10-(b)

to get BNE

$$2q_2^* + c = \theta a_H - \theta\left[\frac{a_H - q_2^* - c}{2}\right] + (1-\theta)\cdot\left[a_L - \left(\frac{a_L - q_2^* - c}{2}\right)\right]$$

$$= \theta\cdot a_H - \tfrac{1}{2}\theta\cdot a_H + \tfrac{1}{2}\theta\cdot q_2^* + \tfrac{1}{2}\theta c + a_L - \left(\frac{a_L - q_2^* - c}{2}\right) - a_L\theta + \theta\left[\frac{a_L - q_2^* - c}{2}\right]$$

$$= \theta\cdot a_H - \tfrac{1}{2}\theta\cdot a_H + \tfrac{1}{2}\theta\cdot q_2^* + \tfrac{1}{2}\theta\cdot c + a_L - \tfrac{1}{2}a_L + \tfrac{1}{2}q_2^* + \tfrac{1}{2}c - a_L\theta + \tfrac{1}{2}\theta a_L - \tfrac{1}{2}\theta q_2^* - \tfrac{1}{2}\theta c$$

$$\tfrac{3}{2}q_2^* + c = \tfrac{1}{2}\theta a_H + \tfrac{1}{2}a_L + \tfrac{1}{2}c - \tfrac{1}{2}\theta a_L$$

$$3q_2^* = \theta a_H + a_L - c - \theta a_L$$

$$\boxed{q_2^* = \frac{\theta a_H + (1-\theta)\cdot a_L - c}{3}}$$

$$2q_1^*(a_L) = a_L - \left[\quad\right] - c$$

$$6q_1^*(a_L) = 3a_L - (\theta a_H + (1-\theta)\cdot a_L - c) - 3c$$

$$= 3a_L - \theta a_H - (1-\theta)\cdot a_L + c - 3c$$

$$= 3a_L - \theta a_H - a_L + \theta a_L + c - 3c$$

$$= 2a_L + \theta a_L - \theta a_H - 2c$$

$$\boxed{q_1^*(a_L) = \frac{(\theta+2)a_L - \theta a_H - 2c}{6}}$$

$$q_1^*(a_H) = \tfrac{1}{2}a_H - \tfrac{1}{2}\left[\frac{(\theta\cdot a_H + (1-\theta)\cdot a_L - c)}{3}\right] - \tfrac{1}{2}c$$

$$= \tfrac{1}{2}\left[\frac{3a_H - \theta a_H - (1-\theta)\cdot a_L + c - 3c}{3}\right]$$

$$= \tfrac{1}{2}\left[\frac{(3-\theta)\cdot a_H - (1-\theta)\cdot a_L - 2c}{3}\right]$$

$$= \boxed{\frac{(3-\theta)\cdot a_H - (1-\theta)\cdot a_L - 2c}{6}}$$

$$\frac{(3-\theta)a_H - \left[3-\theta\right]a_L}{6} > 0$$

$$\frac{(\theta+2)a_L - (\theta+2)a_L}{6} > 0$$

$$\theta a_L + 2a_L - \theta a_H - 2a_L$$

$$\theta(a_L - a_H),$$

$$(\theta+2)\left[a_L \quad (\theta+2)a_L - 2a_L - \theta a_H\right.$$