

1 Two-Variable Regression Model: The Problem of Estimation

Ordinary least squares (OLS)

- Graphical representation
- Objective function
- Normal equations
- Solving the normal equations
- Properties of the solution (residuals are denoted by e rather than \hat{u})
 - $\bar{e} = 0$
 - $\text{corr}(X, e) = 0$
 - $\text{corr}(\hat{Y}, e) = 0$

Classical assumptions

- Assumption #1. Linearity
- Assumption #2. $\text{Corr}(X, u) = 0$
- Assumption #3. $E(u) = 0$
- Assumption #4. Homoscedasticity
- Assumption #5. No autocorrelation
- Assumption #6. $n > k$
- Assumption #7. $\text{Var}(X) > 0$

Standard errors of OLS

- Formula
- Discussion

Gauss-Markov theorem

- Assumptions

- Discussion of theorem

Goodness of fit

- Coefficient of determination
- Properties

Application: Family income & the SAT