Is it better for the shareholders to remunerate CEOs with profit-sharing contracts or other types of contracts? One of the issues is, of course, moral hazard on the part of the CEO. In this question we consider instead a different issue, namely a strategic one.

Consider the following situation. There are two individuals, 1 and 2. Each individual is the sole owner of a firm in a Cournot duopoly. The inverse demand function is \( P = 60 - Q \) and both firms have the same cost function characterized by a constant marginal cost equal to 12 and zero fixed cost. Individuals 1 and 2 simultaneously and independently decide whether to appoint a manager with a profit-sharing contract (the manager of firm 1 gets the fraction \( \alpha \) of the profit of firm 1) or a revenue-sharing contract (the manager of firm 1 gets the fraction \( \alpha \) of the revenue of firm 1), where \( 0 < \alpha < 1 \). The value of \( \alpha \) is given exogenously (is not a choice variable). The contracts are then made public (that is, they become common knowledge among everybody in the industry) and afterwards the managers simultaneously compete in output levels. The objective of each manager is to maximize her own income. The objective of each owner is to maximize his own net income (= profit of the firm minus the payment to the manager).

(a) Sketch the extensive-form game.

(b) Find the pure-strategy subgame-perfect equilibria of this game for every value of \( \alpha \).

(c) In the past, each owner used to run the firm himself and the industry was a Cournot duopoly. Now they have delegated the running of the firms to managers. Suppose that \( \alpha \) is small (say \( \alpha = \frac{1}{100} \)). Has delegation led to an increase or a decrease in the income of the owners of the firms?