fall and interest rates rise.

As a result, the private sector postpones or curtails some schemes because obtaining funds has become dearer. Thus the government expenditure crowds out private investment spending. Total financial crowding out occurs when the bond-financed government expenditure equals the same amount of displaced private investment.

Financial crowding out may occur in the following ways:

(1) Purchase of Gilt-edged Securities by Banks:

Private investment may be crowded out when banks buy gilt-edged securities and reduce the sanction of new loans to the private sector. Banks are attracted by such securities because the government offers higher returns in order to sell them.

(2) Competition with Private Sector Bonds:

When government bonds are sold in the market to finance government expenditure, they compete with bonds being sold to finance private investment. This leads to a rise in interest rates. Higher interest rates are assumed to have no effect in reducing the planned increase in government spending. It is only the financing of private investment which is crowded out.

(3) Wealth Effect:

When the government sells bonds, their buyers feel wealthier than before because they expect to have more resources available for consumption in future. But the incomes of these purchasers of bonds is reduced which lead to the curtailment of their present consumption expenditures which adversely affect private investment.

(4) Cut in Taxes:

There is another way for interest rates to rise and crowd out private investment. The government may cut taxes in order to create a budget deficit or to increase the size of the existing budget. The tax cut raises the consumption schedule which raises total output and income. People will like to hold more money in order to maintain the normal ratio of money to income. They will try to increase their money stocks by selling securities which will raise interest rates. Higher interest rates will crowd out private investment.

(5) Confidence Effects:

Private expenditure may also be crowded out by what are now called “confidence effects”. The confidence effects may be macro or micro. It was Keynes who suggested in his General Theory at the macro level that the government programme may through its effect on “confidence”, increase liquidity preference or diminish the marginal efficiency of capital, which again may retard other investment on the part of firms.

This is the macro level confidence effect. Suppose a firm expects to benefit from the closure of a rival firm which is running into losses. But the government gives subsidy to the loss-making firm. So the first firm cancels its plan of making extra investment to cater to expected expansion of the market. This is the micro level confidence effect which crowds out private investment.

Draw IS-LM framework through Keynesian.. (consult fiscal lectures)

Explain Investment Accelerator Theorm.

The accelerator effect examines the effect on levels of investment from a change in economic output (or demand for a product).

The simple accelerator model suggests that capital investment is a function of Output. If there is an increase in output, investment will rise to meet the expected demand.

If there is a fall in output, there will be a fall in investment.

The simple accelerator model suggests that a fall in the growth rate can lead to lower investment. This suggests the accelerator effect can explain how an economic slowdown leads to a recession.

- – A fall in growth rate leads to lower investment. Investment is a component of AD, therefore AD falls further.

The accelerator model suggest the business cycle can be volatile.

What do you know about theories of investment?

What will you do for economy of Pakistan being finance minister?

What is mundell flemming model? explain its policy implications.

The Mundell–Fleming model, also known as the IS-LM-BoP model (or IS-LM-BP model), is an extension of the IS-LM model. Whereas the traditional IS-LM model deals with economy under autarky (or a closed economy), the Mundell–Fleming model describes a small open economy.

The Mundell–Fleming model portrays the short-run relationship between an economy's nominal exchange rate, interest rate, and output (in contrast to the closed-economy IS-LM model, which focuses only on the relationship between the interest rate and output). The Mundell–Fleming model has been used to argue that an economy cannot simultaneously maintain a fixed exchange rate, free capital movement, and an independent monetary policy. This principle is frequently called the "impossible trinity," "unholy trinity," "irreconcilable trinity," "inconsistent trinity" or the "Mundell–Fleming trilemma.

What is structural unemployment? Explain it reference to economy of Pakistan.

Structural unemployment is a form of unemployment caused by a mismatch between the skills that workers in the economy can offer, and the skills demanded of workers by employers (also known as the skills gap). Structural unemployment is often brought about by technological changes that make the job skills of many of today's workers obsolete.

In Pakistan: structural changes such as, rural to urban migration, shift from agricultural to industrial sector, this labor force lacks required technological skills, knowledge, education.

What is expectations augmented Philips curve?

An inverse (negative) relationship between unanticipated inflation (the diff. b/w actual & expected inflation rates) and cyclical unemployment (the diff. b/w actual & natural unemployment rates).

$$\pi - \pi e = -h(u - u*)$$

What is difference b/w short run and long run Philips curve?

The long-run Phillips curve is a vertical line at the natural rate of unemployment, but the short-run Phillips curve is roughly L-shaped (negatively sloped curve). The inverse relationship shown by the short-run Phillips curve only exists in the short-run; there is no trade-off between inflation and unemployment in the long run.

What is natural rate of unemployment? Explain it with reference to different schools of thought.

The natural rate of unemployment is a combination of frictional and structural unemployment that persists in an efficient, expanding economy when labor and resource markets are in equilibrium (when economy's output is at full-employment level).

Explain briefly diff. types of markets.

Perfect Competition

Perfect competition is a market system characterized by many different buyers and sellers. In the classic theoretical definition of perfect competition, there are an infinite number of buyers and sellers. With so many market players, it is impossible for any one participant to alter the prevailing price in the market. If they attempt to do so, buyers and sellers have infinite alternatives to pursue.

Monopoly

A monopoly is the exact opposite form of market system as perfect competition. In a pure monopoly, there is only one producer of a particular good or service, and generally no reasonable substitute. In such a market system, the monopolist is able to charge whatever price they wish due to the absence of competition, but their overall revenue will be limited by the ability or willingness of customers to pay their price.

Oligopoly

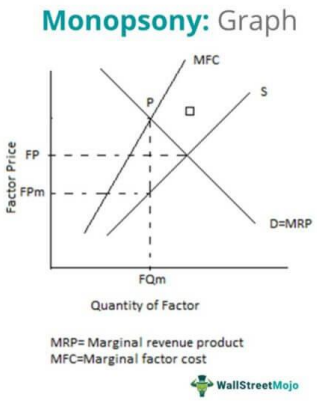
An oligopoly is similar in many ways to a monopoly. The primary difference is that rather than having only one producer of a good or service, there are a handful of producers, or at least a handful of producers that make up a dominant majority of the production in the market system. While oligopolists do not have the same pricing power as monopolists, it is possible, without diligent government regulation, that oligopolists will collude with one another to set prices in the same way a monopolist would.

Monopolistic Competition

Monopolistic competition is a type of market system combining elements of a monopoly and perfect competition. Like a perfectly competitive market system, there are numerous competitors in the market. The difference is that each competitor is sufficiently differentiated from the others that some can charge greater prices than a perfectly competitive firm. An example of monopolistic competition is the market for music. While there are many artists, each artist is different and is not perfectly substitutible with another artist.

Monopsony

Market situation in which there is only one buyer. An example of pure monopsony is a firm that is the only buyer of labor in an isolated town. Such a firm is able to pay lower wages than it would under competition.



Differentiate among goods sold in diff. markets.

Differentiate b/w monopoly and monopolistic competition.

Explain diff. types of goods.

A list of different types of economic goods.

Income elasticity of demand and types of goods

Income elasticity of demand (YED) measures the responsiveness of demand to a change in income.

- **Inferior good:** An inferior good means an increase in income causes a fall in demand. It is a good with a negative income elasticity of demand (YED). An example of an inferior good is Tesco value bread. When your income rises you buy less Tesco value bread and more high quality, organic bread.
- **Normal good.** This means an increase in income causes an increase in demand. It has a positive income elasticity of demand YED. Note a normal good can be income elastic or income inelastic.
- **Luxury good**. A luxury good means an increase in income causes a bigger percentage increase in demand. It means that the income elasticity of demand is greater than one. For example, HD TV's would be a luxury good. When income rises, people spend a higher percent of their income on the luxury good.

Note: a luxury good is also a normal good, but a normal good isn't necessarily a luxury good.

Other types of goods

- **Complementary goods**. Goods which are used together, e.g. TV and DVD player.
- **Substitute goods**. Goods which are alternatives, e.g. Pepsi and Coca-cola.

- **Giffen good**. A low-income, non-luxury product for which demand increases as the price increases and vice versa. A Giffen good has an upward-sloping demand curve which is contrary to the fundamental laws of demand which are based on a downward sloping demand curve. The reason is that the income effect of a rise in the price causes you to buy more of this cheap good because you can't afford more expensive goods. For example, if the price of wheat rises, a poor peasant may not be able to afford meat anymore, so has to buy more wheat.

- **Veblen / Snob good**. A good where an increase in price encourages people to buy more of it. This is because they think more expensive goods are better.
- **Public goods** – goods with characteristics of non-rivalry and non-excludability, e.g. national defence.
- **Merit goods**. Are commodities that the public sector provides free or cheaply because the government wishes to encourage their consumption. Also often has positive externalities, e.g. education, health care, welfare services, housing, fire protection.
- **Demerit goods**. Good or service whose consumption is considered unhealthy, degrading, or otherwise socially undesirable due to the perceived negative effects on the consumers themselves. Often has negative externalities, e.g. smoking, drugs.
- **Private goods** – goods which do have rivalry and excludability. The opposite of a public good
- **Free goods** – A good with no opportunity cost, e.g. breathing air.

Difference b/w producer's surplus and producer's profit.

Economic profit is the difference between total revenue and total cost. Producer surplus is the difference between total revenue and total variable cost or total revenue and marginal cost. Thus, the difference between profit and PS is the fixed cost of production.

Difference b/w producer and consumer surplus.

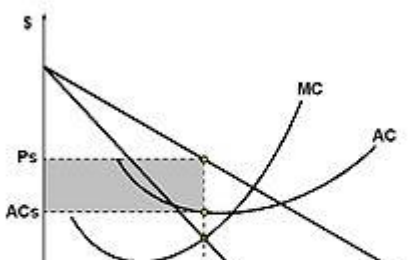
Producer surplus: is the difference b/w actual price and the minimum price at which the supplier is willing to supply. It is the area below the price and above the supply curve.

Consumer surplus: is the difference b/w what maximum consumer is willing to pay and what he actually pays. It is the area below the demand curve and above the price.

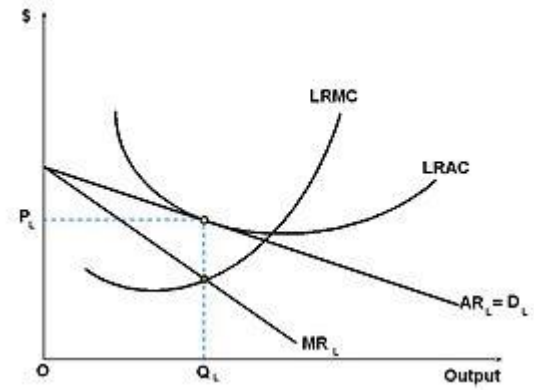
What is shape of demand curve in monopolistic competition?

The demand curve of a monopolistic competitive market slopes downward. This means that as price decreases, the quantity demanded for that good increases. While this appears to be relatively straightforward, the shape of the demand curve has several important implications for firms in a monopolistic competitive market.

- The downward slope of a monopolistically competitive demand curve signifies that the firms in this industry have market power.
- Market power allows firms to increase their prices without losing all of their customers.
- The downward slope of the demand curve contributes to the inefficiency of the market, leading to a loss in consumer surplus, deadweight loss, and excess production capacity.



Short-run equilibrium of the firm under monopolistic competition. The firm maximizes its profits and produces a quantity where the firm's marginal revenue (MR) is equal to its marginal cost (MC). The firm is able to collect a price based on the average revenue (AR) curve. The difference between the firm's average revenue and average cost, multiplied by the quantity sold (Qs), gives the total profit.



Long-run equilibrium of the firm under monopolistic competition. The firm still produces where marginal cost and marginal revenue are equal; however, the demand curve (and AR) has shifted as other firms entered the market and increased competition. The firm no longer sells its goods above average cost and can no longer claim an economic profit.

Explain the slope of budget line.

Slope of budget line is equal to the ratio of the prices of the two commodities (goods X and Y).

What is non satiation?

This axiom implies that more the consumer gets of one or of both the goods, the higher would be his level of satisfaction. That is why this axiom is also known as the axiom of “more is better”. The indifference curve has a negative slope; this is caused because of nonsatiation.

Give the utility function and constraint, derive MDF on board.

Marshalian demand function/Ordinary demand/Money Income held constant demand function

Maximize utility subject to a given level of income. It shows relation between price of goods and level of income. $X = M/2P$

Hicksian demand function/Expenditure minimizing demand function/utility held constant demand

Minimize expenditure subject to given level of utility. It shows a relationship between price of good and utility.

$X^M(P_X, P_Y, M)$

How can we decrease inequality and poverty?

Through progressive tax transfers and subsidies.

Governments can intervene to promote equity, and reduce inequality and poverty, through the tax and benefits system. This means employing a *progressive* tax and benefits system which takes proportionately more tax from those on higher levels of income, and redistributes welfare benefits to those on lower incomes.

Cash benefits

Cash benefits are designed to help those on low or zero original income, and include contributory and non-contributory benefits.

Contributory benefits, such as pensions and job-seekers' allowance, are those where individuals or employers make a contribution into the National Insurance Fund.

Non-contributory benefits, such as housing benefit, income support, carer's benefit and child support, do not require a previous contribution to have been made. Generally, there are tests to see if individuals actually need these benefits, called *means tests*, though child benefit is not means tested and is a *universal benefit* available to all families with children.

Direct taxes

These *tax bands* help narrow the income gap and so help reduce inequality.

Indirect taxes

In contrast, indirect taxes are regressive meaning that, as a percentage of income, the proportion of tax paid declines at higher income levels, and, as such, the burden of the tax is largely on the poor. This means that, as a rule, indirect taxes widen the income gap.

The progressive effects of direct tax, and regressive effects of indirect tax generally cancel each other out. **Make the tax code more progressive.**

Benefits in kind

Benefits in-kind are those services, such as healthcare and education that are provided free or heavily discounted at the point of consumption. These benefits can make a considerable impact on final income, increasing it considerably for the poorest, and narrowing the gap between rich and poor.

Increase the minimum wage.

Research shows that higher wages for the lowest-paid workers has the potential to help nearly 4.6 million people out of poverty and add approximately $2 billion to the nation's overall real income. Additionally, increasing the minimum wage does not hurt employment nor does it retard economic growth.

Expand the Earned Income Tax.

In recent years, the EITC has been shown to have a positive impact on families, lifting roughly 4.7 million children above the poverty line on an annual basis. Increases in the EITC can pull more children out of poverty while providing more economic support for the working poor, especially single parents entering the workforce.

Build assets for working families.

Policies that encourage higher savings rates and lower the cost of building assets for working and middle class households can provide better economic security for struggling families. New programs that automatically enroll workers in retirement plans and provide a savings credit or a federal match for retirement savings accounts could help lower-income households build wealth. Access to fair, low-cost financial services and home ownership are also important pathways to wealth.

Invest in education. (increases productivity, creates jobs)

End residential segregation

Higher levels of racial residential segregation within a metropolitan region are strongly correlated with significantly reduced levels of intergenerational upward mobility for all residents of that area. Segregation by income, particularly the isolation of low-income households, also correlates with significantly reduced levels of upward mobility. Eliminating residential segregation by income and race can boost economic mobility for all.

What is natural monopoly?

A natural monopoly is a type of monopoly that exists as a result of the high fixed costs or startup costs of operating a business in a specific industry. Additionally, natural monopolies can arise in industries that require unique raw materials, technology or other similar factors to operate.

How marginal revenue and average revenue curves are different in monopoly and oligopoly?

Revenue Curves under Different Markets (With Diagram)

(i) Revenue Curve under Perfect competition:

Perfect competition is the term applied to a situation in which the individual buyer or seller (firm) represent such a small share of the total business transacted in the market that he exerts no perceptible influence on the price of the commodity in which he deals.

Thus, in perfect competition an individual firm is price taker, because the price is determined by the collective forces of market demand and supply which are not influenced by the individual. When price is the same for all units of a commodity, naturally AR (Price) will be equal to MR i.e., AR = MR. The revenue schedule for a competitive firm is shown in the table 5.

Table 5

Units	TR	AR	MR
1	5	5	5
2	10	5	5
3	15	5	5
4	20	5	5
5	25	5	5

In table 5 we find that as output increases, AR remains the same i.e. Rs. 5. Total revenue increases but at a constant rate. Marginal revenue is also constant i.e. Rs. 5 and is equal to AR.

Thus

TR = AR x Q

Also TR = MR x Q [Since AR = MR]

In figure 8, on the X-axis, we take quantity whereas on Y-axis, we take revenue. At price OP, the seller can sell any amount of the commodity. In this case the average revenue curve is the horizontal line. The Marginal Revenue curve coincides with the Average Revenue.

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It is because additional units are sold at the same price as before. In that case AR = MR. A noteworthy point is that OP price is determined by demand and supply of industry.

The firm only follows, (see figure below):

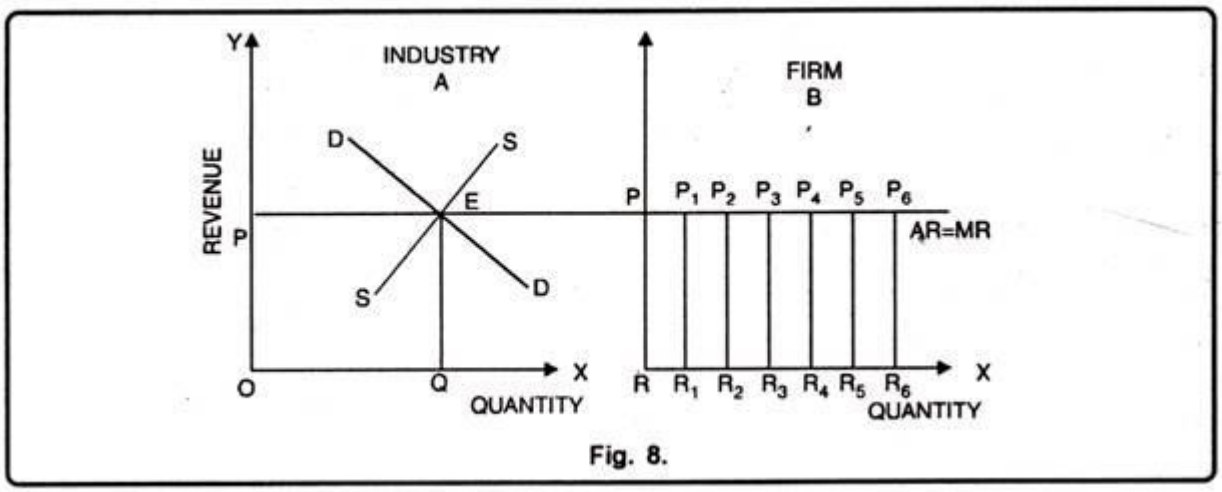

Fig. 8.

(ii) Revenue Curves under Monopoly:

Monopoly is opposite to perfect competition. Under monopoly both AR and MR curves slope downward. It indicates that to sell more units of a commodity, the monopolist will have to lower the price. This can be shown with the help of table 6.

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Table 6

Unit sold	Price Rs.	TR	AR	MR
5	4	20	4	—
10	2	20	2	0
20	1	20	1	0
40	0.50	20	0.50	0
50	0.40	20	0.40	0

In case of pure monopoly, AR curve can be rectangular hyperbola as has been shown in Fig. 9. In this situation, a producer is so powerful that by selling his output at different prices, he can make the consumer spend his income on the concerned commodity. In this case AR curve is rectangular hyperbola. It implies that TR of the monopolist will remain same whatever may be the price. Area below each point of AR curve will be equal to each other. When TR is constant MR curve will be represented by OX-axis as has been shown in figure 9.

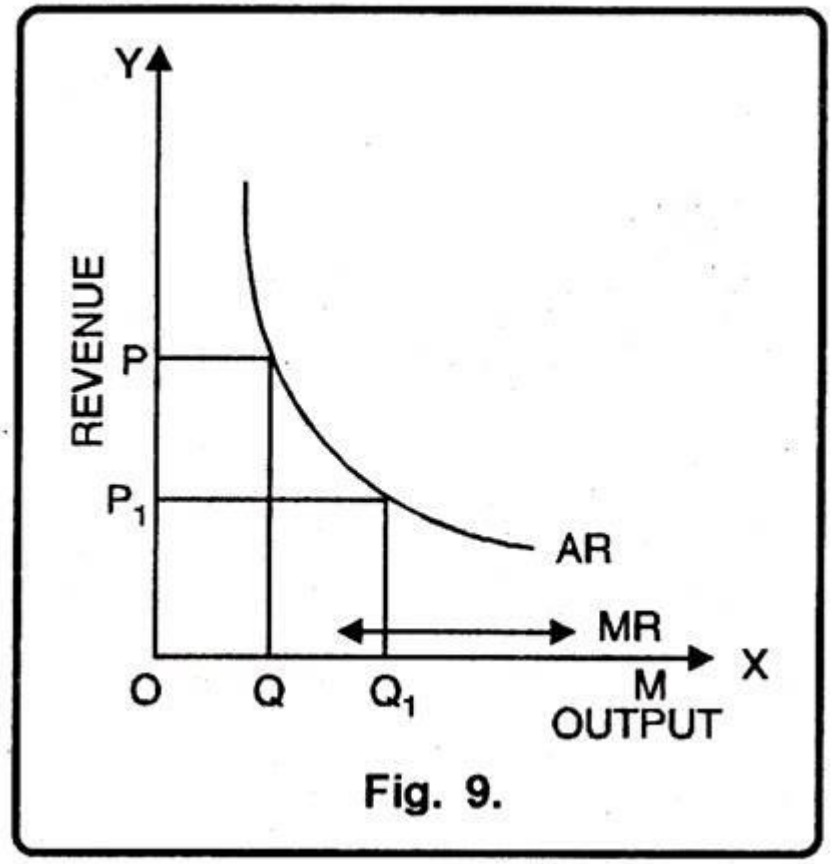

Fig. 9.

(iii) Revenue Curve under Imperfect Competition:

When a firm is working under conditions of monopoly or imperfect competition, its demand curve or AR curve is less than perfectly elastic, the exact degree of elasticity being different in different market situations depending upon the number of sellers and the nature of product.

In other words, the demand/AR curve has a negative slope and the MR curve lies below it. This is because the monopolist seller ordinarily has to accept a lower price for his product, as he increases his sales.

Under imperfect competition conditions, total revenue increases at a diminishing rate. It becomes maximum and then begins to decline.

The position of various revenue curves is shown in Table 7:

Table 7

Price	Units Sold	TR	AR	MR
6	1	6	6	6
5	2	10	5	4
4	3	12	4	2
3	4	12	3	0
2	5	10	2	–2

In table 7, 2 units can be sold at a unit price of Rs. 5, bringing in total revenue of Rs. 10. When 3 units are sold, the price per unit is lowered to Rs. 4 to make it possible for larger quantity to be sold. The total revenue in this case is Rs. 12.

The marginal unit is not bringing in Rs. 4 which is its price, but only Rs. 2. This is because the additional one unit is sold at Re. one less and the first 2 units which could have been sold for Rs. 5 are also sold at Rs. 4. i.e., Re. one less.

Fig. 10 A shows that as additional units are sold when price comes down not only for the marginal units but also for other previous units. As a result, marginal units do not bring revenue equal to its price. In fig. 10 B. TR increases at a diminishing rate, becomes maximum at point N and then begins to decline. This has been represented by the curve TR. AR at any point on the TR curve is given by the slope of straight line joining the point to the origin. For instance, AR at any point N on TR curve is given by the slope of line

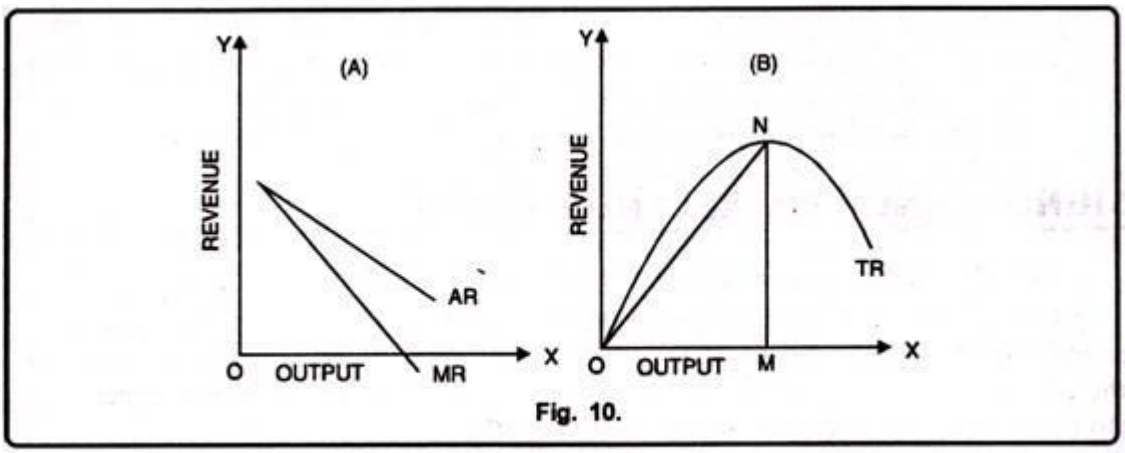

Fig. 10.

$$ON = \frac{NM}{OM} = \frac{TR}{output}$$

(iv) Revenue Curves under Oligopoly:

Under oligopoly market situation the number of sellers is small. The price reduction or extension by one firm affects the other firms. If a seller raises the price of his product, others will not follow him. They know that by following the same price, they can earn more profits. That producer, who has raised the price, is likely to suffer losses because demand of his product will fall.

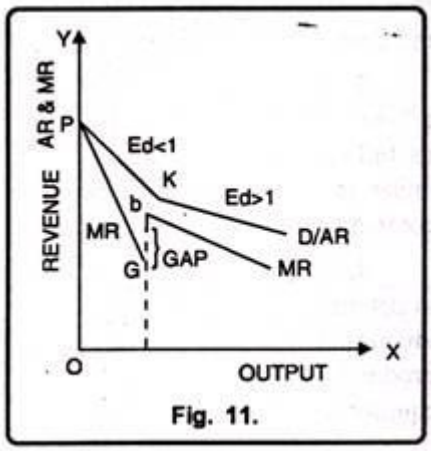

Fig. 11.

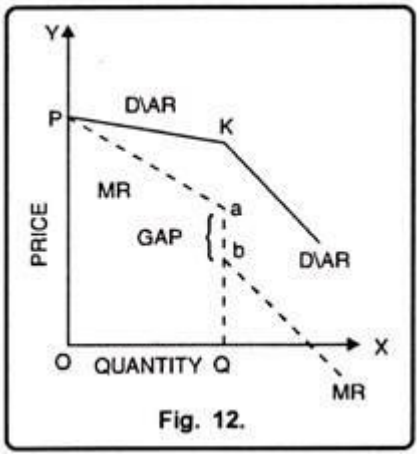

Fig. 12.

In this case, as shown in Fig. 11, the AR curve becomes highly elastic after K whereas it was less elastic before K. MR, corresponding to AR curve rises discontinuously from b. After that it again takes its course at a new higher level.

(b) If a firm has a kinked demand curve i.e. when it expects that other firms will follow, then it will cut the price. In that case MR curve will be discontinuous at the point of the kink. This can be shown with the help of a Fig. 12.

If under oligopoly, a seller reduces the price of his product; his rivals also follow him in reducing the price of their product. If it is done so, he may not be in a position to raise his sales. Thus AR curve becomes less elastic from K onwards and correspondingly MR curve falls vertically from a to b and then slopes at a lower level.

Thus, from the above analysis we can conclude that:

1. Under perfect competition, average revenue curve is a straight horizontal line and is equal to MR.

2. In pure monopoly, AR curve is a rectangular hyperbola and MR curve coincides with the horizontal axis.

3. In all other markets, AR curve slopes downwards and MR curve lies below it. In oligopoly, however, AR curve cannot be drawn with definiteness but the practice is to draw downward sloping AR and MR curves.

What is unit root?

In probability theory and statistics, a unit root is a feature of some stochastic processes that can cause problems in statistical inference involving time series models. A linear stochastic process has a unit root if 1 is a root of the process's characteristic equation. Such a process is non-stationary but does not always have a trend.

What is unit root test?

Unit root test is used to check the stationarity in time series. In statistics, a unit root test tests whether a time series variable is non-stationary and possesses a unit root. The null hypothesis is generally defined as the presence of a unit root and the alternative hypothesis is stationarity, trend stationarity or explosive root depending on the test used.

What is chow breakpoint?

What is variance? Relationship b/w variance and standard deviation?

Variance is the average squared deviations from the mean, while standard deviation is the square root of this number. Both measures reflect variability in a distribution, but their units differ.

Standard deviation is the under root of variance.

Why classical linear regression model is called classical?

What is difference b/w continuous variable and discrete variable?

Discrete variables: represents count data for e.g no. of persons in a family, no. of rooms in a school. (no decimals)

Continuous variable: represents measurement data for e.g age of a person, weight of a commodity (decimals exist).

What random variable?

A random variable is a numerical description of the outcome of a statistical experiment. A random variable, usually written X, is a variable whose possible values are numerical outcomes of a random phenomenon. There are two types of random variables, discrete and continuous.

What is stochastic variable?

Random variable also known as stochastic variable. Stochastic variable or random variable is a variable quantity whose value depends on possible outcomes.

What is spurious regression?

A spurious regression is a regression that provides misleading statistical evidence of a linear relationship between independent non-stationary variables.

What is a Parsimonious Model?

Parsimonious models are simple models with great explanatory predictive power. They explain data with a minimum number of parameters, or predictor variables.

Assumptions of CLRM

1. Regression model is linear in parameters
2. X values are fixed in repeated sampling and independent of error term
3. Zero mean value of disturbance term
4. Homoscedasticity: equal/ constant/ same variance of error term
5. No autocorrelation between the disturbance given any two values X_i and X_j
6. The no. of observation n should be greater than the no. of parameters estimated
7. X values must not all be same, positive variance , no outliers
8. Zero covariance b/w U_i and X_i. No endogenity.
9. Regression model should be correctly specified

What is problem of endogeniety? How to solve it?

When there is a correlation between Independent term and error term. Or ya ap kay variables to koi third variable effect karay or wo error term mai include hota ho. Means agar ap X or Y mai relation dekh rahay ho to koi third variable Z un ko effect karay to wo endogeniety ka problem hoga.

Endogeneity can arise as a result of measurement error, autoregression with autocorrelated errors, simultaneous causality (see Instrumental variable) and omitted variables. Or when exogenous variables(independent) become endogenous variables(depend on error term).

When endogeniety problem arises we use ILS and 2SLS.

Note: independent variables are all exogenous variable that equation is called reduced form equation and OLS estimates reduced form equation.

Independent side variables have endogenous variable that equation is called equation.

Structural equation is changed to reduced form equation and then OLS estimates the equation and then again structural equation is formed. This is indirect least square method.

Why is OLS estimator called BLUE?

Because it is simple and easy to estimate, chances of error are low.

Properties:

1. It is linear function of random variable.
2. It is unbiased
3. It has minimum variance
4. It has maximum values in the class of all linear unbiased estimator that is why it is best.

Best- min variance of estimation

Unbiased- estimated value is equal to population parameter (estimated value equal true value)

Linear- estimated values should be linear