Class 23

Monday, April 19, 2021 11:12 AM

Simple Linear Reg

$$y_t = \beta_0 + \beta_1 x_{1,t} + \varepsilon_t$$

y_t : observed value of the response (dep var) at time t

β_0 : intercept $\Rightarrow$ expected value (population mean) for y when $x_1 = 0$

β_1 : population slope $\Rightarrow$ for each unit change in x_1, there will be a β_1 unit change in your response (y)

$x_{1,t}$: observed value of your independent variable @ time t

ε_t : random error at time t $\Rightarrow \varepsilon_t \overset{iid}{\sim} N(0, \sigma^2)$

$$y_t = \beta_0 + \beta_1 x_{1,t} + \beta_2 x_{2,t} + \cdots + \beta_q x_{q,t} + \varepsilon_t$$

β_0 : expected value of y_t when ALL x_s are set to 0

$\beta_1, \beta_2, \ldots, \beta_q$: change in the value of y with a unit change in x_i holding all the other x_s constant

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The JJ example:

(A) Reg equation

$$y_t = -327.548 + 0.167 x_1$$; x_1 is the date in a decimal format

(B) How do we use the above equation for prediction?

- Q3 of 1972 $\Rightarrow x_1 =$ 1972.50 (season num − 1)/4 $\Rightarrow$ freq

$y_t = -327.548 + 0.167 * 1972.5 = 1.8595$ → log(s)

with rounding errors

- What is our predicted EPS for Q3 of 1972?

$e^{1.8595} = 6.42 \Rightarrow$ pred / fitted value for the EPS

(c) Residuals

actual − fitted

1.61740608 − 1.8595 = −0.242

(log-jj) (green calc)

(d) Interpretation of the intercept : −327.548

it has no meaning

① at year 0, JSJ did not exist as a company

②

(e) slope = 0.167 → for each unit increase in time, y_t increases by 0.167

Q: what is a unit of time in the context of this problem?

quarter → inc t by 0.25

year → t to inc by 1

(f) se(B_1) : we use that to find significance (0.003)

(g) RSE : 0.159 ⇒ var around our reg line