Collusion and horizontal agreements
Main ingredients of collusion

- Situation where firms set prices above the competitive level, which can be obtained either by explicit or by tacit collusion.
- But not so easy:
  - temptation to deviate (price just under the collusive price, take all the demand and make more profit);
  - need to detect deviation from the collusive price and identify it as a deviation;
  - Need to punish deviation.
- Each of these items raises difficult problems.
No need to talk!

- In many market circumstances, there is no need to communicate between firms to reach a collusive price.

- Tacit collusion: each firm understands that it is better to price high if the other firm prices high too.

- Problems of coordination may arise: on which price to focus? With explicit collusion contacts, coordination on a specified level of prices, quantities…

- Detection and punishment remain the same /explicit collusion.
Factors that facilitate collusion

• Analysis of the incentives to collude received by each firm: comparison of the profits under collusion/competitive behavior.
• Incentives depend on various factors that reinforce or lessen the propensity to collude.
• Structural factors, factors related to information, pricing rules and properties of contracts.
Incentives to collude (1)

\[ \Pi_i^c + \delta V_i^c \geq \Pi_i^d + \delta V_i^p \]

Where : \( \delta \) = discount factor, \( c \) = collusive, \( d \) = deviation, \( p \) = punishment, \( \Pi \) = profit, \( V \) = future value of profits.

\[ \Pi_i^d - \Pi_i^c \leq \delta (V_i^c - V_i^p) \]

\[ \delta \geq (\Pi_i^d - \Pi_i^c) / (V_i^c - V_i^p) = \delta^* \]

In order to have sustainable collusion, \( \delta \) has to be large enough : future has to matter
Incentive to collude (2)

• n identical firms, same discount factor δ, same unit cost c.
• At each period of time t, firms play non cooperatively.
• If they all charge the same price \( p \), they all share the demand at that price, i.e., each obtains \( D(p)/n \) and \( \pi_i = \pi(p)/n \)

• If firm \( i \) charges \( p_i < p_j \) for all \( j \), it takes all the demand and all the profit: \( D_i(p_i)=D(p_i) \) and \( \pi_i = \pi(p_i) \)

• If firm \( i \) charges \( p_i > p_j \) for all \( j \), then \( D(p_i)=0 \) and \( \pi_i=0 \)
Incentives to collude (3)

• Trigger strategies: at \( t = 0 \), all the firms charge the same collusive price (monopoly price) \( p_m \)
• At time \( t \), each firm sets \( p_m \) if all the others have set \( p_m \) at the previous period
• If one firm has set another price (deviation from the tacit or explicit price level), each firm sets \( p = \) marginal cost \( c \) (and makes 0 profit) forever (Bertrand competition).
• Collusion arises if no firm has an incentive to deviate, that is, if (symmetry):

\[
(1+\delta+\delta^2+\delta^3+\ldots) \pi(p_m)/n \geq \pi(p_m) + 0
\]

\[
[\pi(p_m)/n] \cdot [1/(1-\delta)] \geq \pi(p_m)
\]

Condition 1: \( \delta \geq 1 - 1/n \)

When \( n \) is small, \( 1/n \) is high and the condition is more easy to satisfy.
Structural factors (1)

• Collusion more likely, the smaller the number of firms:
  – Collusive profit: small share of the cake if many firms
  – Incentives to deviate ++ if many firms.
  – Cartels appear more easily in concentrated industries.

• Symmetry between firms favors collusion: more easy to coordinate.

• Entry: if entry easier, collusion more difficult to sustain.
  – If the entrant doesn’t pursue a collusive strategy: its prices are lower, it takes market share to the collusive firms who must reduce their prices.
  – If it does, since a higher number of firms makes collusion less likely, entry reduces the incentives to collude.
Structural factors (2)

• Cross ownership: makes objectives of the firms less conflicting.

• Regularity and frequency of orders:
  – in public market, an unusually large order gives a strong temptation to deviate to obtain the market;
  – High frequency of orders: allows a timely punishment in case of deviation.

• Buyer power: a strong buyer
  – can stimulate competition between sellers,
  – can break collusion,
  – can design procurement auctions so as to minimize the risk of collusive behaviour among suppliers.
Structural factors (3)

• Demand elasticity:
  – if demand very elastic, a price cut increases demand ++.
  – Both true:
    • for deviations (deviation is more likely to occur, so that a high elasticity discourages collusion)
    • And for punishment (that becomes less costly for the non deviating firms, which favors collusion)
  – Affects both sides of the incentive constraint
  – Overall effect: ?
Structural factors (4)

• Dynamics of demand: demand shocks upward or downward may affect collusion.
  – Upward shock: may give an incentive to deviate to benefit from an increased transitory demand
  – If permanent shock: then better wait in order to enjoy a large collusive profit

• Product homogeneity: affects both sides.
  – Products more homogenous: deviation allows to capture a more important share
  – But punishment is more efficient.

• Symmetry: facilitates collusion (easier to find an arrangement)
Structural factors (5)

- Multi-market contacts: more costly to deviate on one market, because punishment on many markets.
- Inventories and excess capacities: if no excess capacity, then deviation unprofitable (impossible to answer additional demand):
  - In an industry where capacity are fully employed, collusion more probable.
  - If no inventories, collusion more probable.
Information

• Observability of firms’ behavior affects collusion.
  – Risks of secret prices cuts: how then to detect collusion?
• Major problem: when a firm observes that its demand shrinks, is it due to a deviation by another firm or to a general decrease in demand?
• Depends on the characteristics of the demand
Collusion, observability and demand shocks (1)

• Haltiwanger and Harrington (1991)
• « Collusion is more likely to fail during demand falls ».
• If a firm observe a fall in the demand addressed to it, and if it is unable to observe if this is due to a deviation or to a general fall in demand, then it should return to the competitive equilibrium (i.e. punish a possible deviation).
• Then collusion is more likely to disappear during periods where there are negative shocks on demand.
Collusion, observability and demand shocks (2)
Rotemberg and Saloner (1986)

• Demand may be low or high,
• More incentive to deviate when demand is high: then more profit to gain.
• Collusion is less likely to hold during high demand periods.
• In practice, it is often observed that collusion begins during period where there is a decrease in demand (defensive cartels).
Practical problems

• It seems indeed to be not so easy to sustain collusion for a long period of time.
  – Incentives to deviate are strong (and often unobservable).
  – Incentives to retaliation are often weak (because it is costly for the firm who punish).

• Firms often build sophisticated mechanisms in order to detect and punish deviations from the collusive equilibrium.
Practical problems

• These difficulties make it often difficult for competition authorities to prove that there is a risk of tacit collusion, because it requires to prove 1) that detection and identification of deviations are possible; 2) that retaliation is possible and will be implemented.

2) may be difficult for example if long term contracts.
What should be considered legal/illegal?

1. Standards of proof: market data/hard evidence of collusion?
   - Collusion results in high prices.
   - Analysis of the price level in an industry and if they are high, consider them as collusive?
   - No!
     - Price data may not be available;
     - Could be disagreement on the monopoly price: sellers may have different views.
     - If there is an agreement on this monopoly price, how close the observed price should be in order to be considered collusive?
     - Dangerous principle: high prices can result from market power, which is not by itself illegal!
What should be considered legal/illegal?

• Rather than the level, the evolution of prices?
• « Parallelism of behavior » : sellers charge similar prices over time.
• But this may result from a common factor, like the increase of the price of an input.
• If a seller increases its price of 10% one day, it may be individually rational to do the same.
• A tacitly collusive behavior may consist in staying on its own market to avoid aggressive behavior from the other firm.
What should be considered legal/illegal?

• «Parallelism + »: parallelism of prices plus other facilitating factors (RPM, best price clauses, exchange of information…)
• Existence of periods of price war: reveals collusion?
• Price wars are usually part of the functioning of a cartel, but can also be due to other causes.
• Inferring illegal price collusion from market data is not desirable.
• Hard evidence should be required: dawn raids to obtain documents....
Ex ante measures against collusion (1)

- Fines: should be computed in order to discourage collusive behavior, that is,

\[ \pi^{\text{coll}} - pS \leq \pi^{\text{conc}} \text{ and } S \geq \frac{\pi^{\text{coll}} - \pi^{\text{conc}}}{p} \]

- S should not only deprive the firm from its anticompetitive profit, but also take into account the probability of detection p.
- The higher p, the lower S needs to be.
- A policy against collusion is defined by (S, p) that are substitutes.
Ex ante measures against collusion (2)

Black list of facilitating practices

• Business practices that should be forbidden
  – Exchange of disaggregate information about prices and quantities;
  – Co-ordination among firms aimed at harmonising business practices that increase observability of actions among sellers but not for buyers: best price clause, ..
  – Minority shareholding?
  – RPM (debate)
Ex ante measures against collusion (3)

- Auction design: players can use their bids to signal their collusive intention in simultaneous ascending auctions;
- An appropriate auction design can prevent this problem: anonymous bidding
- Merger analysis and control (see further)
Ex post measures against collusion

• Dawn raids (surprise inspections)
• Leniency programs: since competition authorities hardly observe the collusive behavior, they can « buy » information by granting immunity to firms that give information on cartels they are involved in.
• Many cases for leniency.
Ex post measures against collusion (2)

• Automatic and total immunity for firms that report evidence of a cartel before any investigation has begun, provided that the firms terminates its participation to the collusive behavior;

• Partial immunity for firms that come after an investigation has started if they bring evidence that allow to characterise the practices.

• Allows the competition authorities to save resources and discourages collusion.
Effects of leniency policy

- Potential effects are twofold:
  1) Ex ante: before entering a cartel, a firm should take into account the fact that another firm can reveal the existence of the cartel. This increases the probability of the cartel and reduces the incentives to collude.
  2) Ex post: once a firm has entered a cartel, it can always avoid fines by coming forward. Makes collusive behavior more profitable.

- The first effect dominates: leniency programs have allowed a better detection of collusive practices since they are implemented.