$$p_{\text{ctrl}} = \frac{1 - b^{\text{main}}}{2}$$

$$p_{\text{case}} = \frac{1 + b^{\text{main}}}{2}$$

For $a = 1, 2, 3$

For each $i = 1, \ldots, m_{\text{ctrl}}$

$$X_{ia}^{\text{ctrl}} \sim \mathcal{B}\left(n = 2, p_{\text{ctrl}}\right)$$

For $a = 1, 2, 3$

For each $i = 1, \ldots, m_{\text{case}}$

$$X_{ia}^{\text{case}} \sim \mathcal{B}\left(n = 2, p_{\text{case}}\right)$$

$$X^{\text{main}} = \begin{bmatrix} X^{\text{ctrl}} \\ \hline X^{\text{case}} \end{bmatrix}$$