

$$y \times 0.5 \times (1-cy) + (1-y) \times 0.1$$

$$= 0.5y - 0.5cy^2 + 0.1 - 0.1y$$

$$(1-cy) [P_2 \cdot y + P_1 (1-y)]$$

$$w = (1-cy) [P_2 \cdot y \cdot f(r) + P_1 (1-y) \cdot f(r)] \cdot 0.5$$

$$\frac{dw}{dy} = \frac{\partial w}{\partial y} \cdot \frac{dy}{dx} + \frac{\partial w}{\partial r} \cdot \frac{dr}{dx}$$

$$\frac{dw}{dy} = \frac{\partial w}{\partial y} + \frac{\partial w}{\partial r} \cdot r$$

$$\begin{aligned} \frac{\partial w}{\partial y} &= \left((1-cy) P_2 \cdot y \cdot f(r) + (1-cy) P_1 (1-y) \cdot f(r) \right)' \\ &= [P_2 \cdot f(r) (y - cy^2) + P_1 \cdot f(r) (cy^2 - y - cy + 1)]' \\ &= P_2 \cdot f(r) (1 - 2cy) + P_1 \cdot f(r) (2cy - 1 - c) \end{aligned}$$

$$r \cdot \frac{\partial w}{\partial r} = [(1-cy) P_2 \cdot y \cdot f'(r) + P_1 (1-y) \cdot f'(r)] \cdot r$$

$$\begin{aligned} \frac{\partial w}{\partial y} &= P_2 \cdot f(r) (1 - 2cy) + P_1 \cdot f(r) (1 - 2cy) - f(r) \cdot c \\ &= (P_2 - P_1) f(r) (1 - 2cy) - f(r) \cdot c \end{aligned}$$

$$\begin{aligned} r \frac{\partial w}{\partial r} &= y \cdot P_2 \cdot f'(r) - cy^2 P_2 f'(r) + P_1 \cdot f'(r) - y P_1 f'(r) \\ &= (P_2 - P_1) y f'(r) + (P_1 - cy^2 P_2) f'(r) \end{aligned}$$

$$W' = (P_2 - P_1) [f(r) + ry f'(r)]$$