Quantitative Methods 2

Tutorial 8

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Last week

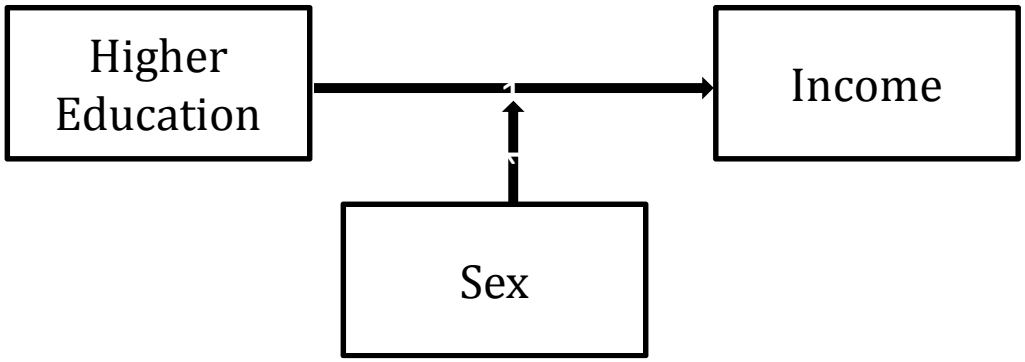
1. Goodness of fit test
2. Independence test
3. Homogeneity test
4. Correlation test
   - Pearson correlation
   - Spearman rank correlation

Bivariate analysis

- Parametric tests require stricter conditions than non-parametric tests
- Parametric tests are more powerful
  - If conditions are likely satisfied, choose parametric tests

Tutorial 8

- Why regression?
  - Statistical significance of effects
  - Direction and magnitude of effects
  - Control for other effects
  - Explain, predict and forecast



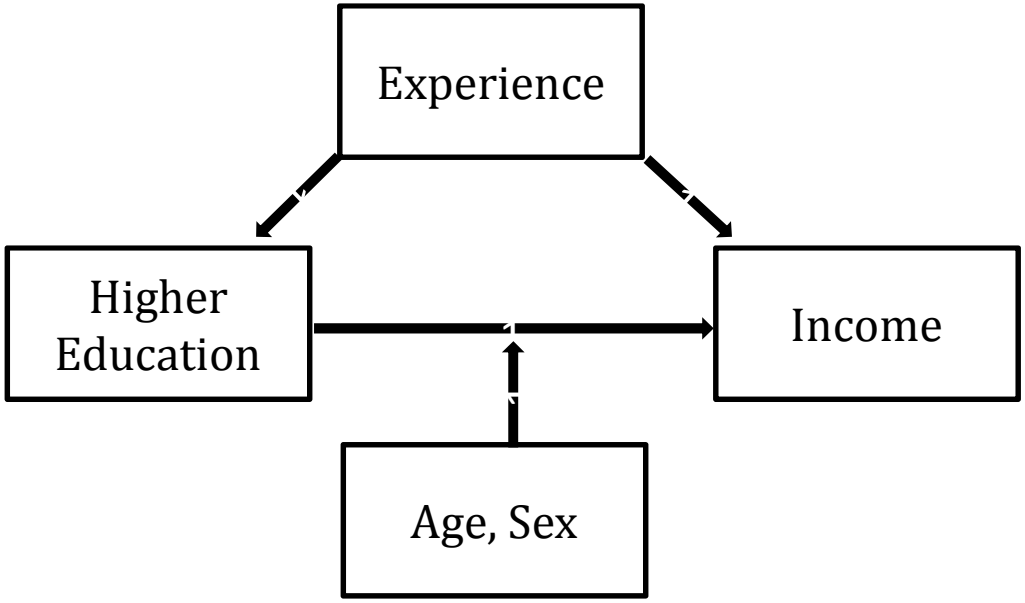
Tutorial 8

- Sex = Male

- Sex = Female

Tutorial 8

- Why regression?
  - Statistical significance of effects
  - Direction and magnitude of effects
  - Control for other effects



Tutorial 8

- Simple linear regression
- Multiple linear regression

Tutorial 8

- Simple linear regression

$$E(Y) = \beta_0 + \beta_1 X$$

$$Y = \beta_0 + \beta_1 X + \varepsilon$$

- Multiple linear regression

$$E(Y) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k$$

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k + \varepsilon$$

Tutorial 8

MLR assumptions

	Assumption	Violation
MLR1	$y_i = \beta_0 + \beta_1 x_{1i} + \cdots + \beta_k x_{ki} + \varepsilon_i$	Nonlinearity
MLR2	$E(\varepsilon_i \mid x_i) = 0$	Omitted variable
MLR3	$Var(\varepsilon_i \mid x_i) = \sigma^2$	Heteroskedasticity
MLR4	$E(\varepsilon_i \varepsilon_j \mid x_i, x_j) = 0$	Autocorrelation
MLR5	No exact linear relationship among x_i	(Perfect) multicollinearity
MLR6	$\varepsilon_i \mid x_i \sim N(0, \sigma^2)$	Unreliable hypothesis testing