

Econometrics

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ECONOMICS DEPT.

Stochastic Disturbance Term

$$Y_i = \beta_1 + \beta_2 X_i + u_i$$

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- *Significance of the Stochastic Disturbance Term*

1. Vagueness of the Theory

- The Theory determining the behaviour of Y may be incomplete.
- $C = a + bY$
- We might know for certain that weekly income X influences weekly consumption expenditure Y , But we might be ignorant or unsure about other variables affecting
- Therefore, u_i may be used as a substitute for all the excluded or omitted variables from the model.

2. Unavailability of data variables

- Even if we know some of the excluded variables and therefore consider a multiple information rather than a simple regression, we may not have quantitative information about these variables.
- For example, we could introduce family wealth as an explanatory variable in addition to the income variable to explain family consumption expenditure. But unfortunately, information about family wealth is not generally available.

3. Core variables vs. peripheral variables

- Assume the consumption- income example that besides income X_1 , the number of children per family X_2 , sex X_3 , religion X_4 , and education X_5 also affect consumption expenditure.
- But it is quit possible that the joint influence of all or some of these variables may be so small at non-systematic or random.
- Thus as a explicitly. Their combined effect can be treated as a random variable u_i .

4. Intrinsic Randomness in Human Behaviour

- Human behaviour is not predictable. Even if we succeed in introducing all the relevant variables into the model, there is bound to be some intrinsic randomness in individual Y that cannot be explained no matter how hard we try.
- The disturbances, the u 's may vary well reflect this intrinsic randomness.

5. Wrong functional form

- In two variable models the functional forms of the relationship can often be judged from the scattergrams.
- $Y_i = \beta_1 + \beta_2 X_i$
- But in a multiple regression model, it is not easy visualize scattergrams in multiple dimensions.
- $Y_i = \beta_1 + \beta_2 X_i + \beta_3 X_i^2 + u_i$

6. Poor proxy variables

- Although regression model assumes that the variable Y and X are measured accurately ,in practice the data may be plagued by errors of measurement .
- The deviation of the points from the two regression line may be due to errors of measurement of the variables which are inevitable due to the methods of collecting and processing statistical information .
- the disturbance term U_i also represent the errors of measurement .

7. Principles of parsimony

- We would like to keep our regressions model as simple as possible .
- if we can explain the behaviour of Y substantially with two of three explanatory variables and if our theory is not strong enough to suggest that other variables might be include ,there is no need to introduce other variables.
- Let ***ui*** represent all other variables.