Competitive Strategy: Week 9

Reputation and Cooperation

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Why is Reputation Useful?

- Cooperation between competitors
  - Prices.
  - New product design, standards, market development, lobbying, advertising.
- Complementors.
  - New products.
- Suppliers
  - Reputation not to hold up suppliers.
- Buyers
  - Reputation for high quality product
- Entrants
  - Reputation for toughness to fight entry.
Tacit Cooperation over Prices

- Tacit cooperation
  - Cooperation without explicit agreements.
  - Agreements not enforceable by court.

- Key ingredients
  - Shared interest as basis for cooperation.
  - Mechanism for punishment.
  - Mechanism for recovering from mistakes.

- Warning: price fixing is illegal!
  - Cooperation on R&D or advertising is not.

Cases

- American Airlines circa 1990
  - After deregulation there were frequent price wars
  - Interpretation: AA was trying to teaching rivals how to cooperate.
  - But bankrupt rivals had no interest in playing along.

- 1955 Automobile Price War
  - 45% more cars were produced in 1955 than 1954 or 1956.

- Joint Executive Committee
  - Classic railroad cartel from 1880s
  - Involved in price war 1/3 of the time
Punishment

- Is punishment severe enough to deter defection?
  - Price war may need to be very long.
  - AA couldn’t punish bankrupt airlines sufficiently.

- Is punishment credible?
  - Punishment is costly, but must be optimal after defection.
  - Idea: get punished for not punishing.
  - Problem: must avoid renegotiation.

- When to punish?
  - Is deviation deliberate or by mistake?
  - Threshold rule: market share cannot rise above 20%.
  - Ambiguous rule: prob of price war rises with market share.

Recovery

- How do you recover from mistakes?
- Could punish for fixed time
- Make punishment fit the crime
  - Deeper and longer price war for larger transgression.
A Mathematical Example

- Market
  - Two firms $A$ and $B$
  - Costs zero
  - Demand $p = a - q$.

- Bertrand competition
  - Prices $p_A = p_B = 0$ and profits $\pi_A = \pi_B = 0$.

- Joint profit maximisation
  - Prices $p_A = p_B = a/2$ and both industry profits $\pi_M = a^2/4$.

Example II

- Suppose both firms agree to set $p_A = p_B = a/2$.
  - Problem: incentive to deviate.

- Punishment
  - If cheat then we revert to Bertrand competition.

- Grim strategy for $i \in \{A, B\}$
  - If no-one has ever defected $\rightarrow$ set $p_i = a/2$.
  - If someone has defected $\rightarrow$ set $p_i = 0$.

- Is this a subgame perfect equilibrium? Will any firm defect?
Example III

• Game
  – Each round firms choose \( p_i \)
  – Discount rate \( \delta \).

• Suppose no-one has defected.
  – If don’t defect get \( \pi_M/2 \) forever.
  – If defect get \( \pi_M \) today, but get punished for rest of time.
  – Hence defect if
    \[
    \pi_M > \frac{\pi_M}{2} + \delta \frac{\pi_M}{2} + \delta^2 \frac{\pi_M}{2} + \delta^3 \frac{\pi_M}{2} + \ldots
    \]
    \[
    = \frac{1}{1 - \delta} \frac{\pi_M}{2}
    \]
  – Defect if \( \delta < 1/2 \).

Example IV: Some Questions

• What are the shared interests of firms \( A \) and \( B \)?
• When do firms enter punishment phase?
• How is defection punished?
• Is “Nash reversion” punishment credible?
• Can firms recover from punishment phase?
• What if firms could renegotiate in punishment phase? Would this increase payoffs?
Problems with Tacit Collusion

- Lots of firms
  - More reason to deviate.
  - If there are $N$ firms in Bertrand model, need $\delta \geq (N - 1)/N$.
  - Harder to detect defection.
  - Harder to coordinate punishment.

- Small or failing firms
  - If firms differ they may have different incentives to defect.
  - Design punishments to stop those most likely to deviate.
  - Or ignore these firms.

- Entry
  - Successful cooperation promotes entry and free-riding.

Problems cont.

- Competition on other dimensions
  - If cooperate on advertising, then price competition may increase.

- Demand Variation
  - When demand unusually high, have large incentive to deviate.
  - Could increase punishments.
  - Could create exemptions and not risk price war.

- Differentiated Products
  - Makes price comparisons harder.
  - Also changes nature of competition.

- Reaction Time
  - Long reaction time like low $\delta$, so cooperation harder to sustain.
Problems cont.

- Environmental Randomness
  - Suppose market price of oil falls.
  - Is this random, or did OPEC country defect?
- Communications problems
  - How specify exactly what type of adverts are allowed?
- Need infinite period game.
  - Suppose game lasts for 10 periods.
  - Then cheat in period 10 for sure.
  - Thus cheat in period 9 for sure.
  - Thus cooperation cannot be sustained!
- When fixing prices: Confessions

Problem: Allocating Production in a Cartel

- Two firms $A$ and $B$ with costs $c_A(q) = 0$ and $c_B(q) = 1$.
  - Linear demand, $q(p) = a - p$, where $a \geq 2$
- Bertrand production
  - $A$ prices at $p_A = 1$. Profits: $\pi_A = (a - 1)$ and $\pi_B = 0$.
- Joint profit maximising problem
  - $A$ prices at $p_A = a/2$. Profits: $\pi_A = a^2/4$ and $\pi_B = 0$.
- If transfers are possible
  - Nash bargaining: $A$ pays $B$ half of gain from cooperation.
  - Problem: Firm may misrepresent costs.
- If transfers not possible
  - $B$ gets some production, although this is inefficient.
Aiding Tacit Cooperation

- Industry associations
  - Lobby government, help advertising, provide information to consumers.
- Published price lists
  - Makes pricing more transparent.
  - Example: General Electric’s electric turbines.
- Most–Favoured Customer clauses
  - Commit not to make secret price cut to an individual.
- Exclusive territories
  - Make market sharing rule transparent.

Aiding Tacit Cooperation cont.

- Preannouncing future price increases
  - Reduces lag time.
  - Example: because of fuel prices, prices will rise by 10%
- Incremental Steps
  - If don’t trust rivals take small steps.
- Multi-market contact
  - Easy to trust if interact in many markets: more possibilities for punishment.
- Unused capacity
  - Increases threat of punishment.
Reputation for Quality

• A firm chooses quality $q \in \{q_L, q_H\}$ at cost $\{c_L, c_H\}$.
  - Utility of buyer equals $q - p$.
  - Buyer only sees quality after they purchase good.

• One shot game
  - Firm produces $q = q_L$ and charge price $p = q_L$.

• Repeated game.
  - Buyer: pays $q_H$ if firm chosen $q_H$ in past, else pays $q_L$.
  - Firm chooses high quality if
    \[
    \frac{1}{1-\delta}(q_H - c_H) \geq (q_H - c_L) + \frac{\delta}{1-\delta}(q_L - c_L)
    \]

Reputation to Fight Entry

• Entry Game
  1. Entrant $E$ chooses to enter or not.
  2. If $E$ enters, incumbent $I$ chooses to fight or not.
    \[
    (u_I, u_E) = \begin{cases} 
    (200, 0) & \text{E doesn’t enter} \\
    (75, 75) & \text{if E enters and I acquiesces} \\
    (-50, -50) & \text{if E enters and I fights}
    \end{cases}
    \]

• One period game: $E$ enters and $I$ acquiesces.

• Repeated game (“chain store game”)
  - $E$’s strategy: enter if $I$ has ever acquiesced.
  - $I$ can credibly fight if
    \[-50 + 200\frac{\delta}{1-\delta} \geq 75/(1-\delta)\]
Assignment

• Read “The Real Lesson of Enron’s Implosion” by McAfee (on website).

• Why is Enron’s collapse puzzling?

• What was Enron’s role in the gas market?

• Why is trust important in this market?

• Can you think of other firms in the trust business?