

Relationship of equation (1) of PENG/P4 to equation (4) of PENG/P7

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Equation (1) of Peng/P4:

$$y_{i,j,k,l} = \alpha + b_j + b_{j,k} + \beta_1 x_j + \beta_2 z_i + \beta_3 x_j z_i + \beta_4 \frac{S_j}{S} + \beta_5 \frac{A_j}{A} + \epsilon_{i,j,k,l}$$

Omit information not available for OM4 (month, sardine and anchovy abundance):

$$y_{i,j,l} = \alpha + b_j + \beta_1 x_j + \beta_2 z_i + \beta_3 x_j z_i + \epsilon_{i,j,l}$$

Change to OM4 notation $j \rightarrow y, l \rightarrow j, y \rightarrow F$

$$F_{i,y,j} = \alpha + b_y + \beta_1 x_y + \beta_2 z_i + \beta_3 x_y z_i + \epsilon_{i,y,j}$$

Re-arrange order

$$F_{i,y,j} = \alpha + \beta_2 z_i + b_y + \beta_1 x_y + \beta_3 x_y z_i + \epsilon_{i,y,j}$$

Define $a_i = \alpha + \beta_2 z_i$ and $\delta(X_{i,y}) = \beta_1 x_y + \beta_3 x_y z_i$ (where $\delta(X_{i,y})$ is defined as in PENG/P7)

$$F_{i,y,j} = a_i + b_y + \delta(X_{i,y}) + \epsilon_{i,y,j}$$

Equation (4) of PENG/P7 (corresponding to OM4) is:

$$F_{i,y,j} = a_i + b_y + \eta_{i,y} + \delta(X_{i,y}) + \epsilon_{2i,y,j}$$

Note:

- i. x_y, z_i and $X_{i,y}$ are binary variables
- ii. OM4 assumes the closure effect δ to be the same for both islands; PENG/P4 assumes the effect to differ for the two islands (β_1 for the one, and $\beta_1 + \beta_3$ for the other).