3 November

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$Y = \beta_0 + \beta_1 X$

y = dependent variable
β_0 = y intercept
β_1 = slope (change in y for unit change in x)
x = independent variable

Assumptions

1) y given x is normally distributed
2) observations need to be independent
3) $E(\varepsilon) = 0$
4) ε and x are not correlated

Goodness of fit

R^2 = Coefficient of Determination

$R^2 = SSR/SST$ = total variation explained by the model

$0 \leq R^2 \leq 1$ → can be a %

$Wage = \beta_0 + \beta_1(educ) + \varepsilon$

Wage = annual salary
educ = # of years of education

β_1 = effect of educ on wage while all other factors are constant
ε = all other factors that affect wage

$Wage = \beta_0 + \beta_1(educ) + \beta_2(experience) + \beta_3(skills) + \varepsilon$

MLR = multiple linear regression

In MLR, all x variables should not be correlated

Consumption and income

$Consumption = \beta_0 + \beta_1(income) + \beta_2(income)^2 + \varepsilon$

$x_1 = income \quad x_2 = income^2$

$\Delta cons / \Delta inc = \beta_1 + 2\beta_2(income)$

Generalized form of MLR

Assumptions
1) y given x_i is normally distributed
2) observations are independent
3) No perfect colinearity between x values
   a) none of the independent variables are constant
   b) No linear relationship among the independent variables
4) $E(\varepsilon | X_1, X_2 \ldots X_i) = 0$
5) Homoskedasticity → $Var(\varepsilon | X_1, X_2 \ldots X_i) = \sigma^2$