

# Competitive Strategy: Week 10

## Cooperation

Simon Board

## Cooperate on What?

- Prices
- New product design and standards
  - U.S. firms agreed on CDMA mobile phone standard.
- Establishing brand names
  - Negative advertising lowers value of all industry (e.g. SUVs).
- Production of compliments
  - AA increased flights between San Jose and Austin for AMD.
- Lobbying the government for regulations or infrastructure

## Tacit Cooperation

- Tacit collusion
  - 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 teach 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 1980s
  - 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
  - But why not make punishment fit the crime?
- 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

$$\begin{aligned}\pi_M &> \frac{\pi_M}{2} + \delta \frac{\pi_M}{2} + \delta^2 \frac{\pi_M}{2} + \delta^3 \frac{\pi_M}{2} + \dots \\ &= \frac{1}{1-\delta} \frac{\pi_M}{2}\end{aligned}$$

- 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  $\delta \leq (N - 1)/N$ .
  - 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?
- 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.