Chapter 3: Multiple Linear Regression

❑ Multiple Regression:

- ❑ Multiple Linear Regression models the linear relationship between single dependent variable and more than one independent variable.

P1

Y (price)	X_1 (area)	X_2 (bedrooms)
5.5	2.6	3
5.65	3	3
6.10	3.2	3
6.95	3.6	3
7.6	4	4

Flat	Y (price)	X_1 (area)	X_2 (bedrooms)	X_1X_1	X_2X_2	X_1X_2	X_1Y	X_2Y
1	5.5	2.6	3					
2	5.65	3	3					
3	6.10	3.2	3					
4	6.95	3.6	3					
5	7.6	4	4					
∑								

$$\sum x_1^2 = \sum X_1X_1 - \frac{(\sum X_1)(\sum X_1)}{N} = 1.17$$

$$\sum x_2^2 = \sum X_2X_2 - \frac{(\sum X_2)(\sum X_2)}{N} = 0.8$$

$$\sum x_1y = \sum X_1Y - \frac{(\sum X_1)(\sum Y)}{N} = 1.88$$

$$\sum x_2y = \sum X_2Y - \frac{(\sum X_2)(\sum Y)}{N} = 1.24$$

$$\sum x_1x_2 = \sum X_1X_2 - \frac{(\sum X_1)(\sum X_2)}{N} = 0.72$$

$$b1 = (\sum x_2^2)(\sum x_1 y) - (\sum x_1 x_2)(\sum x_2 y) \,/\, (\sum x_1^2)(\sum x_2^2) - (\sum x_1 x_2)^2$$

b1 =

$$b2 = (\sum x_1^2)(\sum x_2 y) - (\sum x_1 x_2)(\sum x_1 y) \,/\, (\sum x_1^2)(\sum x_2^2) - (\sum x_1 x_2)^2$$

b2 =

$$b_0 = \overline{Y} - b1\overline{X1} - b2\overline{X2}$$

$$Y = b_0 + b_1 X_1 + b_2 X_2$$

❑ Multiple Regression:

- ❑ Multiple Linear Regression models the linear relationship between single dependent variable and more than one independent variable.

Y (salary)	X_1 (exp)	X_2 (test)
25	1	8
17	3	4
42	4	6
50	5	9
45	7	5

Person	Y (salary)	X_1 (exp)	X_2 (test)	X_1X_1	X_2X_2	X_1X_2	X_1Y	X_2Y
1	25	1	8					
2	17	3	4					
3	42	4	6					
4	50	5	9					
5	45	7	5					
Σ								

$$\sum x_1^2 = \sum X_1X_1 - \frac{(\sum X_1)(\sum X_1)}{N} = 20$$

$$\sum x_2^2 = \sum X_2X_2 - \frac{(\sum X_2)(\sum X_2)}{N} = 17.20$$

$$\sum x_1y = \sum X_1Y - \frac{(\sum X_1)(\sum Y)}{N} = 93$$

$$\sum x_2y = \sum X_2Y - \frac{(\sum X_2)(\sum Y)}{N} = 49.40$$

$$\sum x_1x_2 = \sum X_1X_2 - \frac{(\sum X_1)(\sum X_2)}{N} = -4.00$$

$$b1 = (\sum x_2^2)(\sum x_1 y) - (\sum x_1 x_2)(\sum x_2 y) \,/\, (\sum x_1^2)(\sum x_2^2) - (\sum x_1 x_2)^2$$

b1 =

$$b2 = (\sum x_1^2)(\sum x_2 y) - (\sum x_1 x_2)(\sum x_1 y) \,/\, (\sum x_1^2)(\sum x_2^2) - (\sum x_1 x_2)^2$$

b2 =

$$b_0 = \bar{Y} - b1\overline{X1} - b2\overline{X2}$$

$$Y = b_0 + b_1 X_1 + b_2 X_{2D}$$