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Cheap talk, monitoring and collusion

The legal context

Communication between competitors

Why focus on this specific subject?

- One of the most glaring discrepancies between the legal and the economic approach
- From a legal perspective, the presence or absence or communication is decisive
  - Tacit collusion alone cannot be repressed *ex post*
  - On the contrary, explicit collusion, *i.e.*, the same practice together with, for instance, communication regarding future prices, quantities, production capacities is subject to the most rigorous standard, being considered a *restriction by object*
    - It is illicit no matter its actual impact
- From the viewpoint of economic theory, very little difference between tacit and explicit collusion
  - Almost the entire contents of the report entitled *"The economics of tacit collusion"* written by a group of economists for the European Commission

Communication between competitors

A topical subject

- EU *cathodic tubes* cartel case (2012)
  - Fines totalling € 1.47 bn (largest ever)
  - Exchanges of information on past prices and sales volumes
  - Exchanges of information regarding plans for future volumes / prices
- EU *bananas* case (2008)
  - Fines totalling € 60 million
  - Competitors were discussing their pricing intentions very regularly
  - However, the regulatory régime (in particular import quotas) made it unlikely that any discussion could have a significant market impact
  - This means that the discussions by themselves were a sufficient motive for a finding of an infringement
- Current investigation of liner shipping sector
- Recent Commission guidelines (2011)

Many different types of practices

- Private vs. public information exchanges
  - Public vs private price announcements
  - Collection and dissemination of information that is also publicly available (at some cost)
- Direct vs. indirect information exchanges
  - Series of bilateral exchanges
  - Direct multilateral exchanges
  - Through trade association or commonly set organization (*John Deere*)
  - Through market research firm (*AC Treuhand*)
  - Hub and spoke (*sports replica,* UK *toys* case*,* US *Toys'R Us* case)
- Nature of information exchanged
  - Past or current market outcomes (prices, quantities) vs. future conduct
  - Scope of information exchange
  - In the case of past conduct: hard, verifiable information, or "cheap talk"
  - Technical specifications, future market trends
- Relationship with other behavior
  - Existence of a cartel
  - Information exchange mechanism without any (other) evidence of cartel behavior

DG Comp's approach

Guidelines on horizontal co-operation agreements, 14.1.2011

- Fluctuating approach to information sharing and trade associations
- *"Information exchanges between competitors on individualised data regarding intended future prices or quantities should be considered a restriction by object"* (§71)
- All other types of information exchanges require a case-by-case analysis of their likey impact on competition
  - Key question: do they facilitate collusion?
  - In the absence of additional evidence on collusive behavior, the question is whether they facilitate tacit collusion
- Guidelines may seem to advocate a checklist approach
  - Analysis of whether market lends itself to collusion (close to *Airtours* criteria)
  - Characteristics of information exchange
    - Strategic information
    - Market coverage
    - Degree of disaggregation
    - Age of data
    - Frequency of the information exchange
    - Public vs non-public information
  - Guidelines also pay lip service to a possible efficiency defense

The former Chief Economist's view

"I would suggest a three step approach to the scrutiny of information exchanges that do not fall under the per-se rule or the safe harbor rule:

1. A clearly specified theory of how information exchange would lead to monitoring or coordination effects in this specific market. If there are market characteristics (like strong asymmetries between firms, highly fragmented markets) that make coordinated behavior unlikely the case should end.

2. An analysis of the marginal impact of the information exchange on monitoring or the scope for coordination in the market. If the marginal impact appears small, the case should be closed. However, if in step 1 and 2 the case is not close there should be a presumption that the information exchange is anticompetitive.

3. An efficiency defense should be considered. If the claimed efficiency can be obtained with a higher degree of aggregation, the information exchanges scheme should then be considered illegal. However, if the degree of disaggregation of information is necessary to achieve the efficiency effect the agreement should generally be cleared."

Kai-Uwe Kühn, contribution to OECD report on information exchanges, 2010

Current theoretical knowledge

How can communication facilitate collusion?

- Caveat: communication often takes place absent any collusion
- *"Upon its creation, a cartel immediately faces three key problems: coordination, cheating, and entry"*
- Information exchanges may in some cases help an oligopoly to solve the first two
  - Coordinating on collusive behaviour: defining a common line of action
    - Especially important in cartels requiring frequent fine-tuning due to cost or demand shocks
  - **Monitoring: facilitating the detection of deviations in order to discipline cartel members**
- In some (rare) cases, communication may also facilitate exclusion of non-colluding firms
  - Coordination on "division of labor" to implement exclusionary strategies
- The Guidelines explicitly refer to these roles for communication
  - The delineation of the "restriction by object" category treats information exchanges with a monitoring function more leniently
  - It also necessitates a better understanding of how monitoring could work

Credible information sharing can facilitate monitoring

- Lack of transparency on competitors' behavior limits scope of collusion
- Credible information collection / dissemination would facilitate collusion
- Example: Green and Porter model with occasional demand shocks
  - In the standard model, price wars follow negative demand shocks in equilibrium
  - This is because firms cannot tell whether their low sales result from a deviation from collusion or from a negative demand shock
  - A mechanism allowing each firm to know each competitor's price or sales volume would lead to the existence of a collusive equilibrium with monopoly prices in all periods
  - In fact, much less information would be needed: information on aggregate sales volumes would be sufficient
    - In equilibrium, reversion to static (Nash-Bertrand) equilibrium as soon as a firm sells zero while observing that total sales are above zero
  - However, in the absence of verifiability, credible communication would be impossible
- In this (admittedly extreme) example, aggregated information on past sales could be enough to make outcomes more collusive

Can cheap talk facilitate collusion?

- Cheap talk can facilitate *coordination* on collusive outcomes
  - Several papers by Athey and Bagwell (sharing private cost information)

- Can cheap talk facilitate *monitoring*?
  - Relevant question in the light of the case law
  - No comparative statics result except Awaya and Krishna (forthcoming, *AER*)
    - Some papers describe collusive equilibria with communication (including cheap-talk) but they fail to investigate the *marginal impa*ct of cheap talk (save for AK)
    - This is because obtaining results on the maximum achievable payoffs without cheap talk is very hard (multiplicity of equilibria, many of them not intuitive)
    - AK's equilibrium is not very plausible (messages are 'high' or 'low' with common-knowledge threshold)
  - This paper provides such a comparative statics result
    - Our stylized demand function and stochastic structure affords us enough simplification to make such a comparison
    - Communication in our equilibrium matches some actual practices

Communication of own sales data in several recent cartels

Characteristics of several cartels (Citric Acid, Vitamins, zinc phosphate)

- Price information never becomes public
- Firms exchange non-verifiable information on current sales, with a high frequency (every week / month)
- At the time it is disclosed, sales information is not verifiable
- Sales information becomes public with a lag of about one year through
  - Verification by an external auditor
  - Cross-checking against public sources (import and export statistics, data published by sectoral regulators, etc.)
- Firms act upon exchanged sales data by implementing quick market share reallocation mechanisms to compensate market share swings revealed by communication on sales

'to avoid, as far as possible, the need for compensation at the end of each year'

A result on cheap talk facilitating monitoring

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Can non-verifiable reports on own behavior facilitate collusion?

- Apparent paradox: would a deviator voluntarily reveal that it deviated and then trigger retaliation?
  - Undercutting could be detected only after reliable sales data become public (assuming that observation of low own sales by competitors is not sufficient to allow them to infer a deviation)
  - Likewise, inaccurate reports (*aka* lies) could be detected only after reliable sales data become available
- *Prima facie*, it seems that non-verifiable reports on own sales cannot improve mutual monitoring and thus cannot facilitate collusion
- This *prima facie* view is incorrect: such reports may lead to higher collusive profits, which cannot be obtained in any communication-free equilibrium
- We obtain such a comparative statics result by focusing on a highly stylized model, which allows us to derive properties shared by *all* equilibria of the infinitely repeated game

The model

- *n* firms, zero costs, identical consumers, valuation *V*, discounting rate δ
- Firms simultaneously set prices in all periods, no interfirm transfers
- Uncertainty comes from the demand side (i.i.d. across periods)
  - Total demand D_t belongs to some set *S,* expected value *D*
  - Probability π^L (>0): zero demand

    ➔ ***(à la Green-Porter): observing own zero sales is not enough to infer deviation***
  - Probability π^B (>0): biased demand. When demand is biased in favor of Firm *i,* consumers have a weak (lexicographic) preference for Firm *i*'s product
    - A slightly less extreme / more complicated assumption in current version of the paper
  - Some possible demand levels *D* can arise both with biased and non-biased demand

    ➔ ***Sales data are not enough to detect deviations***
  - Probability π^K (>0): demand is biased with total demand *D*, where *D* is such that *nD* is also a possible demand level with non-biased demand. In other words, a seller serving the entire demand because it is benefitting from biased demand may not know whether it has 100% of demand (because of a random shock in preferences), or 1/n of a larger demand pool (with symmetric demand)

    ➔***A "lucky" firm may not know it is lucky: own sales not enough to infer own market share***

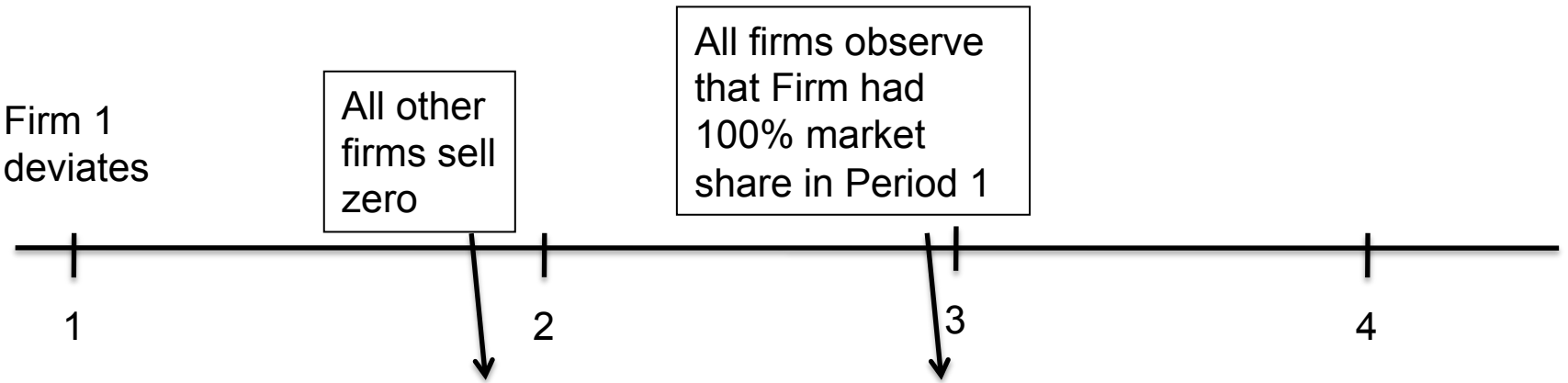
The model

- Information structure
  - Prices are never observable
  - Each firm observes its own sales at the end of the period
  - All firms' sales become observable with a one-period lag

- Focus on symmetric efficient collusive equilibria ('SECE')
  - Efficiency : consumers pay the monopoly price in all periods (no price wars)

- Preview of the main results
  - Analysis of the set of all symmetric efficient equilibria of the no-communication game: under some conditions, such equilibria do not exist
  - Construction of a simple 'candidate' SECE of the game with communication, in line with the actual use of communication in cartels
  - Under some conditions, this candidate SECE is indeed an equilibrium whereas no SECE exists absent communication

An overview of the main mechanism: no communication



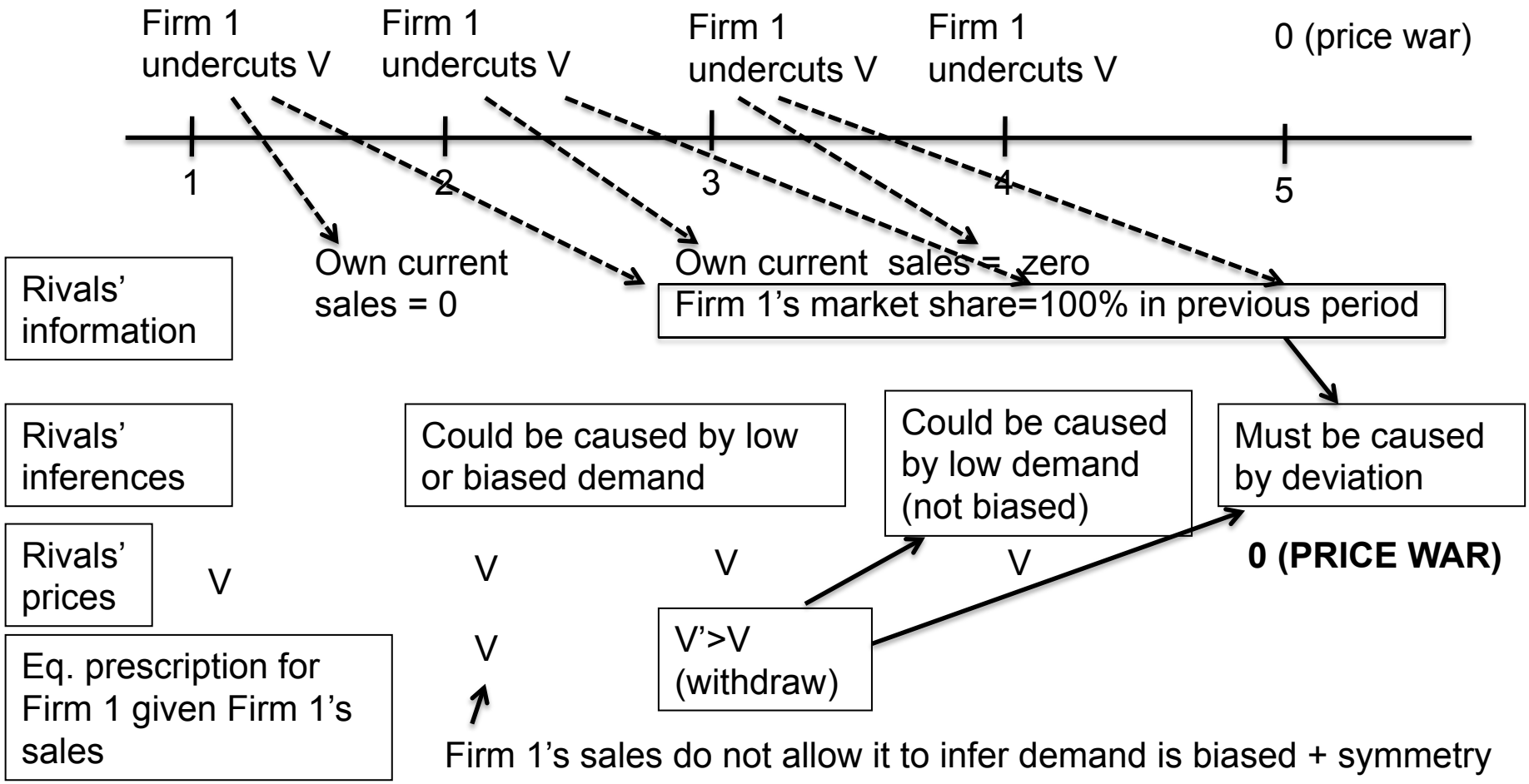
Non-verifiable sales reports at the end of Period 1 would not facilitate the enforcement of such (relatively inefficient) deterrence mechanisms

An overview of the main mechanism: no communication

- Efficiency precludes price wars along any equilibrium path: lowest price should be equal to *V*
- Deterrence of undercutting requires that a firm benefitting from biased demand suffer a loss afterwards: can happen by having it withdraw from market by setting a price >V, for some periods
  - Market share reallocation in response to unexpected swings, as observed in many collusion cases
- This raises two difficulties relative to deterrence through price wars
  - *Ex post* (after a firm turns out to be lucky): a market share reallocation requires cooperation from its victim, and is vulnerable to further deviation (if all other firms set price *V*, then instead of setting price *V'>V* to withdraw temporarily from market, targeted firm could instead undercut and set price at *V-ε*
  - *Ex ante:* deterrence is less strong as loss from temporary market share reallocation is less than loss from price war lasting forever

An overview of the main mechanism: no communication

Absent communication, a SECE must allow a firm to deviate and earn monopoly profits in the first **four** consecutive periods



An overview of the main mechanism: no communication

- Assume Firm 1 deviates in period 1, and sells D_1
  - Assume also that nD_1 is a possible (non-biased) demand level
- Consider hypothetical SECE *Eq**
- End of Period 1
  - Rivals sell zero, launch no price war (could be caused by biased/low demand)
  - Eq* prescribes firm selling D_1 to set price at V rather than withdraw (otherwise all firms would withdraw with positive probability when demand is not biased and is equal to nD_1) – matters for inferences at the end of Period 2, once D_1 is observed
- Period 2
  - Firm 1's rivals set price V
  - Firm 1 can undercut monopoly price again

An overview of the main mechanism: no communication

- End of Period 2
  - Firms observe Period 1's asymmetric market shares + their own zero sales
  - Could be explained by biased demand followed by biased or zero demand
  - Efficiency prescribes setting monopoly price again in Period 3 (and possibly Firm 1 to withdraw)
- Period 3: Firm 1 can undercut monopoly price again
- End of Period 3
  - Rivals observe their own Period 3 zero sales but cannot infer a deviation from this alone (could be caused by zero demand)
  - Rivals observe that Firm 1 had a 100% market share in Period 2. But this is consistent with *Eq** in the presence of biased demand since Firm 1 was not supposed to withdraw from market in Period 2
  - Efficiency thus prescribes Firm 1's rivals to set monopoly price in Period 4

An overview of the main mechanism: no communication

- Overall, Firm 1 can undercut monopoly price in all first four periods
- Definition of equilibrium implies that the profit from such a deviation must be less than sum of future discounted expected collusive profits *VD/(1-δ)*
- Formally, if

$$n-1-n\delta^4-n(1-\delta)\left[\pi^H\delta^2+\left(\pi^H\left(2-\pi^H-\pi^K\right)+\pi^K\right)\delta^3\right]\geq 0$$

then no communication-free SECE exists

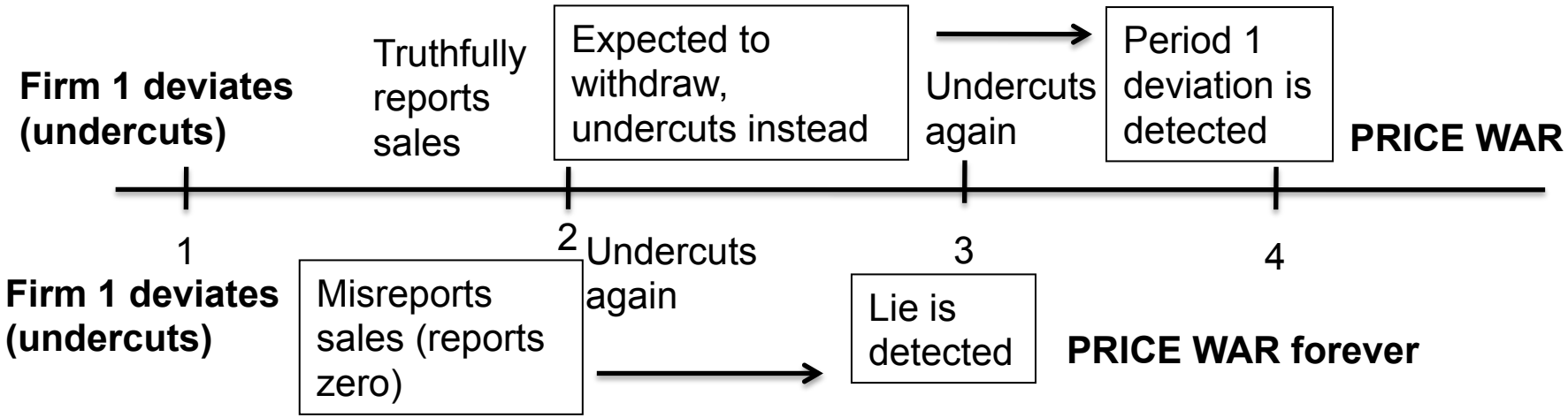
(π^H = probability that demand level is incompatible with biased demand)

A candidate SECE with communication

- A very simple candidate equilibrium
  - At the end of each period, all firms report their sales
  - If reports point to asymmetric sales, then lucky firm withdraws from market for *k* periods
  - Evidence of misreporting sales triggers a price war forever
  - Evidence of failure to comply with equilibrium triggers a price war forever
- Such an equilibrium allows for quicker retaliation against deviators while ensuring no price wars occur along equilibrium path

A candidate SECE with communication

Two alternative post-undercutting scenarios



- Communication reduces the number of possible profitable undercutting periods **from 4 to 3**, which decreases incentive to cheat
- Role of communication in SECE: a lucky firm would agree to withdraw but it cannot unless it is certain that its sales reflect an asymmetry rather than high symmetric demand – communication allows firms to do this, no incentive to lie

A candidate SECE with communication

- Technically, need to check that this is indeed an equilibrium
  - Incentive to truthfully report sales
  - Incentive to comply with 'self-punishment' in each of the *k* periods
  - Incentive not to undercut rivals given the prospect of withdrawal from market for *k* periods

$$n - n\delta^2 + n\pi^L\delta^2 < \delta^k \left(1 - \frac{(n-1)\pi^B}{n}\right)^k$$

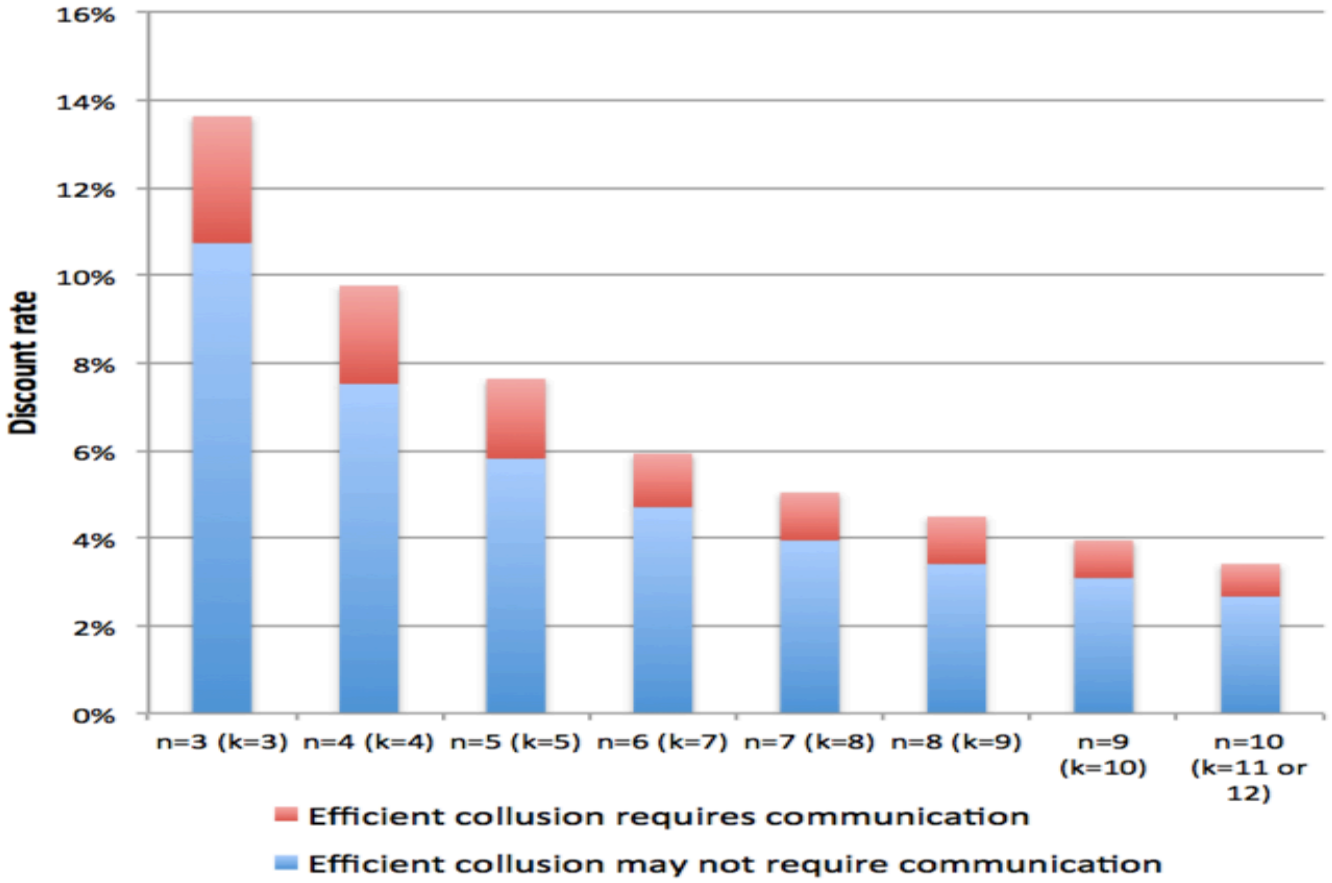
$$n - 1 - n\delta + \delta^{k+1} \left(1 - \frac{(n-1)\pi^B}{n}\right)^k$$

$$-\pi^H\delta \left(\delta^k \left(1 - \frac{(n-1)\pi^B}{n}\right)^k + n\delta - n\right)$$

$$+\pi^L\delta \left(1 - \delta^k \left(1 - \frac{(n-1)\pi^B}{n}\right)^k\right) + \frac{\delta^2\pi^B}{1-\delta}\left(1 - \pi^H - \pi^L\right) \quad < \quad 0$$

Main result

For some parameter values, there exists a symmetric efficient equilibrium if communication is possible whereas there exists none if it is not possible



Policy implications

- Exchanges of information on past own sales may facilitate collusion even if such communication is mere cheap talk in that it doesn't accelerate the disclosure of reliable data

- Findings carry over to the assumption that the data that become public with a lag are about total market sales (rather than individual sales)
  - Comparing total reported and actual sales is enough to detect a lie
  - The identity of the liar is not important since the continuation subgame involves a symmetric price war

- A possible test
  - Are market share swings systematically compensated by offsetting swings in subsequent periods, to an extent that cannot be explained by fundamentals (stochastic process generating demand function, firms' costs, intertemporal substitution, etc.)?