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Cartels

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Cartels

- Oligopolistic competition
  - Lower prices and profits
- Q: Why not cooperate instead?
  - Common price policy
  - Share the market
- A: Not feasible
  - Incentive to cheat
  - Agreement not enforced by courts

Cartels

- But, cartels do exist
  - Sweden: Petrol, Asphalt
  - Europe/EU: Sotheby and Christies
  - Generic drugs?

Generic drugs

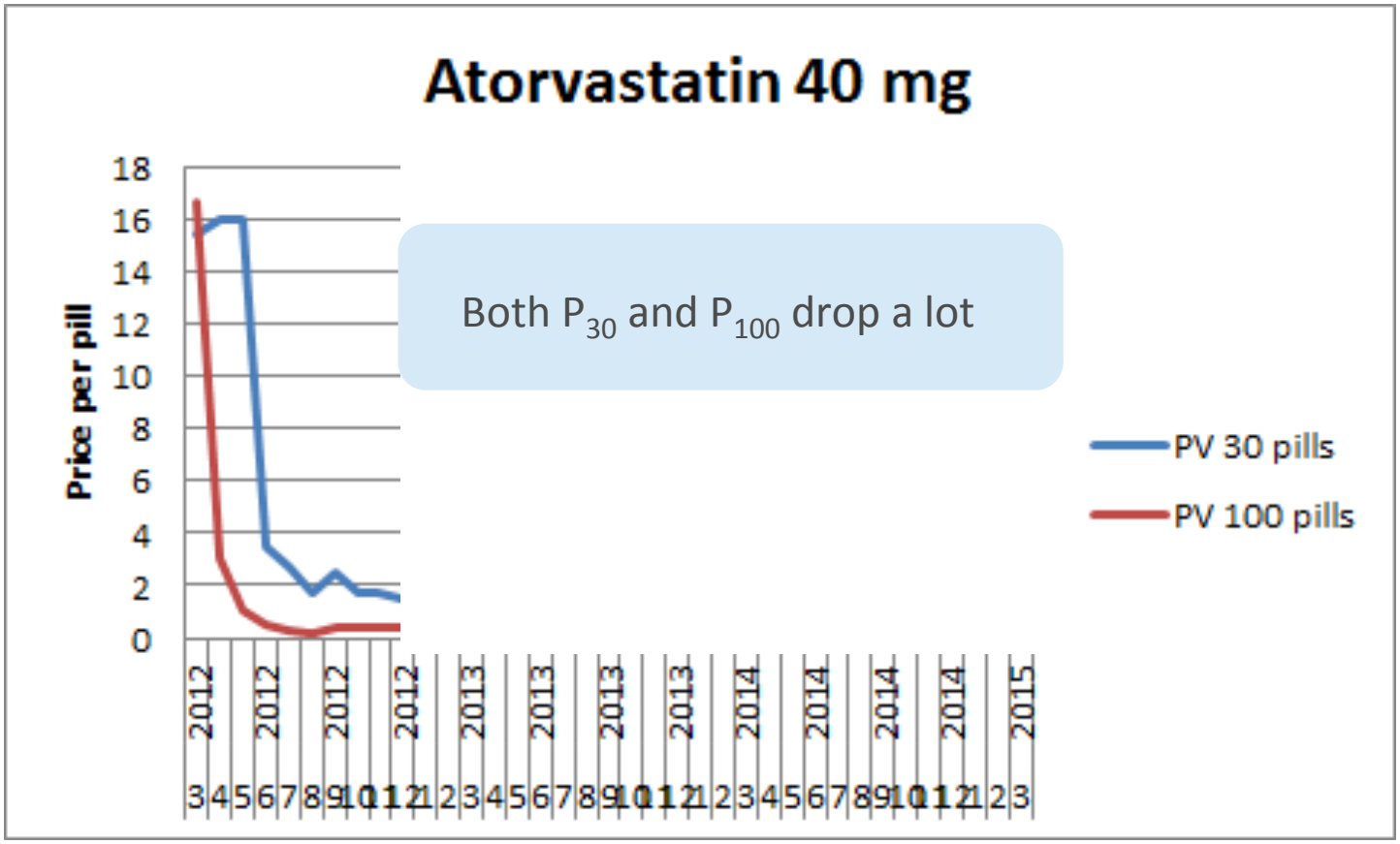
- National auction
  - All drugs without patent
  - Every month
- Idea
  - Lowest price = “product of the month”
  - Large market share
    - Recommended
    - Subsidy does not cover “over-charge”
- But
  - Also “brand name” usually gets market share

Generic drugs

- Example: Atorvastatin
  - Reduces cholesterol
  - Patent expired in 2012
  - Sold in different package sizes, e.g.:
    - 100-pills: large market => many competitors
    - 30-pills: smaller market => fewer competitors

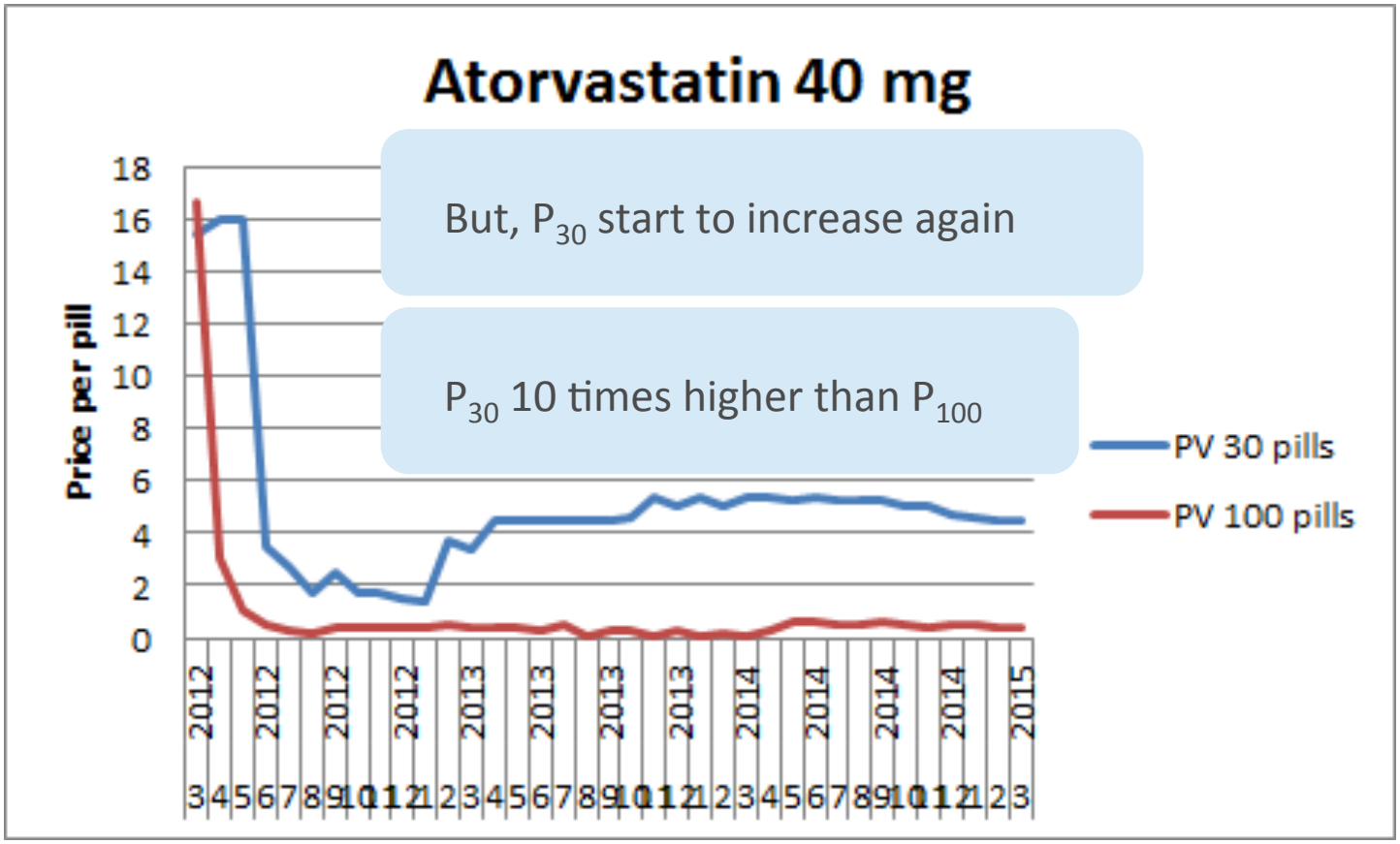
Generic drugs

Price of the product of the month



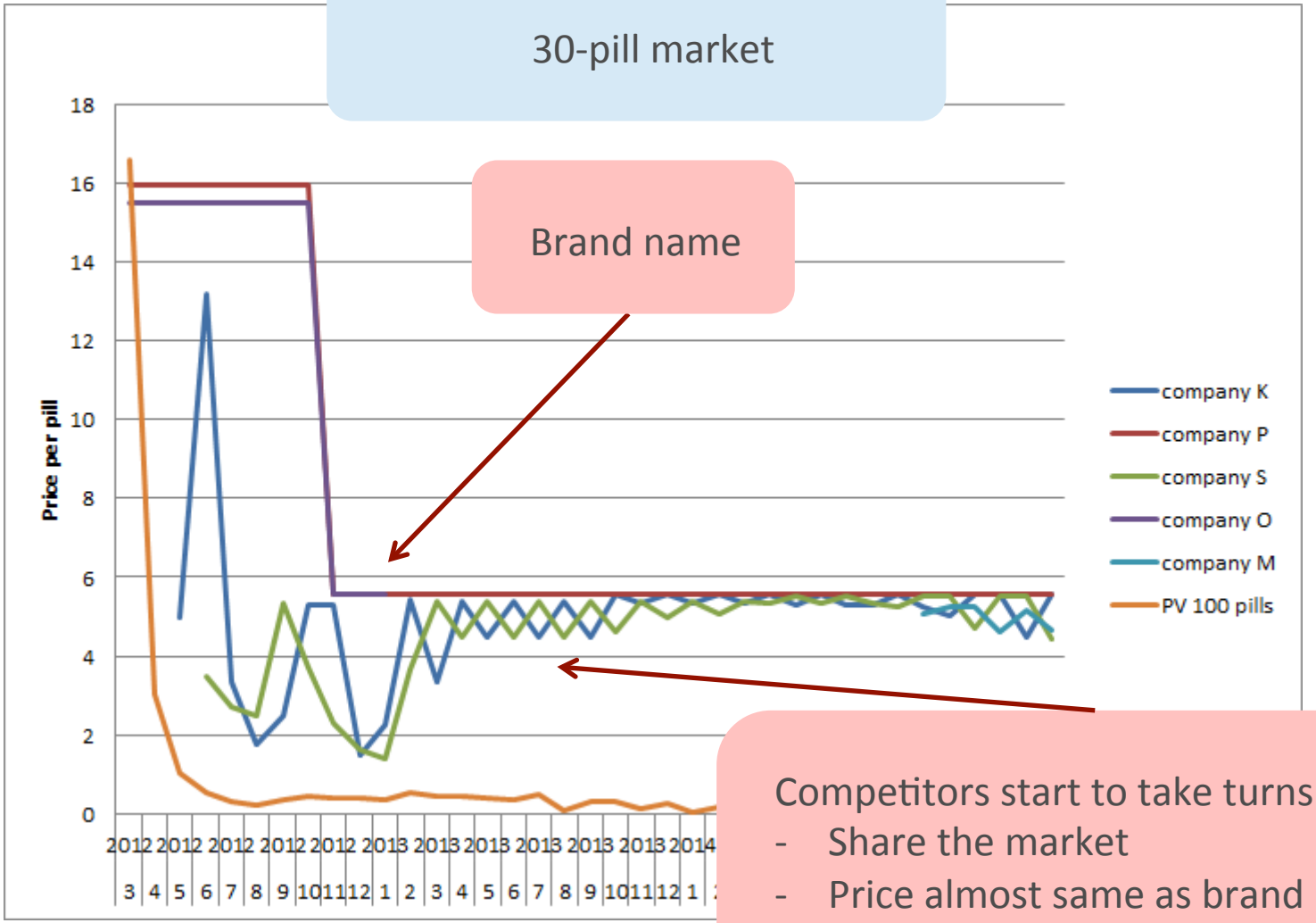
Generic drugs

Price of the product of the month



Generic drugs

30-pill market



Competitors start to take turns

- Share the market
- Price almost same as brand name
- They seem to collaborate !

Cartels

- Q: Collaboration - What do we miss?
  - Markets are long lived
  - Changes the situation dramatically

Agenda

- Issues
  - How can cartels enforce their agreements?
  - What markets are at risk?
  - How can we fight cartels?

First a little bit of game-theory…

“Folk Theorem”

Folk theorem

- Repeated game theory
  - Model to explain how people can cooperate

Folk theorem

- Recall “prisoners’ dilemma”
  - Two players
  - Two strategies: Cooperate and Cheat
  - Payoff matrix:

	Cooperate	Cheat
Cooperate	10, 10	-1, 18
Cheat	18, -1	0, 0

Folk theorem

- Unique Nash equilibrium: both cheat

	Cooperate	Cheat
Cooperate	10, 10	-1, 18
Cheat	18, -1	0, 0

  - In fact: cheat is dominating strategy

Folk theorem

- Now repeat PD game infinitely many times
  - t = 1, 2, 3, …..
  - Payoff = discounted sum of period payoffs
  - Complete and “almost perfect” information
- Strategy
  - Instruction telling player what to do at every decision node

Folk theorem

- Define: Trigger strategy
  - Period 1: Cooperate
  - Period t = 2, 3, ….
    - Cooperate, if both have cooperated all previous periods
    - Cheat, otherwise
- Note
  - This is only a definition – a possible way to behave
  - If both follow TS, then cooperation (at every t)
  - Question: when would players behave like this?

Folk theorem

- Game theoretic details
  - Need to study if TS is Sub-game perfect equilibrium
  - Problem: No last period
  - We will skip these “details”
  - Take short-cut

Folk theorem

- Analysis
  - Assume A follows TS
  - Does B want to follow TS (in every subgame)?
  - If so, (TS, TS) is SPE
- Need to consider two cases (types of subgames)
  - When nobody has cheated in the past
  - When somebody has cheated in the past

Folk theorem

- Assume: nobody has cheated in the past

Follow TS

$$U^{cooperate} = 10 + \delta \cdot 10 + \delta^2 \cdot 10 + \delta^3 \cdot 10 + ... = 10 \cdot \frac{1}{1-\delta} \qquad (\delta < 1)$$

Cheat

$$U^{cheat} = 18 + \delta \cdot 0 + \delta^2 \cdot 0 + \delta^3 \cdot 0 + ... = 18$$

No deviation if

$$U^{cooperate} \geq U^{cheat} \Leftrightarrow \qquad 10 \cdot \frac{1}{1-\delta} \geq 18 \Leftrightarrow \qquad \delta \geq \frac{4}{9}$$

Folk theorem

- Assume: somebody has cheated in the past

Follow TS

$$U^{cooperate} = 0 + \delta \cdot 0 + \delta^2 \cdot 0 + \delta^3 \cdot 0 + ... = 0$$

Cheat (nothing to gain even in the short run)

$$U^{cheat} = 0 + \delta \cdot 0 + \delta^2 \cdot 0 + \delta^3 \cdot 0 + ... = 0$$

Folk theorem

- Folk theorem
  - IF a game (e.g. prisoners' dilemma) is **repeated** infinitely many times, and
  - IF the players are **sufficiently patient**,
  - THEN, they can enforce **cooperative** outcomes, simply by threating not to cooperate anymore if somebody cheats.

Folk theorem

- Examples
  - Externalities
  - Public goods
  - Cartels
  - …

Folk theorem

- But, multiple equilibria
  - Also the strategy “Always cheat” is a subgame-perfect equilibrium
- Conclusion
  - Folk-theorem shows conditions under which cooperation **might** arise, not that it must arise

How cartels work

How can they enforce their agreements?

How cartels work

- Setup
  - Players: Two firms
  - Actions: Set prices in each period (Bertrand)
  - Time: t = 1, 2, 3, … (infinite)
  - Information: Complete and "almost perfect"
  - Payoff: $\Pi_i = \Sigma_t \, \delta^{t-1} \, \pi_i(p^t_1, p^t_2)$ [$\delta < 1$ is discount factor]

How cartels work

- Definitions π = period profit of a firm

π^N	=	All firms compete (Nash equilibrium)	$p = c$
π^C	=	All firms charge cartel (= monopoly) price	p^m
π^D	=	Best one-stage deviation when all other firms charge cartel price	$p < p^m$

$$\pi^D > \pi^C > \pi^N$$

How cartels work

- Trigger Strategy - Definition
  - Start out charging the monopoly price
  - If no firm has cheated in the past,
    - set monopoly price
  - If someone has cheated in the past,
    - set price equal to one stage Nash (in Bertrand p = c)

How cartels work

- Claim
  - If A behaves according to TS, it is in B's interest to also follow TS in every subgame, and vice versa.
- Note
  - No incentives to deviate ➔ [TS, TS] = SPE
  - Monopoly price will prevail
  - Cooperation hinges on threat of price war

How cartels work

- Proof – Cooperative phase
  - Assume no one has deviated in the past
  - Assume B sticks to TS
  - Q: Does A have incentive to deviate?

How cartels work

- If A sticks to TS

$$V^{+} = \pi^{C} + \delta\pi^{C} + \delta^{2}\pi^{C} + \ldots = \frac{1}{1-\delta}\pi^{C}$$

- If A deviates one period
  - Maximum profit during the period is π^{D}
  - Then, war starts: π^{N}

$$V^{D} = \pi^{D} + \delta\pi^{N} + \delta^{2}\pi^{N} + \ldots = \pi^{D} + \frac{\delta}{1-\delta}\pi^{N}$$

How cartels work

- No incentive to deviate if

$$V^{+} \geq V^{D}$$

How cartels work

- No incentive to deviate if

$$V^{+} \geq V^{D}$$

$$\pi^{C} + \frac{\delta}{1-\delta}\pi^{C} \geq \pi^{D} + \frac{\delta}{1-\delta}\pi^{N}$$

How cartels work

- No incentive to deviate if

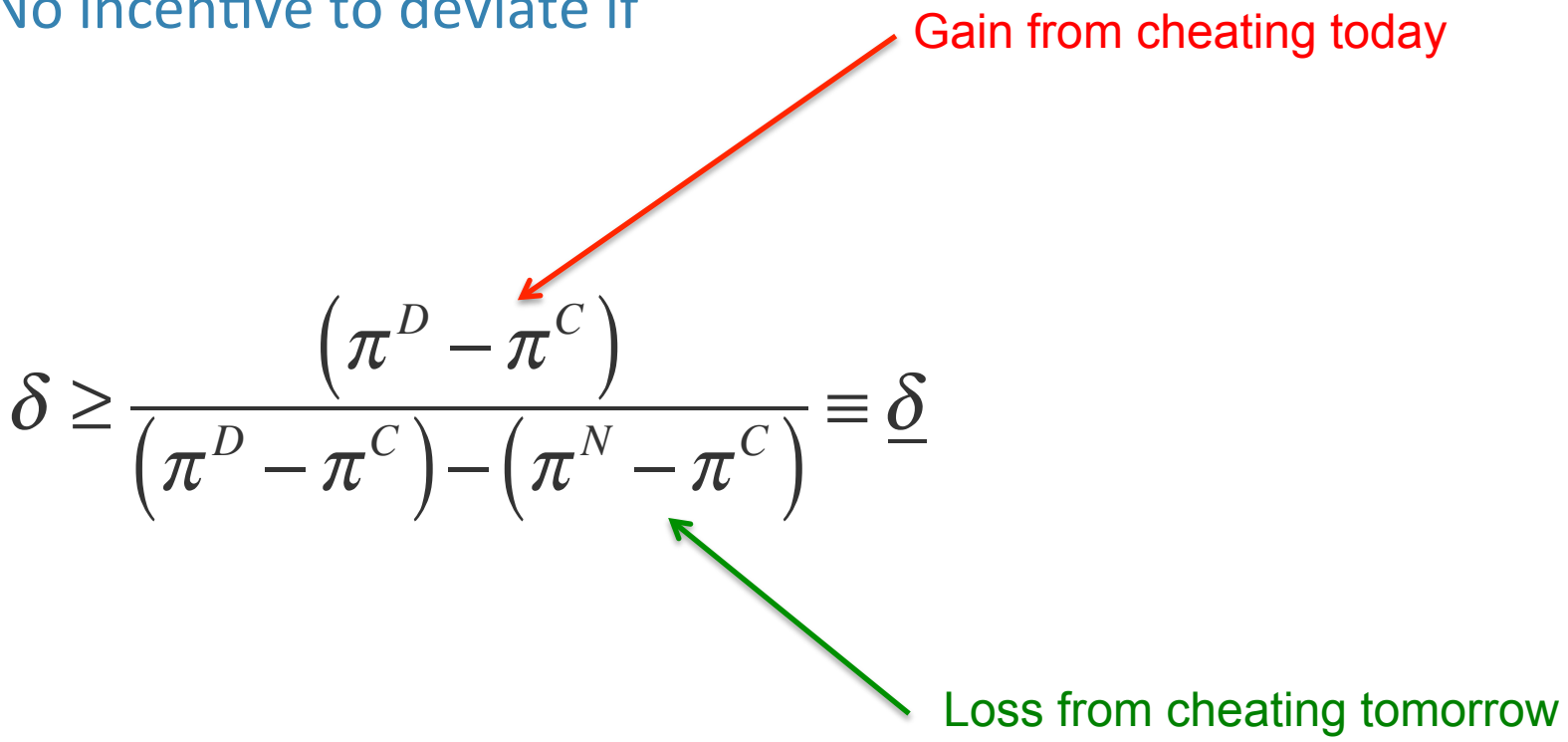
$$V^{+} \geq V^{D}$$

$$\pi^{C} + \frac{\delta}{1-\delta}\pi^{C} \geq \pi^{D} + \frac{\delta}{1-\delta}\pi^{N}$$

$$\delta \geq \frac{\left(\pi^{D} - \pi^{C}\right)}{\left(\pi^{D} - \pi^{C}\right) - \left(\pi^{N} - \pi^{C}\right)} \equiv \underline{\delta}$$

How cartels work

- No incentive to deviate if



How cartels work

- Example: Bertrand competition with homogenous goods

$$\pi^N = 0 \qquad \pi^C = \pi^{monopoly} / 2 \qquad \pi^D = \pi^{monopoly}$$

$$\delta \geq \frac{\pi^{monopoly} - \pi^{monopoly} / 2}{\left[\pi^{monopoly} - \pi^{monopoly} / 2\right] - \left[0 - \pi^{monopoly} / 2\right]} = \frac{1}{2}$$

How cartels work

- Proof – Punishment phase
  - Assume someone has deviated in the past
  - Assume B sticks to TS
  - Q: Does A have incentive to deviate?

How cartels work

- Proof – Punishment phase
  - If A also sticks to TS
    - $V^{-} = \pi^N + \delta\,\pi^N + \delta^2\,\pi^N + \ldots = \pi^N/(1-\delta)$
  - If A deviates one period
    - Maximum profit during the period is still π^N
    - Subsequent periods: war still continues, giving profit π^N
    - $V^d = \pi^N + \delta\,\pi^N + \delta^2\,\pi^N + \ldots = \pi^N/(1-\delta)$

How cartels work

- Q: Conclusion
  - Cartels self-enforcing
  - If firms *sufficiently patient*
- Policy implications
  - Not sufficient to deny firms legal enforcement
  - Necessary to make collusion illegal and punish

How cartels work

- Competition is also possible
  - Competitive Strategy: Always set price equal to cost
  - If A follows CS, B has incentive to follow CS
  - CS is also SPE
- What should we predict?
  - Economics has no answer today
- Economics still useful
  - Delineate necessary conditions for collusion (e.g. interest rate).

What Markets have High Risk of Cartels?

Which Markets?

- Factors facilitating collusion
  - Discount factor (interest rate)
  - **Concentration**
  - Entry barriers
  - Frequency of interaction
  - **Transparency**
  - Business cycles and fluctuations
  - Firm differences
- How to use the list
  - Identify potentially problematic industries
  - In cases, analyze if allegations plausible

Which Markets?

Concentration

- If a duopoly firm cheats
  - » Gain (first period):
  - » Loss (subsequently):

Which Markets?

Concentration

- If a duopoly firm cheats
  - » Gain (first period): $\pi^m/2 = \pi^m - \pi^m/2$
  - » Loss (subsequently): $-\pi^m/2 = 0 - \pi^m/2$

Which Markets?

Concentration

- If a duopoly firm cheats
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- If a triopoly firm cheats
  - » Gain (first period):
  - » Loss (subsequently):

Which Markets?

Concentration

- If a duopoly firm cheats
  - » Gain (first period): $\pi^m/2$ $= \pi^m - \pi^m/2$
  - » Loss (subsequently): $-\pi^m/2$ $= 0 - \pi^m/2$
- If a triopoly firm cheats
  - » Gain (first period): $2\pi^m/3$ $= \pi^m - \pi^m/3$
  - » Loss (subsequently): $-\pi^m/3$ $= 0 - \pi^m/3$

Which Markets?

Concentration

- If a duopoly firm cheats
  - » Gain (first period): $\pi^m/2$ $= \pi^m - \pi^m/2$
  - » Loss (subsequently): $-\pi^m/2$ $= 0 - \pi^m/2$
- If a triopoly firm cheats
  - » Gain (first period): $2\pi^m/3$ $= \pi^m - \pi^m/3$
  - » Loss (subsequently): $-\pi^m/3$ $= 0 - \pi^m/3$
- Prediction
  - – Low concentration → more tempting to cheat → cartels less stable

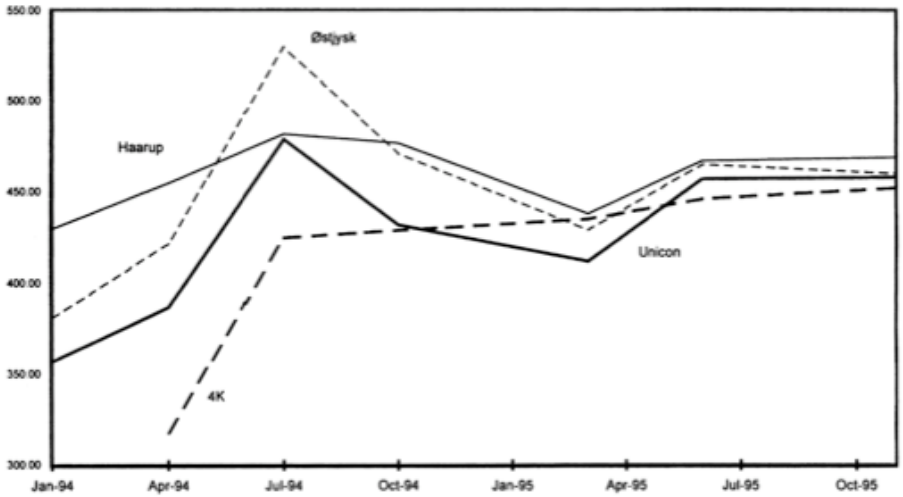
Which Markets?

Transparency

- Illustration
  - Information important for consumers
    - Which firms charge the lowest prices?
    - What do other customers pay?
  - Danish competition authority started to publish statistics on transaction prices (Oct 93)

Which Markets?

Transparency



- Prices increased by 15-20% within a year
- Price variation was reduced
- Other prices did not increase by much during the same time

- WHAT HAPPENED?

Which Markets?

Transparency

- Increased transparency may have helped firms form a cartel
  - If: difficult for firms to observe their competitors prices
  - Then: it is difficult to punish cheating

- 1996 the authority stopped publishing prices.

Transparency

Sketch of Model

Which Markets?

Transparency

- Problem 1:
  - If: firms cannot observe competitors' prices
  - Then: they cannot punish cheating

Which Markets?

Transparency

- Solution 1
  - But firms can still observe own sales
  - Unexpected reduction in demand
    = signal that a competitor cheated → punish

Which Markets?

Transparency

- Problem 2
  - Demand also varies for other reasons, that cannot be observed
- Solution 2
  - Must punish, even when no one cheats
  - But, stop price war, once “cheater’s” loss sufficient

Which Markets?

Transparency

- Conclusions
  - Prediction: temporary price wars
  - Start price war when demand drops, unless evidence that no one cheated: reversed burden of proof

More generally…

- People can cooperate, despite incentives to cheat
  - in long-lived situations
  - if people are sufficiently patient
- Behavioral requirements
  - be suspicious – assume guilty until proven otherwise, and
  - be vengeful – punish suspected cheaters, but
  - be forgiving – revert to cooperation as soon as possible

Cartel Deterrence

Richard Whish & David Bailey: Competition Law, Seventh Edition, Oxford University Press, 2012.

Article 101 TFEU

1. The following shall be prohibited as incompatible with the internal market: all agreements between undertakings, decisions by associations of undertakings and concerted practices which may affect trade between Member States and which have as their object or effect the prevention, restriction or distortion of competition within the internal market, and in particular those which:

(a) directly or indirectly fix purchase or selling prices or any other trading conditions;

(b) limit or control production, markets, technical development, or investment;

(c) share markets or sources of supply; …

Article 101 TFEU

2. Any agreements or decisions prohibited pursuant to this Article shall be automatically void.

Article 101 TFEU

3. The provisions of paragraph 1 may, however, be declared inapplicable in the case of

[… agreements …]

which contributes to improving the production or distribution of goods or to promoting technical or economic progress, while allowing consumers a fair share of the resulting benefit, and which does not:

(a) impose on the undertakings concerned restrictions which are not indispensable to the attainment of these objectives;

(b) afford such undertakings the possibility of eliminating competition in respect of a substantial part of the products in question.

“Undertakings”

- Included
  - Private (for-profit) firms
  - Trade associations
  - Cooperatives
  - Football clubs
  - Public authorities (when doing “**economic activities**”)
- Excluded
  - Goods and services provided on the basis of **solidarity**
  - Example:
    - Payments according to income
    - Consumption based on “need”
  - Schools

Types of agreements

- Horizontal
  - Price cartels
  - R&D collaboration
- Vertical
  - Resale price maintenance
  - Exclusive territories

Agreements and concerted practices

- Included
  - Contracts
  - Partial agreement during negotiation process
  - Also if only one party reveals its intentions
  - Recommendation by trade association
  - Exchange of information, also about e.g. past prices
- Excluded
  - Tacit collusion = when firms act without contact
  - Example: Swedish generic drug market

Burden of proof

- Commission
  - But there are presumptions that eg agreements over prices limit competition
  - Then firms must prove no effect

"*Object* or *Effect* of restricting competition"

- If object of restricting competition
  - Commission needs not prove effect
  - Sufficient to prove:
    - *potential* negative impact
    - given the economic context (= market characteristics)
  - Thus
    - Object ≠ subjective intentions
    - Object = theoretical prediction

Examples

- Horizontal
  - Price cartels typically reduce competition
  - Sufficient to prove that firms met and talked about prices
  - Need not show that prices actually higher
- Vertical
  - Minimum resale prices
  - Bans to export to other member states

Counterfactual

- When proving “effect”
  - Necessary to show what would have happened absent the agreement

De Minimis doctrine

- (Potential) effects must be appreciable
  - Effect on competition
  - Effect on trade
- Example
  - Two firms with 5% market shares => probably no effect on competition
  - Except possibly hard-core cartels

Effect on trade between Member States

- Defines boundary between
  - EU law
  - National competition law

Exceptions 101(3)

- 4 requirements
  - Agreement creates "efficiencies"
  - Consumers gain
  - No unnecessary restrictions on competition
  - Unless competition affected "too much"
- Burden of proof
  - Firms
- Example
  - Price cartel – extremely unlikely to be okay
  - Exclusive territories may be okay
  - Block exemptions = classes of agreements that are okay (if market shares low)

Decision making

- EU
  - Commission decides
  - Firms may appeal to courts
- Sweden
  - KKV = “prosecutor”
  - Courts decide

Sanctions

- Fines
  - Up to 10 % of world wide turnover
  - Total yearly fines ≈ € 2-3 billion
- Damages
  - Those who loose may prove harm in court
- Criminal
  - US, UK: Top executives may go to jail for hard core cartels

Importance of economic analysis in case work

- Examples
  - Object of restricting competition = use of economic theory
  - Counterfactual = use of economic theory
  - Economic evidence to support “theory of harm”
  - Article 101(3) = balance anticompetitive effects and efficiencies
  - Compute damages

How successful is cartel deterrence?

Cartel Deterrence

- Effects of competition policy
  - **When a cartel is found guilty it may dismantle**
    - Easier for authorities to keep an eye
  - **Also, there may be a deterrence effect**
    - I.e. cartels may not be initiated
    - Requires that expected fine (+ damage) is larger than gain from cooperation

Cartel Deterrence

Is deterrence sufficient?

- Literature
  - Connor: ”Global Antitrust Prosecutions of Modern International Cartels.”
  - Harrington: ”Antitrust Enforcement.”
- Optimal punishment
  - You should expect to pay what it costs
  - P * F = C or F/C = 1/P
- Evidence from US
  - Detection probability = 10-15% per year (estimate from detected)
  - Fines = 115% of inflicted costs (fines incl. private damages)
- Evaluation: Punishment not sufficient
  - With detection risk P=15%, we need F/C=666% (while actual is only 115%)
  - With fines F/C=115%, we need a detection risk of 87% (actual is 15%)

Cartel Deterrence

Can firms be induced to self-report?

- Major problem
  - Detect cartels
  - Compile sufficient evidence
- Possible solution: Leniency
  - First firm to self-report gets reduced fine

Cartel Deterrence

Can firms be induced to self-report?

- Q: Does leniency work? Incentive to report?
  - IF A believes that B will self-report,
    - THEN better for A to try to get there first.
  - IF A believes that B will not self-report,
    - THEN better for A not to self report
- Beyond leniency – Rewarding self-reporter