Methodology of Econometrics

1. Statement of theory or hypothesis
2. Specification of mathematical model of the theory
3. Specification of econometric model of theory
4. Obtaining the data
5. Estimation of the parameters of the econometric model
6. Hypothesis testing
7. Forecasting or prediction
8. Using model for control or policy purposes

Assumptions of Least Squares

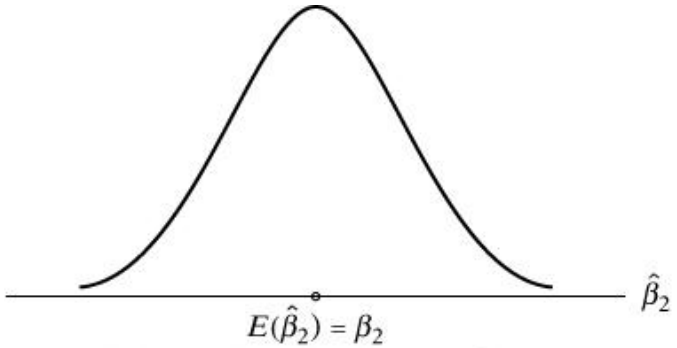
1. Linear Regression Model
2. X_i values are fixed in repeated sampling
3. Zero mean value of disturbance u_i
4. Homoscedasticity or equal variance of u_i
5. No autocorrelation between the disturbance
6. Zero covariance between u_i and X_i
7. Number of observations must be greater than number of parameters to be estimated
8. Variability in X_i values
9. Regression model is correctly specified
10. No perfect multicollinearity
11. Normal Distribution

Properties of Least-Squares Estimator

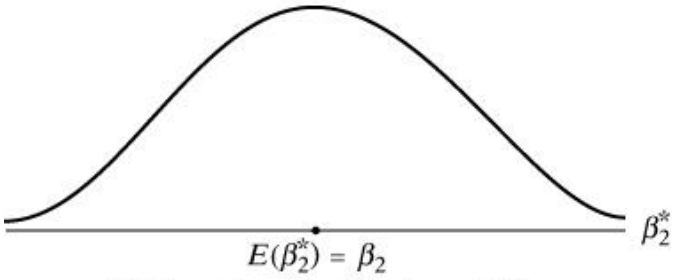
1. Linear
2. Unbiased
3. Efficient estimator

Gauss-Markov Theorem:

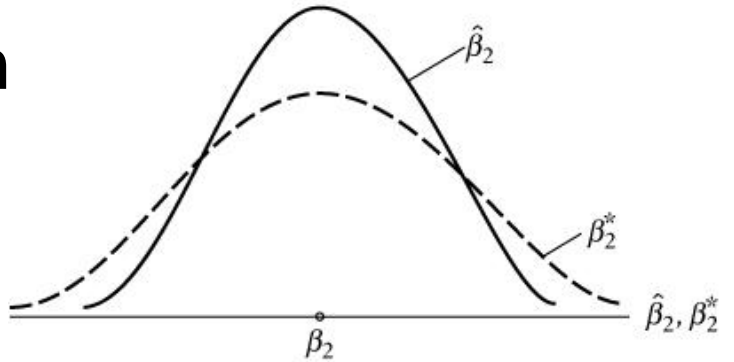
Given assumptions of CLRM, the least-squares estimators, in the class of unbiased linear estimators, have minimum variance -- they are Best Linear Unbiased Estimators (BLUE).



(a) Sampling distribution of β_2



(b) Sampling distribution of β_2^*



(c) Sampling distributions of β_2 and β_2^*

Evaluating Estimated Results

1. Sign of the Coefficients.
   - Whether the estimated results are according to the theory.
2. Overall Test – F-test.
   - Whether all explanatory variables can be used in explaining the dependent variable.
3. R-Squares.
   - How well does the model explain the dependent variable.
4. Individual Test – t-test.
   - Whether each explanatory variables can explain the dependent variable.

Evaluating Estimated Results

5. Violation of OLS Assumption.
   - Autocorrelation Problem.
   - Heteroscedasticity Problem.
   - Multicollinearity Problem.
   - Specification Error Problem.

   Issue of Concern
   - Cause of the Problem.
   - Consequence of the Problem.
   - Detection of the Problem.
   - Remedial Measure.

Evaluating Estimated Results

6. Specific Test.
   - Nested vs Non-nested Model.
   - Restricted vs Unrestricted F-test.
   - Chow-test.
   - Dummy Variable.
     - Intercept Dummy
     - Slope Dummy