

$$\begin{aligned}
 \text{Var}[BV] &= BV_{11}^2 \cdot p^2 + BV_{12}^2 \cdot 2pq + BV_{22}^2 \cdot q^2 \\
 &= (2q\alpha)^2 p^2 + ((q-p)\alpha)^2 2pq + (-2p\alpha)^2 q^2 \\
 &= 4p^2 q^2 \alpha^2 + (q^2 \alpha^2 - 2q\alpha p\alpha + p^2 \alpha^2) \cdot 2pq \\
 &\quad + 4p^2 q^2 \alpha^2
 \end{aligned}$$

$$\begin{aligned}
 &= 4p^2 q^2 \alpha^2 + 2p^3 q \alpha^2 - 4p^2 q^2 \alpha^2 + 2p^3 q \alpha^2 \\
 &\quad + 4p^2 q^2 \alpha^2
 \end{aligned}$$

$$\begin{aligned}
 &= 2p^3 q \alpha^2 + 2p^3 q \alpha^2 + 4p^2 q^2 \alpha^2 \\
 &= 2p^3 q \alpha^2 (q^2 + p^2 + 2pq) \rightarrow (p+q)^2 = 1
 \end{aligned}$$

$$= 2p^3 q \alpha^2 = \sigma_A^2$$

$$\text{Var}[D] = \dots = \sigma_D^2$$