

## Review Notes – Oligopoly

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- The Market Environment
    - Define
    - Types of Markets
    - For oligopoly markets?
      - Why must oligopoly firms react to competitors but in other markets firms do not care about competitors behavior?
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- Traditional Oligopoly models
    - Assume a duopoly (what's that?)
    - Four types of models that we will consider (lots more possible)
      1. Price leader/follower
      2. Quantity leader/follower
      3. Collusion
      4. No followers but simultaneous decisions
    - First define
      - Cournot model = each firm chooses output given belief about output of competing firm; equilibrium occurs where each firm's expectations about competitors behavior is met.
      - Stackelberg model = Q leader/follower, with leader = dominant (smart) firm and follower = stupid firm (why?)
      - What is a reaction function?
        - Definition
        - Graphically?
        - In which direction does profit go?
        - Make sure you know how reaction functions work.
    - Stackelberg model
      - Sequential Game
      - Stupid (follower) firm always on reaction function.
      - Dominant (smart) firm maximizes profit given that follower always on reaction function => leads to what conclusion?
      - Make sure you know the equilibrium concept and result (i.e., where the firms end up graphically). Who ends up producing the monopoly output?
      - Is this a Nash equilibrium?
    - Cournot Model
      - Simultaneous Game
      - Both parties always on their reaction function
      - Make sure you know the equilibrium concept and result (i.e., where the firms end up graphically).
      - How does Cournot equilibrium compare to Stackelberg?
      - If at Stackelberg equilibrium initially how do they get to Cournot equilibrium?

- Is this a Nash equilibrium?
  - What is a Stakelburg bluff model?
  - Collusion
    - Cooperative game
    - Total output is monopoly output
    - Be able to show graphically why collusion leads to incentives to cheat.
  - Bertrand Model
    - Price leader/follower, with leader = dominant (smart) firm and follower = stupid firm (why?)
    - Assuming that  $P=MC \Rightarrow$  Bertrand leads to zero profits and price equal to the competitive price. Make sure you understand the logic for why this is true.
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- Game theory and Oligopoly
  - What is game theory?
    - Definitions: Players, strategies, payoffs, payoff matrix, cooperative solution, non-cooperative solution.
    - Know how to set up a game given the initial conditions
  - Equilibrium concepts in game theory
    - Dominant strategy game = both parties always choose the same regardless of other party.
    - If no dominant strategy  $\Rightarrow$  what is the equilibrium concept?
    - Nash equilibrium = both chooses one strategy assuming the other party makes the best choice possible.
  - Prisoner's Dilemma
    - Each party's dominant strategy is to confess
    - Nash Equilibrium has both parties confessing  $\Rightarrow$  both worse off than if neither confessed.
    - Conundrum of Prisoner's dilemma is that the cooperative solution is better but not chosen because (a) don't trust the other party and (b) dominant strategy given payoffs is to confess.
    - What is the solution to the dilemma?
  - Mixed vs. Pure Strategy
    - Definition of both strategies – did pure strategy games previously
    - Do pure strategy games always have a Nash equilibrium?
    - What is a Nash equilibrium with mixed strategies? Make sure you can solve for mixed strategy equilibriums given a game.
  - Prisoner's Dilemma in a Cartel (Collusion)
    - How is the game set up – choices = cheat or don't cheat.
    - Same basic structure and solutions.
  - Repeated Games
    - What is a tit for tat strategy?

- How does repeating the game change the results, for example, with cartels' prisoner's dilemma game?
  - Sequential Games
    - Previously had done simultaneous games. How do these differ from sequential games?
    - Does the order of decisions affect the outcome? How?
    - Make sure that you can set up a sequential game and find the equilibrium.
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