Problem Set 4: Cartels and Tacit Collusion

Markets, Incentives and Ethical Management

Prof. Dr. Markus Reisinger

1. Consider a market with two firms which produce a homogeneous product. Firms are in Cournot-competition, that is, they compete in quantities. For simplicity marginal and fixed costs of both firms are zero. The inverse demand function is given by $P(Q) = 1 - Q$, with $Q = q_1 + q_2$. The firms play an infinitely repeated game and set their quantities simultaneously in each period. The common discount factor of both firms is $\beta < 1$.

   (a) Determine the critical discount factor above which firms can sustain the monopoly quantity as a subgame perfect equilibrium with the following grim trigger strategies: Produce half of the monopoly quantity in the first period. Keep producing half of the monopoly quantity as long as both firms have done so in all previous periods. If one firm has deviated from producing half of the monopoly quantity, produce the Nash equilibrium quantity forever.
   (Hint: Start by determining the monopoly quantity and respective monopoly profit.
   Then determine the optimal deviation of a firm, given that the other firm produces half the monopoly quantity, and the corresponding deviation profit.
   Then determine the static Nash equilibrium of the Cournot game and the resulting profits.
   Finally, compare the profit for a firm if it follows the collusive strategy of setting half of the monopoly quantity as long as no firm deviated from it with the profit of optimally deviating and obtaining the punishment profit from next period onwards.)

   (b) What are the differences with respect to the deviation profit and the punishment profit of the Cournot model as compared to the Bertrand model considered in the lecture.