

# Coordinated Effects

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\*The views expressed are those of the author and do not necessarily reflect those of DG COMP or the European Commission

# Legal Definitions of Collusion

- n US Merger Guidelines (2.1): “ Co-ordinated interaction is comprised of actions by a group of firms that is profitable for each of them only as a result of the accommodating reactions of the others. This behaviour includes tacit or express collusion...”
- n The difference between explicit and tacit collusion is the lack of a formal procedure to communicate and settle on a particular collusive agreement, not a difference on the outcome.
- n EC Horizontal Merger Guidelines (§39): “A merger in a concentrated market may significantly impede effective competition, through the creation or the strengthening of a collective dominant position, because it increases the likelihood that firms are able to coordinate their behaviour in this way and raise prices even without entering into an agreement...within the meaning of Art. 81”.
- n In the EU: Tacit collusion  $\equiv$  Collective dominance

# EU Competition Policy Instruments

## Antitrust: Restoring effective competition

- n Article 81 to deal with direct communication and agreements leading to collusion - cartels. Evidence of intent and effect is required
- n Article 82 to deal with exploitative and exclusionary abuses of a collective dominant position

## Merger Control: Prevention

- n Prevent the reinforcement or creation of the necessary conditions required to sustain collusive behaviour.

# Collusion vs. Co-ordinated Effects

- n Need to distinguish:
  - Tacit (or explicit) collusion: a state where there is no or only rudimentary competition and
  - Coordinated effects, i.e. the change in the state of competition.
- n Definition of coordinated effects (EC Horizontal Merger Guidelines - §22):

“the merger may change the nature of competition [making firms] significantly more likely to coordinate and raise prices or otherwise harm effective competition. A merger may also make coordination easier, more stable or more effective for firms, which were coordinating prior to the merger”

# Bringing a coordinated effects case

n Must prove:

1. Collusion post-merger is possible and sustainable
2. There is a co-ordinated effect (i.e. the merger makes collusion easier, more stable or more effective)
3. Firms will reach an understanding on the collusive mechanism

(this last condition is the toughest)

1. Assessing whether collusion is possible and sustainable

# Collusion: Game theoretic foundations

- n Game theory is about strategic situations where the ultimate outcome depends on the actions of two or more players, so that what strategy is best for you depends on what you think the others will do.

# Two branches of Game Theory

- n Cooperative: binding commitments possible (e.g. pro-competitive agreements enforced by a court).
  - n Key issue: who to cooperate with and how to split the pie.
  - n Not appropriate to analyse oligopolistic competition (including cartels or other forms of collusion).
- n Non-cooperative: binding commitments not possible (e.g. collusion, whether tacit or explicit)
  - n Firms maximise their own profits (not joint profits)
  - n A “solution” to a non-cooperative game is a reasonable prediction of what each player would do given the circumstances (in particular the information structure and order of moves).
  - n Example: No player can benefit from choosing any alternative action given what he expects other players to do (Nash Equilibrium)



# Collusion

- n The theoretical explanation of collusion is based on the theory of (non-cooperative) repeated games:
  - n collusion can be an equilibrium in a repeated game if,
    - n the short run profit from deviating from the collusive behaviour is lower than the long run loss from being punished by the other firms after the deviation.
- n This applies both to tacit and explicit collusion

# One-shot competition

Firm 1 / 2	Compete	Collude
Compete	2 / 2	8 / 0
Collude	0 / 8	4 / 4

collusion is “almost” impossible in one-shot competition irrespective of the information structure and level of concentration

# Repeated interaction

- n Collusion emerges when firms interact frequently and conjecture that any attempt to undercut the collusive price will be detected and followed by tough retaliation from competitors.
- n The profit loss imposed on a deviant firm by retaliation must be sufficiently large to prevent the short-term benefits from “cheating” on the collusive arrangement;
  - n These short-term benefits, as well as the magnitude and likelihood of retaliation, depend in turn on the characteristics of the industry.

# Retaliation

- n Retaliation refers to the firms' reaction to a deviation from the collusive path. It can take many forms, some being more effective than others.
- n A simple form of retaliation consists in the breakdown of collusion and the restoration of "normal" competition and profits.
- n More sophisticated forms of retaliation may inflict tougher punishments and thereby allow sustaining higher collusive prices. (e.g. temporary price wars, selective actions targeted at reducing the profits of the deviant firm).
- n It must be in the best interest of the firms to carry on the retaliation once a deviation has occurred.

# Comparing gains and loses

- n Since retaliation arises in the future while deviations generate immediate profits, the ability to collude depends in turn on the relative importance of current profits compared to future profits in the firms' objective, as reflected by their discount factor.
- n 1 € in the next period corresponds to  $\bullet$  € in the present period.
- n If firms face no risk and have free access to a credit market with interest rate  $R$ , 1 € today corresponds to  $1+R$  € tomorrow and the discount factor is thus equal to  $\bullet = 1/(1+R)$ .

# Example

- n two firms produce the same good with the same unit variable cost  $c$ .
- n Price competition leads to  $p=c$
- n If they interact repeatedly they can set a collusive price  $p^c$  and each earn:

$$\frac{1}{2} \text{ of } \bullet C = (p^c - c) D(p^c)$$

- n ...by reaching a tacit understanding that any deviation from this price would trigger a price war (i.e. Back to  $p = c$ )

- n If firms have same discount factor by sticking to collusive price each earns:

$$\frac{\pi^C}{2} + \delta \frac{\pi^C}{2} + \delta^2 \frac{\pi^C}{2} + \dots = \frac{\pi^C}{2} (1 + \delta + \delta^2 + \dots).$$

- n If one firm deviates it captures all the collusive profit but in the future  $p=c$
- n Each firm sticks to collusive price if:

$$\frac{\pi^C}{2} (1 + \delta + \delta^2 + \dots) \geq \pi^C + \delta \times 0$$

$$\delta \geq \delta^* \equiv \frac{1}{2}.$$

$$(1 - \delta)(1 + \delta + \delta^2 + \dots) = 1 - \delta + \delta - \delta^2 + \dots = 1.$$

if firms' discount factor lies above the threshold, any collusive price can be sustained, even the monopoly price

# Assessing the sustainability of collusion

- n To measure the influence of the industry characteristics on the sustainability of collusion, we can look at how these industry characteristics would affect this critical threshold
- n A facilitating factor will reduce this critical threshold, while an industry characteristic that makes collusion more difficult will raise it.



# (Critical) Factors

- n Many competitors
  - n the long-run benefit of maintaining collusion is reduced as the pie is shared among many
  - n And the short-run gain from deviation increases,
- n Low entry barriers
  - n would erode the profitability of collusion.
  - n Firms lose less from retaliation if entry occurs anyway
- n Frequency of interaction (or of price adjustments)
  - n Allows firms to react more quickly to a deviation by one of them. Thus, retaliation can come sooner.
  - n Relatedly if purchases are lumpy the incentive to deviate is high.
- n Market transparency
  - n Allows to reach terms of coordination
  - n Allows to distinguish deviations from demand shocks

# (Influential) Factors

- n Demand growth
  - n today's profits are small compared with tomorrow's ones.
- n Innovation makes collusion on prices less easy to sustain.
  - n It reduces both the value of future collusion and the amount of harm that rivals will be able to inflict if the need arises.
- n multi-market contacts
  - n increases the frequency of the interaction
  - n it may allow softening asymmetries that arise in individual markets.
  - n may allow the firms to sustain collusion in markets where the industry characteristics alone would not allow such collusion.

# (More influential) Factors

- n Capacity constraints have ambiguous effects
  - n a capacity-constrained firm has less to gain from undercutting its rivals.
  - n capacity-constraints limit firms' retaliatory power.
- n Cost (and capacity) asymmetry (and quality differentiation)
  - n difficult to agree to a common pricing policy. Low cost firms want lower prices and higher market share
  - n the diversity of cost structures may rule out any "focal point" in pricing policies
  - n Low cost firms gain more from undercutting their rivals and have less to fear from retaliation from high-cost firms

# (More influential) Factors

- n Horizontal differentiation appears ambiguous.
  - n It limits the short-term gains from undercutting rivals, since it becomes more difficult to attract their customers
  - n It also limits the severity of price wars and thus the firms' ability to punish a potential deviation.
  - n But likely reduces scope of collusion: it is hard to infer the relevant information from their own prices and quantities
- n Structural links
  - n Cross-ownership reduces the gains derived from undercutting the other firm.
  - n a firm can punish a deviating partner by investing less in a joint venture

# Practical difficulties to establish the sustainability of collusion

- n The relevant quantities cannot be observed directly (collusive profits, deviation profits, punishment loses, discount rate)
- n Many factors affect these quantities (in different ways and to different degree). Most often, a given market will have some characteristics that facilitate collusion, and some that tend to hinder collusion.

## 2. Assessing co-ordinated effects

# What are co-ordinated effects?

The models of coordinated effects of mergers argue as follows.

- n The merger induces some structural market changes (e.g. the number of firms may decrease, firms may become more symmetric, or a maverick firm might be involved in the merger etc.).
- n These changes have an impact on the existence of collusive equilibria (i.e. they reduce the critical discount rate threshold above which collusion is sustainable).

- n E.g. if the punishment becomes more severe, the payoff after deviation will decrease.
- n Further, the profit from deviation will be smaller when there are fewer firms in the market (as e.g. in a Bertrand-model).

Due to these changes in the structural conditions, it is now "easier" to satisfy the condition for the existence of coordinated equilibria, i.e. the critical discount threshold has decreased.



# Facilitating factors unlikely to be affected by the merger:

- n Demand and product characteristics, market transparency or frequency of interaction
- n Exogenous entry barriers
- n Buying power (reduces the profitability of collusion and large buyers may be able to break collusion).
- n Existence of credible commitment not to deviate (e.g. MFC... but can be costly to retaliate)
- n Existence of credible commitments to retaliate (e.g. Meet competition clauses)

# Theories of harm involving coordinated effects

- n Mergers that may increase the sustainability of collusion by
  - n Reducing the number of participants
  - n Increasing symmetry: it is easier to collude among equals, that is, among firms that have similar cost structures, similar production capacities, or offer similar ranges and quality of products.
  - n Elimination of “maverick”
  - n Creating structural links
  - n Reducing incentives to innovate
  - n Increasing multi-market contacts
  - n Vertical mergers may increase transparency (e.g. regarding input demand) and increase entry barriers

3. How do firms reach a tacit understanding on the terms of coordination?

# The problem of multiple equilibria

- n The same market situation can give rise to many different equilibria.
- n In particular, the repetition of a static equilibrium of a one-shot game is also an equilibrium of the repeated game. Any collusive pricing equilibrium comes in addition to the standard static equilibrium.
- n Thus the fact that firms could sustain collusion does not mean that they actually succeed (we will come back to this)
- n Collusion is easy in theory (e.g. quantity competition, linear demand,  $R=12\%$  -> full collusion possible with 400 firms). Is it easy in practice?

# Ways to “meet minds”

- n Pareto superiority (market transparency and symmetry matter)
- n Cheap talk (announcements)
- n Status quo (e.g. value of incumbency in liberalised markets)
- n Regulation (e.g. price caps, standards)
- n Other focal outcomes
  - n Preserve price differentials
  - n Preserve market or capacity shares
  - n Customer categories
  - n Geographic regions

# E.g. Announcements

- n Jukka Härmälä (Stora Enso): "The industry's success over the next few quarters depends on capacity control in the markets."
- n "Stora Enso is committed to taking market related downtime. We took 205 000 tonnes of downtime in the first quarter this year and we intend to continue this if needed throughout the year"
- n Juha Niemelä, CEO of UPM-Kymmene: "We shouldn't aim at running machines full all the time"
- n Jan Reinås, CEO of Norske Skog, considers that:  
"for me, the most important thing about our industry right now is whether we can really prove that consolidation has led to better behaviour"

## Learning (through trial and error to collusion, Huck, Normann, Oechssler, 2004)

- n Trial & error process: Every time a player increases or decreases his output choice he checks whether this results in an increase or a decrease in profits.
  - n If it increases his profits the movement in this direction is continued. If it does not, it is reversed.
- n Simple:
  - n it requires fairly low cognitive effort of players.
  - n it does not require any information about rivals. actions or the payoff function of the game

## However...

- n Mergers may have a limited impact on the factors that help sustain collusion...and little influence on how firms select the collusive equilibrium
  - Ê In many cases, the set of equilibria remains virtually unchanged by a merger – coordination was possible premerger as it is postmerger. The likelihood of coordination has not increased significantly.
- n US and EU approach in these cases might differ