Interpretation of Regression Coefficients for Untransformed Variables

Univariate

$$y = \alpha + \beta x$$

An increase in x of one results in a change in y of β .

 $\alpha = 3$ $\beta = 5$

 $\Delta x = 1$

x	у
0	3
1	8
2	13

$$\Delta y = 5 = \beta$$

Generalized Rule: $\Delta y = \beta \Delta x$

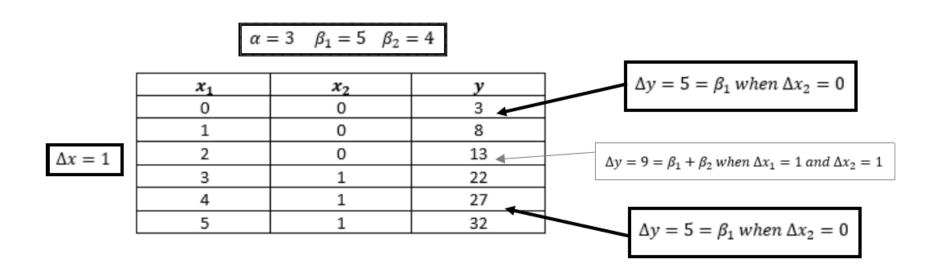
$$y_2 - y_1 = (\alpha + \beta x_2) - (\alpha + \beta x_1)$$
$$= \alpha + \beta x_2 - \alpha - \beta x_1$$
$$= \beta x_2 - \beta x_1$$
$$= \beta (x_2 - x_1)$$

Bivariate & Multivariate

$$y = \alpha + \beta_1 x_1 + \beta_2 x_2$$

Holding x_2 **constant**, an increase in x_1 of one results in a change in y of β_1 .

Holding x_1 **constant**, an increase in x_2 of one results in a change in y of β_2 .



Generalized Rule*: Holding all else constant, $\Delta y = \beta \Delta x$

^{*}this rule can be derived using partial derivatives