Oligopoly

Bruno Salcedo

Economics 2261 · Intermediate Micro II · Winter 2020

Western

cournot competition

- Two firms 1 and 2 with constant marginal costs $c = 10$ chose quantities $q_1, q_2 \in [0, 50]$ and face prices

$$P(q_1, q_2) = 100 - q_1 - q_2$$

- Payoffs are given by:

$$u_1(q_1, q_2) = (90 - q_2 - q_1)q_1 \qquad u_2(q_1, q_2) = (90 - q_1 - q_2)q_2$$

- Best responses are given by:

$$BR_1(\theta_2) = 45 - \frac{1}{2}q_2 \qquad BR_2(\theta_1) = 45 - \frac{1}{2}q_1$$

q_2

50

$q_1 = \mathrm{BR}_1(\bar{q}_2)$

$q_2 = \mathrm{BR}_2(\bar{q}_1)$

q_1

50
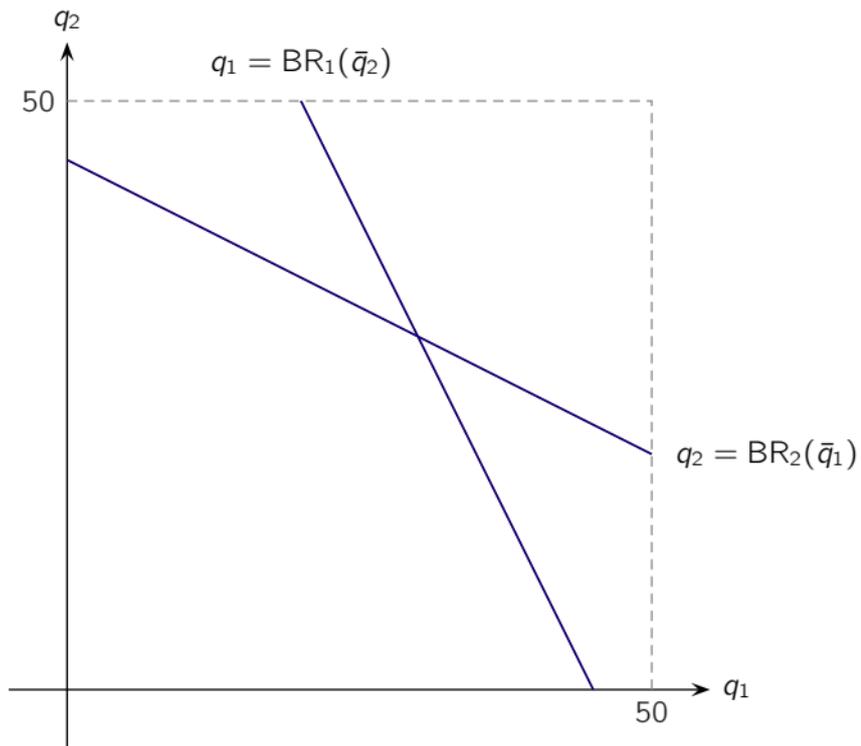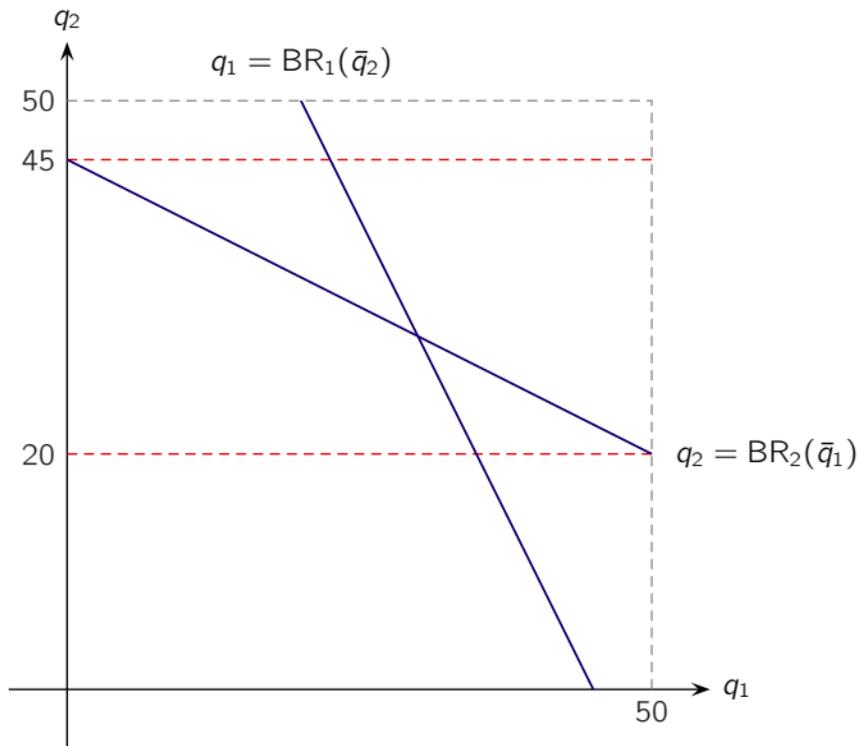
Firm 2's best response function only takes values between 20 and 45
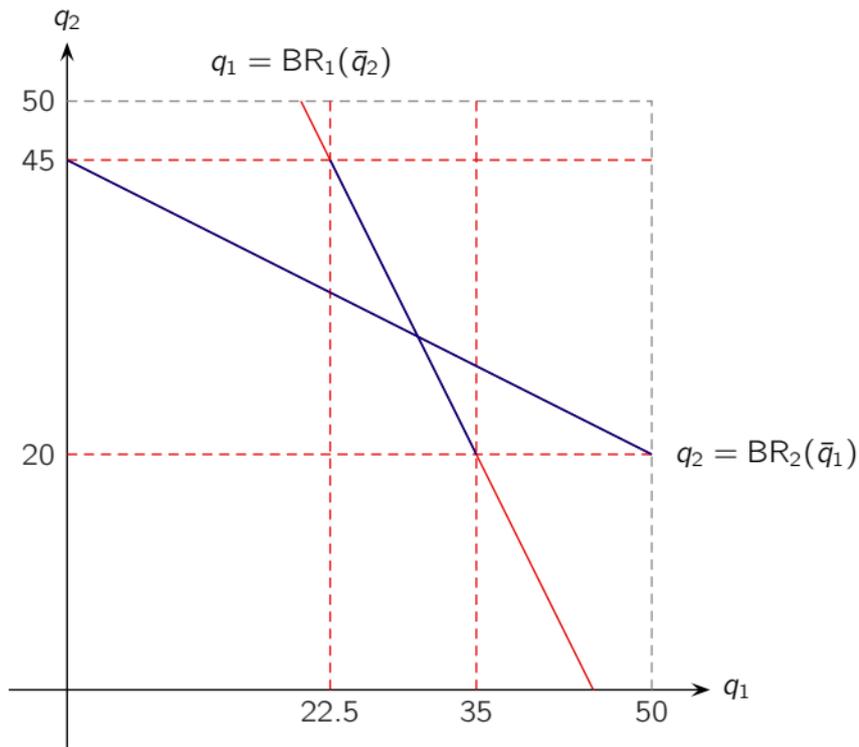
Knowing that firm 2's quantity will be between 20 and 45,
firm 1's best responses are between $BR_1(20) = 35$ and $BR_1(45) = 22.5$
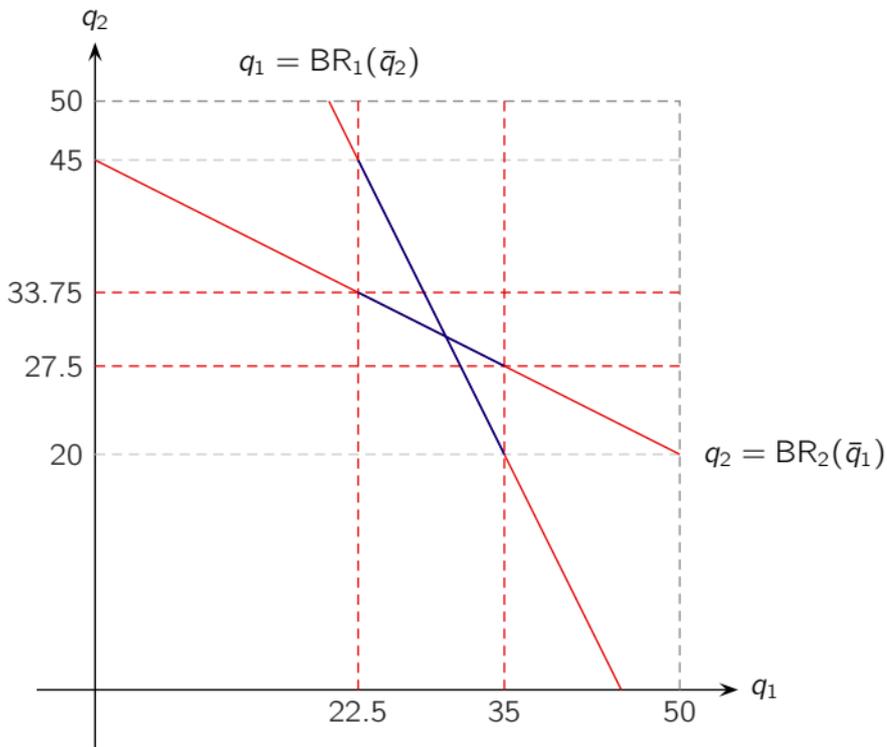
Knowing that firm 1's quantity will be between 22.5 and 35,
firm 2's best responses are between $BR_2(22.5) = 33.75$ and $BR_2(35) = 27.5$
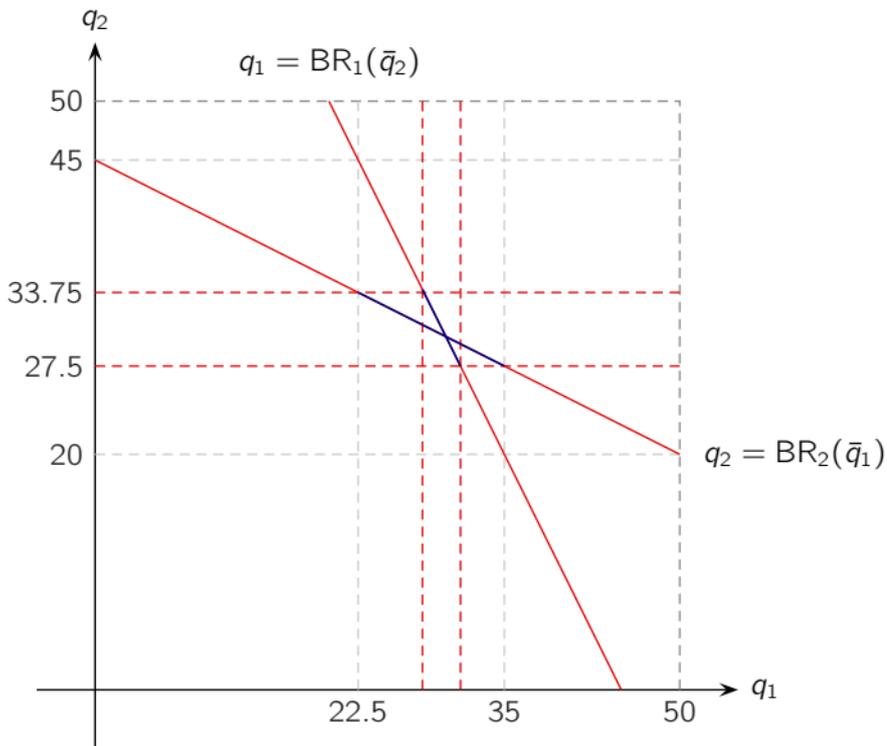
Knowing that firm 2's quantity will be between 27.5 and 33.75,
firm 1's best responses are between $\mathrm{BR}_1(27.5) = 31.25$ and $\mathrm{BR}_1(33.75) = 28.125$
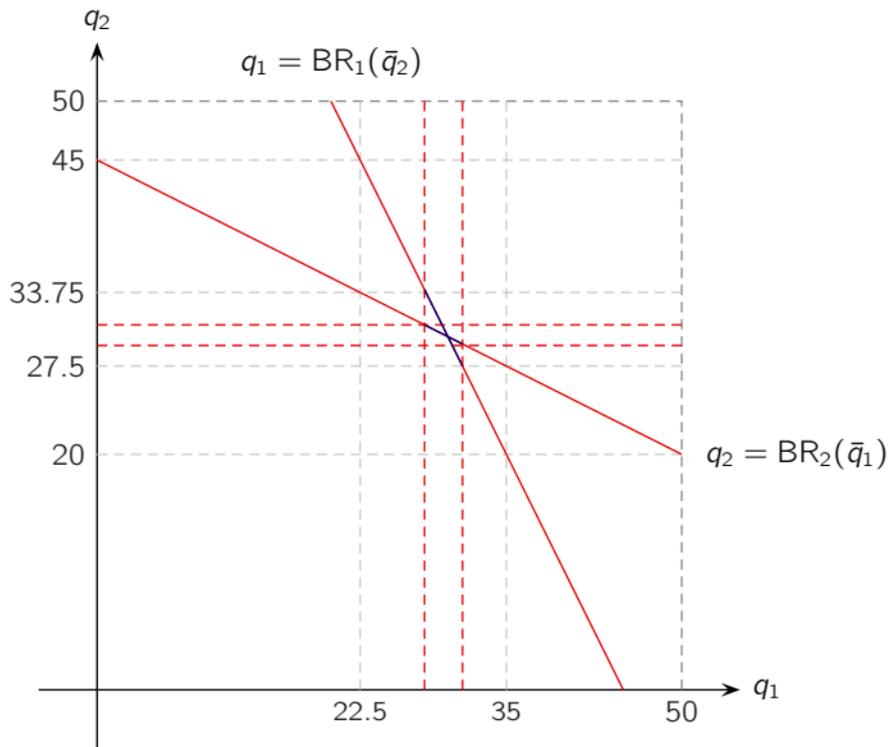
Knowing that firm 1's quantity will be between 28.125 and 31.25,
firm 2's best responses are between $BR_2(28.125)$ and $BR_2(31.25)$
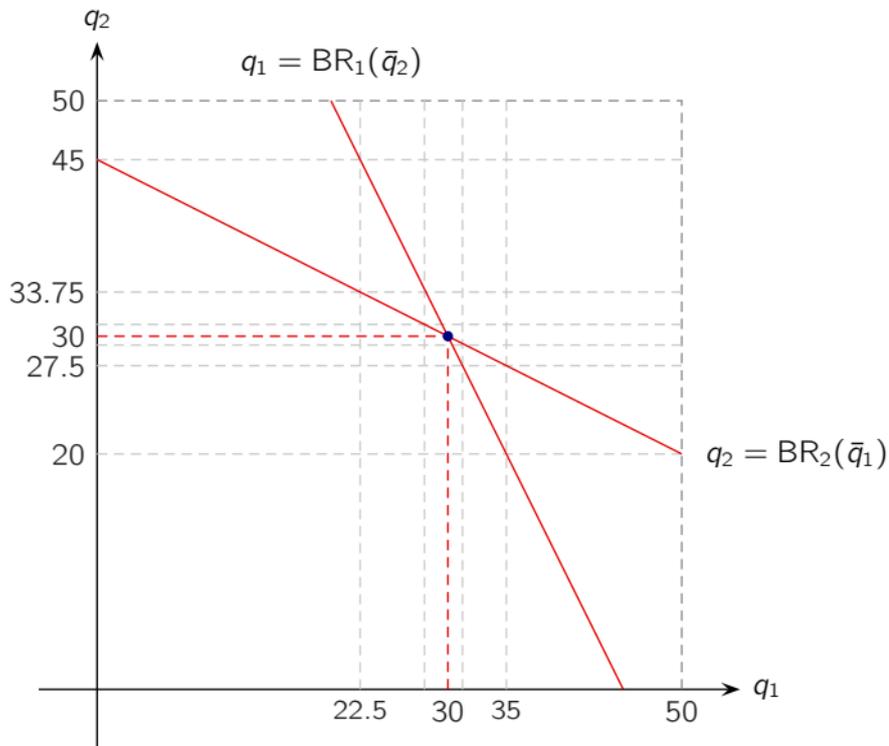
Continuing this process, the only rationalizable strategy for each firm is $q_i = 30$
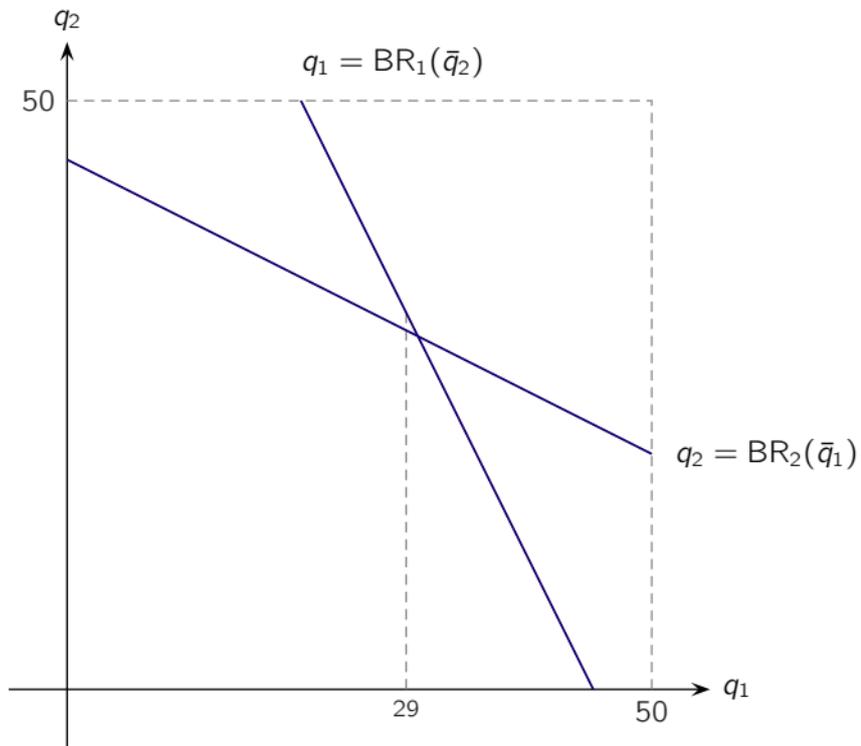
Can firm 1 rationalize choosing $q_1 = 29$?
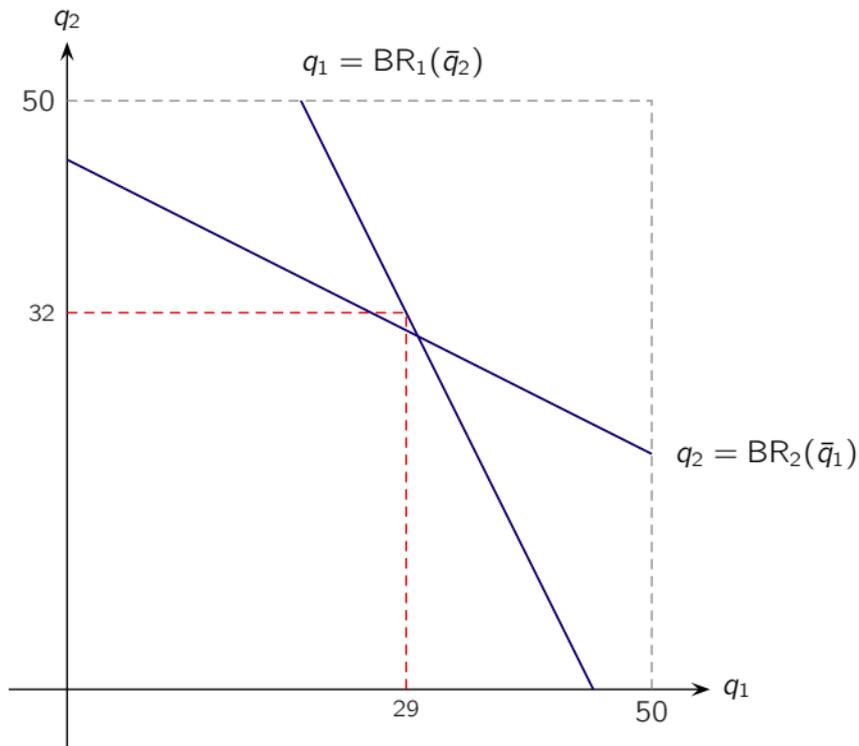
For firm 1 to choose $q_1 = 29$, it must believe that firm 2 will choose on average $\bar{q}_2 = 32$
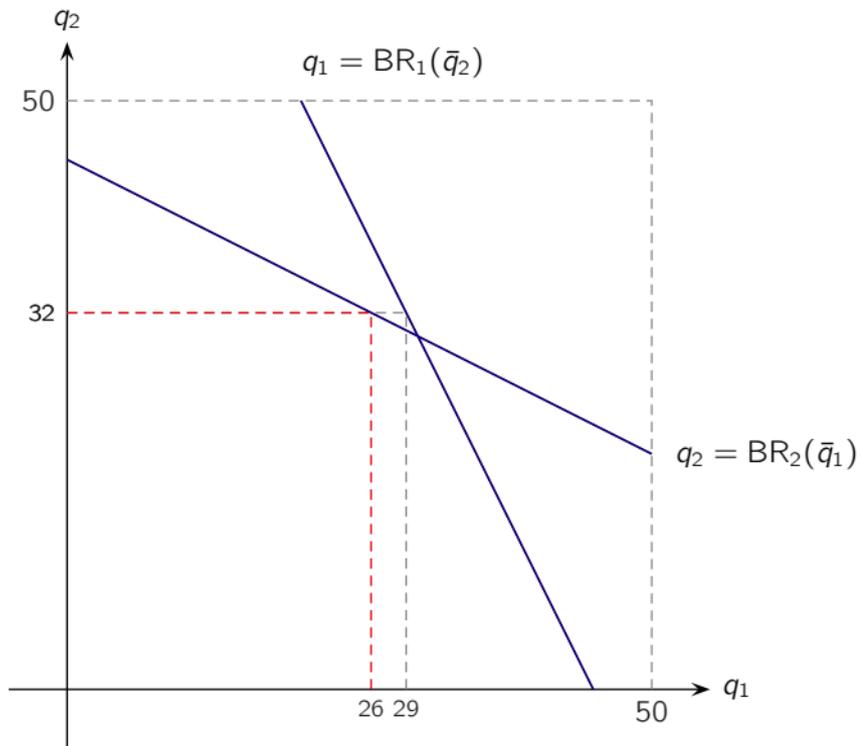
For firm 2 to choose $q_2 = 32$, it must believe that $\bar{q}_1 = 26$
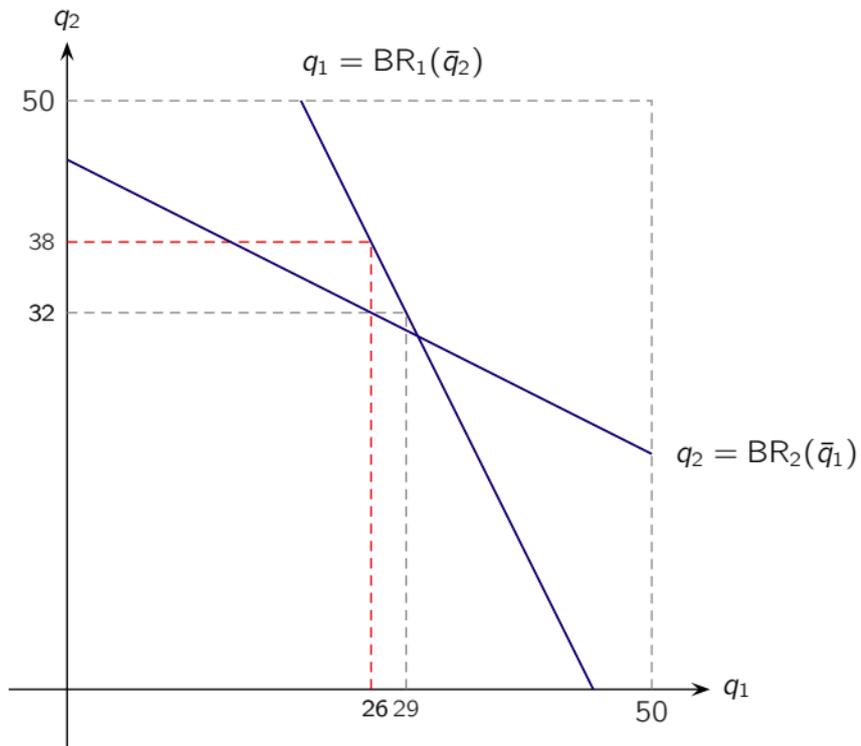
For firm 1 to choose $q_1 = 26$, it must believe that $\bar{q}_2 = 38$
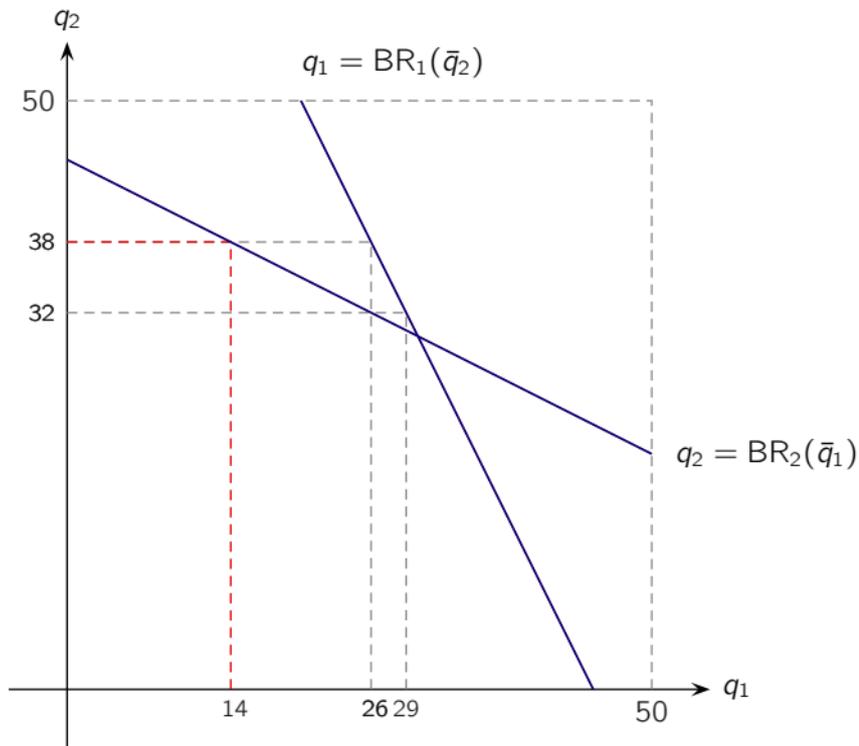
For firm 2 to choose $q_2 = 38$, it must believe that $\bar{q}_1 = 14$
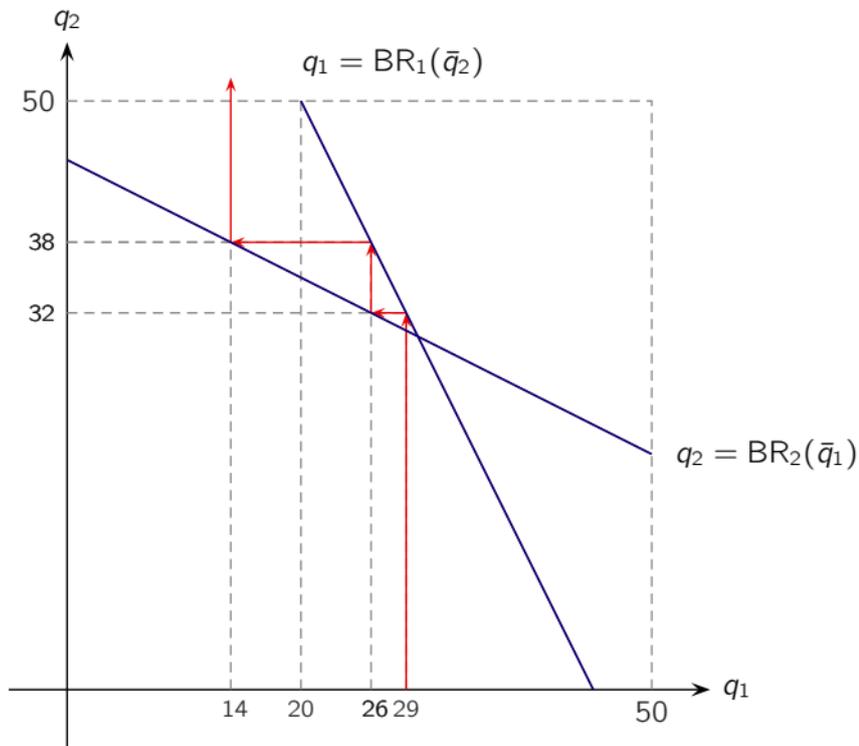
This is never rational because firm 1 will always choose $q_1 > 20$

Hence firm 1 cannot rationalize choosing $q_1 = 29$