

# ECONOMETRICS

## Nature of Regression Analysis



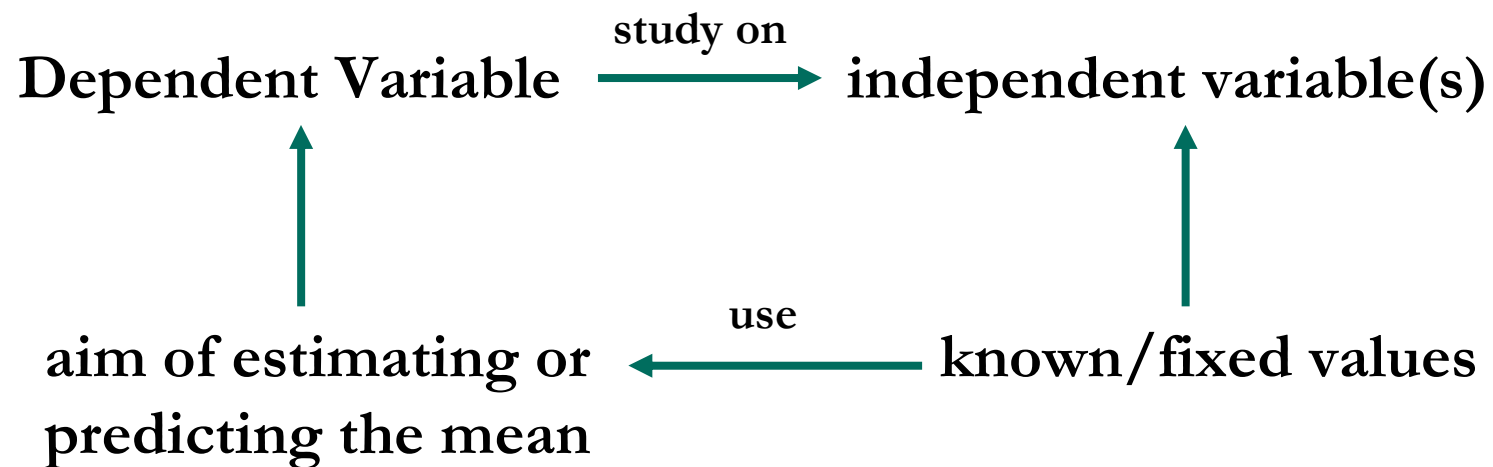
ECONOMETRICS

## Lesson Goal

- Understand the nature of regression analysis.

# Regression Analysis

- What is Regression Analysis?

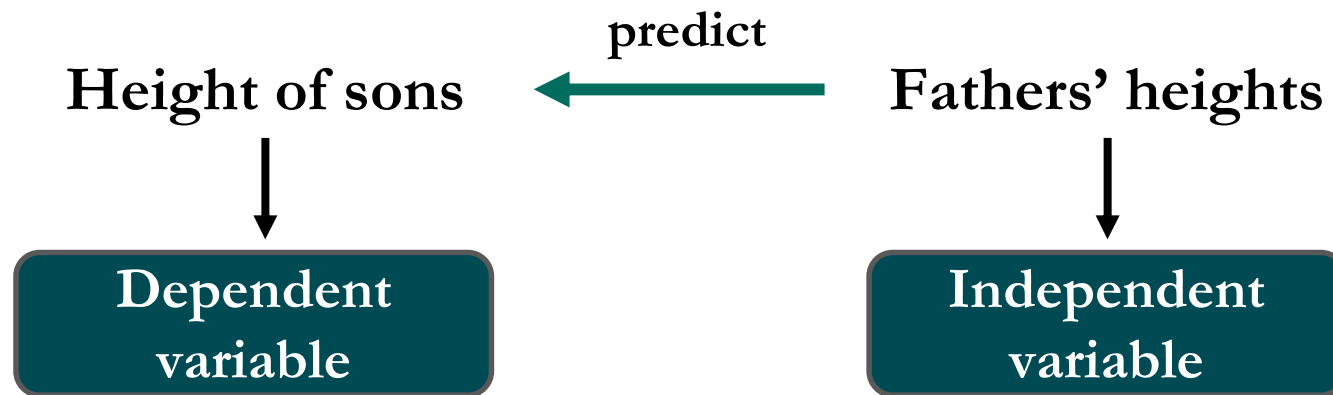


## Regression Analysis

- Example

### Galton's Universal Law of Regression

- Find out how the average height of sons changes, given the fathers' heights.



## Regression Model

- An econometric model:

$$Y = \beta_1 + \beta_2 X + u$$

The diagram illustrates the components of the regression equation  $Y = \beta_1 + \beta_2 X + u$ . Three green arrows point from descriptive text to the equation: one from 'Height of sons' to  $Y$ , one from 'Fathers' heights' to  $X$ , and one from 'Unobserved factors' to  $u$ .

Height of sons

Fathers' heights

Unobserved factors

## Terminology and Notation

$$Y = \beta_1 + \beta_2 X + u$$

**Dependent Variable**

Explained variable

Predictand

Outcome

Regressand

Controlled variable

**Independent Variable**

Explanatory variable

Predictor

Covariate

Regressor

Control variable

## Simple vs. Multiple Regression

- Simple Regression Analysis

$$Y = \beta_1 + \beta_2 X + u$$

Consumption

Income

The diagram illustrates a simple regression model. The dependent variable  $Y$  is labeled 'Consumption' and the independent variable  $X$  is labeled 'Income'. Arrows point from these labels to their respective terms in the equation  $Y = \beta_1 + \beta_2 X + u$ .

- Multiple Regression Analysis

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + u$$

Consumption

Income

Wealth

Population

others

The diagram illustrates a multiple regression model. The dependent variable  $Y$  is labeled 'Consumption'. The independent variables  $X_1$ ,  $X_2$ ,  $X_3$ , and the ellipsis are labeled 'Income', 'Wealth', 'Population', and 'others' respectively. Arrows point from these labels to their respective terms in the equation  $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + u$ .

## Stochastic Error Term

- Unobserved factors?

$$Y = \beta_1 + \beta_2 X + u$$



Unobserved  
factors



Error or Disturbance term



**THANK YOU!**

Next Lesson: **Stochastic Error Term**