Economics 316

Fall 2017 Martin J. Osborne

Solutions to problems for Tutorial 4

1. The players' best response functions are shown in Figure 1.

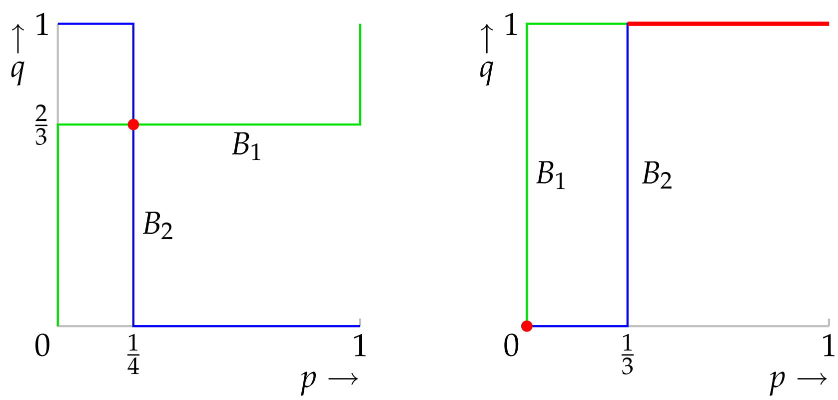

Figure 1. The players' best response functions in the left game (left panel) and right game (right panel) in Problem 1. The probability that player 1 assigns to T is p and the probability that player 2 assigns to L is q. The disks and the heavy line indicate Nash equilibria.

Left game: unique mixed strategy Nash equilibrium $((\frac{1}{4}, \frac{3}{4}), (\frac{2}{3}, \frac{1}{3}))$.

Right game: $((0,1),(0,1))$ and any strategy pair $((p, 1-p),(1,0))$ for $\frac{1}{3} \leq p \leq 1$.

2. The players' best response functions are show in Figure 2.

The game has three mixed strategy Nash equilibria, $((1,0),(1,0))$ (the pure strategy equilibrium (*No effort*, *No effort*)), $((0,1),(0,1))$ (the pure strategy equilibrium (*Effort*, *Effort*)), and $((1-c,c),(1-c,c))$.

An increase in c has no effect on the pure strategy equilibria, and *increases* the probability that each player chooses to exert effort in the mixed strategy equilibrium (because this probability is precisely c).

The pure Nash equilibria are not affected by the cost of effort because a change in c has no effect on the players' rankings of the four outcomes. An increase in c reduces a player's payoff to the action *Effort*, given the other player's mixed strategy; the probability the other player assigns to *Effort* must increase in order to keep the player indifferent between *No effort* and *Effort*, as required in an equilibrium.

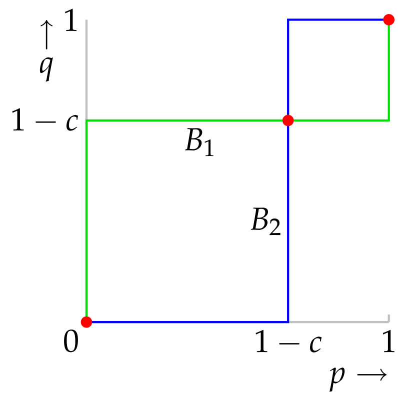

Figure 2. The players' best response functions in game in Problem 2. The probability that player 1 assigns to *No effort* is p and the probability that player 2 assigns to *No effort* is q. The disks indicate the Nash equilibria.

3. The indicated strategy pair is not a mixed strategy Nash equilibrium because player 1's expected payoff to B, $\frac{1}{3} \cdot 6 + \frac{2}{3} \cdot 1 = \frac{8}{3}$, is less than her expected payoffs to T and M, which are both 3, but she assigns positive probability to all three actions.