# Competitive Strategy: Week 11

# Reputation and Cooperation

Simon Board

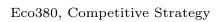
Eco380, Competitive Strategy

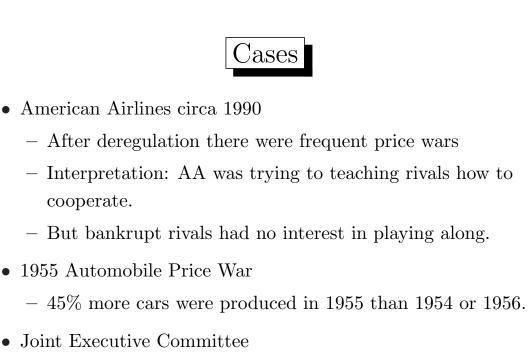
# Why is Reputation Useful?

- 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 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.





- 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.

Eco380, Competitive Strategy

5

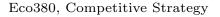
# Recovery

- 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

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

– Defect if  $\delta < 1/2$ .

#### Eco380, Competitive Strategy



- 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  $\delta \ge (N-1)/N$ .
  - 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.

#### 11

## 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

13

# 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  $a \ge 2$
- 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.

15

## 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

$$\frac{1}{1-\delta}(q_H - c_H) \ge (q_H - c_L) + \frac{\delta}{1-\delta}(q_L - c_L)$$

Eco380, Competitive Strategy

#### 17

## 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.

$$(u_I, u_E) = (200, 0)$$
 E doesn't enter  
= (75, 75) if E enters and I acquiesces  
= (-50, -50) if E enters and I fights

- 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

 $-50 + 200\,\delta/(1-\delta) \ge 75/(1-\delta)$ 

# 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?

Eco380, Competitive Strategy