Nash Equilibria in pure strategies

Game Theory

Vincent Knight

$$\begin{pmatrix} (2,2) & (5,0) \\ (0,5) & (4,4) \end{pmatrix}$$

Defect

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$\boxed{\text{Nash Equilibrium: } \tilde{s} \text{ such that } u_i(\tilde{s}) \geq u_i(\bar{s}_i, \tilde{s}_{-i}) \text{ for all } i}$

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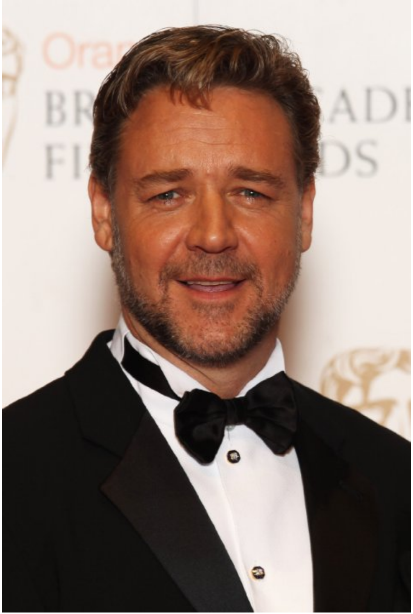

$$u_1(q_1, q_2) = (K - q_1 - q_2)q_1 - kq_1$$
$$u_2(q_1, q_2) = (K - q_1 - q_2)q_2 - kq_2$$

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$\frac{\partial u_1}{\partial q_1} = 0$ ... finds best response for Player 1:

$$q_1^* = q_1^*(q_2)$$

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$\frac{\partial u_1}{\partial q_1} = 0$ ... finds best response for Player 1:

$$q_1^* = q_1^*(q_2)$$

$\frac{\partial u_2}{\partial q_2} = 0$ ... finds best response for Player 2:

$$q_2^* = q_2^*(q_1)$$

$$u_1(q_1, q_2) = (K - q_1 - q_2)q_1 - kq_1$$
$$u_2(q_1, q_2) = (K - q_1 - q_2)q_2 - kq_2$$

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$$q_1^* = q_1^*(q_2)$$

$\frac{\partial u_2}{\partial q_2} = 0$ ... finds best response for Player 2:

$$q_2^* = q_2^*(q_1)$$

$$\boxed{\begin{cases} \tilde{q}_1 = q_1^*(\tilde{q}_2) \\ \tilde{q}_2 = q_2^*(\tilde{q}_1) \end{cases}}$$