Collusion

Collusion

Repeated Bertrand game:

- Same marginal cost c
- Firms set prices simultaneously in each period
- Infinitely repeated
- One equilibrium: Play (c, c) in every period
- Are there other equilibria?

Collusion

Consider the following "trigger strategy" profile:

- In the first period, set price at monopoly level p^M, and share monopoly profits equally, $\frac{1}{2}\pi^M$
- In subsequent periods observe the price history before setting own price
- If everybody has respected the agreement, set p^M in current period
- If someone has deviated, set $p = c$ forever.

Let's check that this is a subgame perfect equilibrium.

Collusion

If both firms stick to their equilibrium strategies, each firm gets:

$$\frac{1}{2}\pi^M + \delta\frac{1}{2}\pi^M + \delta^2\frac{1}{2}\pi^M + \ldots$$

where δ is the discount factor.
Simplifying:

$$V^{Coop} = \frac{1}{2}\pi^M\frac{1}{1-\delta}$$

If a firm deviates by setting a price different from monopoly price, then its future payoff is zero (since competitor will punish forever). This leads to the maximal deviation payoff:

$$V^{dev} = \pi^M$$

Cooperation is better than deviation if:

$$\delta \geq \frac{1}{2}$$

Collusion

Cooperation (collusion!) is sustainable if firms are patient enough – that they care about long run consequences of future punishments. (Why is the above a subgame perfect equilibrium?)

Collusion

The “Folk” Theorem generalizes this result:

"Suppose there is a Nash equilibrium of the one-period game that leads to the (per period) payoff-vector π. Then, one can find a high-enough discount factor δ such that any (average-per-period) feasible payoff vector v such that $v_i > \pi_i$ for every player, can be sustained as the result of a subgame perfect equilibrium strategy profile."

Intuition: One can always revert to the Nash equilibrium that gives π forever as a "punishment" to sustain the strictly better payoff vector v.

Collusion

Why don't firms collude more often?

- Collusion is illegal
  - Sherman Act, section 1: "Every contract, combination, or conspiracy in the form of trust or otherwise, in restraint of trade or commerce... is declared to be illegal ... Every person who shall make any contract or engage in any combination or conspiracy hereby declared to be illegal shall be deemed guilty of a felony"
  - Sherman Act, section 2: "Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce... shall be deemed guilty of a felony."
  - Question of "explicit" vs. "tacit" collusion: physical meetings vs. "meetings of mind"

Collusion

- Discount factor may be small in industries with high turnover
- Punishments of reverting to marginal cost may be too "harsh," destroying the credibility of the punishment
- Secret price cuts

Collusion

Secret Price Cuts and Demand Fluctuations

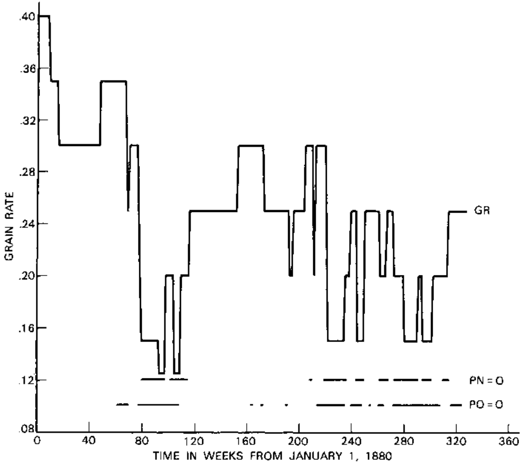
- In some markets, firms negotiate prices with customers
- Hard to observe prices
- Can only infer price cut from own demand
- But demand maybe noisy
- Can a firm decide to punish the other upon seeing low demand?
- Such a harsh punishment would probably deter firms from offering secret discounts, but market downturns may lead to indefinite price wars that are not desirable.
- Intermediate solution: move into a price war for T periods, after which revert back to collusive pricing.
- Let T be sufficiently large that no firm has incentive to undercut rival.
- **Claim:** for high enough δ, such T exist.

Collusion

Examples

FIGURE 1

PLOT OF GR, PO, PN AS A FUNCTION OF TIME



Collusion

Practical Challenges

There are at least four issues that all cartels need to confront:

1. How to enforce an illegal agreement
2. How to split the profits
3. How to deter entry
4. How to avoid detection

Think about each in relation to the following examples

Example 1: Lysine (Price Fixing via Production Quotas)

Youtube: Lysine Cartel 6

https://www.youtube.com/watch?v=ytNI56yzbQg

(Background at:
https://www.justice.gov/atr/speech/caught-act-inside-international-cartel
)

How to coordinate without an explicit meeting?

There are at least four issues that all cartels need to confront:

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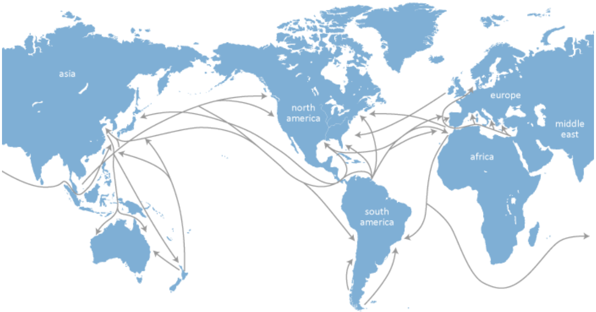
Example 2: Parcel Tankers (Market Division)

(See Asker (2010), Leniency and Post-Cartel Market Conduct: Preliminary Evidence from Parcel Tanker Shipping, IJIO)

Figure: This is a Parcel Tanker

Example 2: Parcel Tankers (Market Division)

Figure: Major Tanker Routes



Example 2: Parcel Tankers (Market Division)

Figure: Incriminating documents: the client list for NWE-Far East

B. NWE - FAR EAST (via Suez/Cape)

SN (BJ)	OT (TMH)
BASF (MEG & MDI)	ACETEX CHIMIE
BP (50% AA)	BP (50% AA)
DOW (MDI)	BRENNTAG
DSM (CYCLO)	ICI
ESBJERG FISK	SABIC
RHONE POLENC	SOLVAY
SHELL CHEMICAL	SASOL
SOLWAY CHEMICAL	

f: adm/list/oppst en 14.10.98 EN/gsh

Collusion

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Market Division: related structures

Market segmentation: If Firm 1 has better product in Market 1, Firm 2 has better product in Market 2. Collusive arrangement: Firm 1 sets monopoly price in Market 1, Firm 2 sets monopoly price in Market 2, without threatening each other.

Can sustain this in equilibrium if Firm 1 makes product for Market 2, and Firm2 makes product for Market 1, with the intent of threatening a deep price-cut in rival's market. These "secondary products" may not be profitable by themselves, but through their "threat" value.

Collusion

Cartel Enforcement

Stolt-Neilsen - Related issue - Multimarket contact:

Firms that compete with each other in several markets may have a greater propensity to collude. Why?

Example 3: Collectable Stamps (Bid Rigging)

See Asker (2010), A Study of the Internal Organisation of a Bidding Cartel, AER

Figure: The knockout auction/side-payment scheme in the stamp cartel

Example 1: Sidepayments from a successful acquisition in a target auction, Sotheby's, June 24, 1997, Lot 49

Knockout auction	Bid ($)	Sidepayment
Bidder A	9,000	$-\left(\frac{7{,}500-6{,}750}{2}\right)-\left(\frac{8{,}000-7{,}500}{2}\right)=-625$
Bidder G	8,000	$+\left(\frac{7{,}500-6{,}750}{2}\right)\times\frac{1}{2}+\left(\frac{8{,}000-7{,}500}{2}\right)=437.50$
Bidder B	7,500	$+\left(\frac{7{,}500-6{,}750}{2}\right)\times\frac{1}{2}=\ 187.50$
Bidder J	5,100	0
Target auction price	6,750	

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Legal treatment of collusion:

- Section 1 of Sherman Act outlaws "every contract, combination or conspiracy ... in restraint of trade" "
- "Antitrust laws...are the Magna Carta of free enterprise." (U.S. vs. Topco Associates, Inc. 1972 – as quoted in Shenefield and Stelzer (1998))
- Supreme Court (1911): "the words "restraint of trade"... only embraced acts or contracts or agreements or combinations.. which, either because of their inherent nature or effect or because of the evident purpose of the acts, etc., injuriously restrained trade."

- Section 1 of Sherman Act outlaws "every contract, combination or conspiracy ... in restraint of trade" "
- Helpful to break down into four elements:
  1. Plurality
  2. Agreement
  3. Restraint
  4. Unreasonableness

Collusion

Legal Context

- *Per se rulings* vs. *Rule of reason*:
  - When a practice can have only harmful effects, the "inherent nature" of the practice is "injuriously restraining trade."
  - E.g. since 1940 price fixing by a cartel is deemed to be illegal per se.
  - Until 1975, doctors, lawyers, engineers and other professions were viewed outside jurisdiction of Sherman Act.
    - In 1975, in Virginia Bar Association was found guilty of price-fixing since it circulated a list of suggested minimum attorney's fees for various services
  - Only need to prove that this behavior has occurred and that there is no good defense against this finding.

Collusion vs Mergers

Legal Context

- Other types of firm behavior may have ambiguous consequences. Example: a manufacturer dictating the price at which retailers sell to consumer (RPM). Why?
- Such conduct is evaluated as legal or illegal based on evidence regarding competitive impact of this action.
- Per se cases are much shorter than rule of reason cases.
- Infamous IBM case: 13 years, 950 witnesses, 726 trial days, 17000 exhibits, 104400 trial transcript pages

Collusion vs Mergers

Legal Context

Suppose there is no evidence that firms got together to fix prices, but they happen to charge identical prices. What to do in these cases?

Per se rulings of price-fixing require a smoking gun.

Example: Five pharmaceutical companies each charged \$30.60 for their brand of tetracycline continuously from 1953 to 1960. Manufacturing cost was \$3.00. However, there was no evidence of a secret meeting.

Defendants argued that it made no sense for any of them to cut price. Demand was price-inelastic, and any attempt to cut price would be met by others. Entry was barred, so no need to cut price to limit entry.

Current opinion seems to be that oligopoly pricing, without explicit collusion, is perfectly legal.

Collusion vs Mergers

Legal Context

Some rationale for this:

- Common remedy in explicit collusion case is to ban the communication practice
- Remedy for "tacit" collusion is to split up companies to increase competition
- But the latter remedy can be administered by the market itself: the hope is that entry will increase competition

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Final Example: A rule of reason type case

One final example: Broadcast Music, Inc. v. CBS, Inc. 441 U.S. 1 (1979)

"Respondent Columbia Broadcasting System, Inc. (CBS), brought this action against petitioners, American Society of Composers, Authors and Publishers (ASCAP) and Broadcast Music, Inc. (BMI), and their members and affiliates, alleging, inter alia, that the issuance by ASCAP and BMI to CBS of blanket licenses to copyrighted musical compositions at fees negotiated by them is illegal price-fixing under the antitrust laws. Blanket licenses give the licensees the right to perform any and all of the compositions owned by the members or affiliates as often as the licensees desire for a stated term. Fees for blanket licenses are ordinarily a percentage of total revenues or a flat dollar amount, and do not directly depend on the amount or type of music used."

There are many thousand music composers who license music through ASCAP and BMI - are they price fixing? Is this anti-competitive?