Tables of $E(Y|\mathbf{x})$ for SAS Example Two[1]

STA441 Spring 2018

Just Country

- $c_1 = 1$ if Country = U.S., zero otherwise
- $c_2 = 1$ if Country = Europe, zero otherwise
- $E[Y|\boldsymbol{X} = \boldsymbol{x}] = \beta_0 + \beta_1 c_1 + \beta_2 c_2$

Country	c_1	c_2	$E(Y|\mathbf{x}) = \beta_0 + \beta_1 c_1 + \beta_2 c_2$
United States	1	0	$\mu_1 = \beta_0 + \beta_1$
Europe	0	1	$\mu_2 = \beta_0 + \beta_2$
Japan	0	0	$\mu_3 = \beta_0$

With weight and length

- $c_1 = 1$ if Country = U.S., zero otherwise
- $c_2 = 1$ if Country = Europe, zero otherwise
- $x_1 = $ weight
- $x_2 = $ length
- $E[Y|\boldsymbol{X} = \boldsymbol{x}] = \beta_0 + \beta_1 c_1 + \beta_2 c_2 + \beta_3 x_1 + \beta_4 x_2$.

Country	c_1	c_2	$E(Y|\mathbf{x})$
United States	1	0	$\mu_1 = (\beta_0 + \beta_1) + \beta_3 x_1 + \beta_4 x_2$
Europe	0	1	$\mu_2 = (\beta_0 + \beta_2) + \beta_3 x_1 + \beta_4 x_2$
Japan	0	0	$\mu_3 = \quad \beta_0 \quad + \beta_3 x_1 + \beta_4 x_2$

Parallel regression planes.

With product terms for interactions

- $c_1 = 1$ if Country = U.S., zero otherwise
- $c_2 = 1$ if Country = Europe, zero otherwise
- $x_1 = $ weight
- $x_2 = $ length
- $E[Y|\boldsymbol{X} = \boldsymbol{x}] = \beta_0 + \beta_1 c_1 + \beta_2 c_2 + \beta_3 x_1 + \beta_4 x_2$
  $\qquad + \beta_5 c_1 x_1 + \beta_6 c_2 x_1 + \beta_7 c_1 x_2 + \beta_8 c_2 x_2.$

Country	c_1	c_2	$E(Y|\mathbf{x})$
United States	1	0	$\mu_1 = (\beta_0 + \beta_1) + (\beta_3 + \beta_5)x_1 + (\beta_4 + \beta_7)x_2$
Europe	0	1	$\mu_2 = (\beta_0 + \beta_2) + (\beta_3 + \beta_6)x_1 + (\beta_4 + \beta_8)x_2$
Japan	0	0	$\mu_3 = \quad \beta_0 \quad + \quad \beta_3 \quad x_1 + \quad \beta_4 \quad x_2$

Non-parallel regression planes.

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