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

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

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

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

$\frac{dw}{dy} = \frac{\partial w}{\partial y} \cdot \frac{dy}{dx} + \frac{\partial w}{\partial \gamma} \cdot \frac{d\gamma}{dx}$

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

$\frac{\partial w}{\partial y} \left\{ (1-cy) P_2 \cdot y \cdot f(\gamma) + (1-cy) P_1 (1-y) f(\gamma) \right\}'$

$= [P_2 \cdot f(\gamma)(y - cy^2) + P_1 f(\gamma)(cy^2 - y - cy + 1)]'$

$= P_2 \cdot f(\gamma)(1-2cy) + P_1 f(\gamma)(2cy - 1 - c)$

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

$\frac{\partial w}{\partial y} = P_2 \cdot f(\gamma)(1-2cy) + P_1 f(\gamma)(1-2cy) - f(\gamma) \cdot c$

$= (P_2 - P_1) f(\gamma)(1-2cy) - f(\gamma) \cdot c$

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

$= (P_2 - P_1) y f(\gamma) + (P_1 - cy^2 P_2) f'(\gamma)$

$w' = (P_2 - P_1)[f(\gamma) + ry f'(\gamma)]$