The linear regression model (LRM) is based on certain statistical assumption, some of which are related to the distribution of random variable (error term) μ_i, some are about the relationship between error term μ_i and the explanatory variables (Independent variables, X's) and some are related to the independent variable themselves. We can divide the assumptions into two categories

1. Stochastic Assumption
2. None Stochastic Assumptions

These assumptions about linear regression models (or ordinary least square method: OLS) are extremely critical to the interpretation of the regression coefficients.

- The error term (μ_i) is a random real number i.e. μ_i may assume any positive, negative or zero value upon chance. Each value has a certain probability, therefore error term is a random variable.
- The mean value of μ is zero, i.e $E(\mu_i) = 0$ i.e. the mean value of μ_i is conditional upon the given X_i is zero. It means that for each value of variable X_i, μ may take various values, some of them greater than zero and some smaller than zero. Considering the all possible values of μ for any particular value of X, we have zero mean value of disturbance term μ_i.
- The variance of μ_i is constant i.e. for the given value of X, the variance of μ_i is the same for all observations. $E(\mu_i^2) = \sigma^2$. The variance of disturbance term (μ_i) about its mean is at all values of X will show the same dispersion about their mean.
- The variable μ_i has a normal distribution i.e. $\mu_i \sim N(0, \sigma^2_\mu$. The value of μ (for each X_i) have a bell shaped symmetrical distribution.
- The random term of different observation (μ_i, μ_j) are

independent i..e $E(\mu_i, \mu_j) = 0$, i.e. there is no autocorrelation between the disturbances. It means that random term assumed in one period does not depend of the values in any other period.

- μ_i and X_i have zero covariance between them i.e. μ is independent of the explanatory variable or $E(\mu_i X_i) = 0$ i.e. $Cov(\mu_i, X_i) = 0$. The disturbance term μ and explanatory variable X are uncorrelated. The μ's and X's do not tend to vary together as their covariance is zero. This assumption is automatically fulfilled if X variable is non random or non-stochastic or if mean of random term is zero.

- All the explanatory variables are measured without error. It means that we will assume that the regressors are error free while y (dependent variable) may or may not include error of measurements.

- The number of observations n must be greater than the number of parameters to be estimated or alternatively the number of observation must be greater than the number of explanatory (independent) variables.

- The should be variability in the X values. That is X values in a given sample must not be same. Statistically, $Var(X)$ must be a finite positive number.

- The regression model must be correctly specified, meaning that there is no specification bias or error in the model used in empirical analysis.

- There is no perfect or near to perfect multicollinearity or collinearity among the two or more explanatory (independent) variables.

- Values taken by the regressors X are considered to be fixed in repeating sampling i.e. X is assumed to non-stochastic. Regression analysis is conditional on the given values of the regressor(s) X.

- Linear regression model is linear in the parameters, e.g. $y_i = \beta_1 + \beta_2 x_i + \mu_i$

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