

# Agenda

Advancing economics in business

## The ties that bind: when is retaliation effective and credible for tacit collusion?

**Retaliation against cheaters is an important condition for tacit collusion or coordination between rival companies to be sustainable. The assessment of retaliation mechanisms is therefore a key stage in testing for coordinated effects in merger inquiries or other types of competition investigation where tacit collusion decisions may be of concern. In what circumstances are these mechanisms effective and credible?**

Retaliation or punishment is a means by which members of a cartel can ensure that other members do not deviate from the agreed price or output. The existence of such a mechanism is critical if the cartel is to be sustained over time. The harsher the punishment (with other factors remaining constant), the less likely the firms are to deviate from the collusive outcome.

This holds both for explicit cartels—those normally outlawed by competition law—and for ‘tacit’ collusion or coordination. Coordinated behaviour is usually not prohibited as such under the competition rules if no explicit communication is involved (with some exceptions—eg, in Spain), but is of relevance to the assessment of the degree of competition in other contexts, particularly merger control. Coordinated behaviour is one criterion under the ‘substantial impediment to effective competition’ (SIEC) test under the 2004 EC Merger Regulation (139/2004)—ie, a merger can be prohibited if it is deemed to lead to a market structure that is conducive to coordinated effects.

The standard of proof for the existence of a retaliation mechanism within the EU merger control rules was unclear until 2002. The legal precedent was set in the context of the merger of tour operators Airtours and First Choice. As part of the merger assessment in 1999, the European Commission argued that it was not necessary for it to consider the existence of a retaliation mechanism to assess the possibility of coordination post-merger.<sup>1</sup> However, the Court of First Instance (CFI) revisited the Commission’s decision in 2002 and disagreed with this conclusion, ruling that assessment of the possibility of retaliation is important when analysing the stability of coordination:

The fact that there is scope for retaliation goes some way to ensuring that the members of the

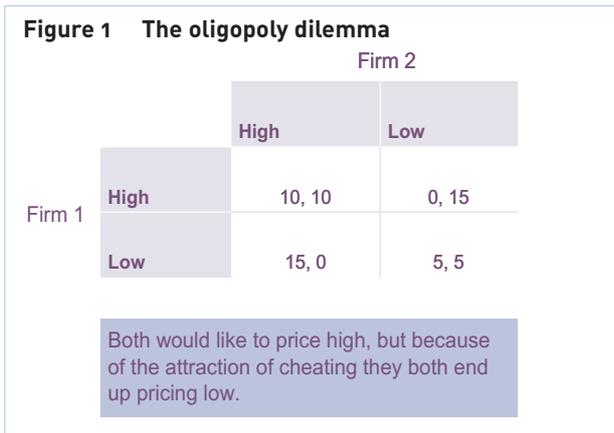
oligopoly do not in the long run break ranks by deterring each of them from departing from the common course of conduct.

In that context, the Commission must not necessarily prove that there is a specific retaliation mechanism involving a degree of severity, but it must none the less establish that deterrents exist which are such that it is not worth the while of any member of the dominant oligopoly to depart from the common course of conduct to the detriment of the other oligopolists.<sup>2</sup>

The CFI’s assessment showed that, in the *Airtours* case, there was little possibility of retaliation in the market (see box below for further details of this case). This article discusses the economic theory behind the notion that the existence of a retaliation mechanism is necessary in sustaining coordination, and sets out the factors that need to be taken into account when assessing the scope for retaliation. It is also shown that retaliation and punishment in economic theory are actually often not mechanisms as such, but rather are simply carried out through a reversion from the collusive to the competitive outcome.

### Role of punishment in sustaining tacit collusion

In the context of the joint dominance test, competition authorities assess whether it would be possible for firms to coordinate their behaviour tacitly (ie, without an explicit agreement) to enhance their joint position. Such an arrangement may be difficult to sustain in practice because the participating firms have an incentive to deviate from the collusive outcome. This incentive can be demonstrated using economic principles.



**Tacit coordination**

In the simplest scenario there are two firms in the market (firm 1 and firm 2). Each recognises that the volume of its output and profit depends on its own price and that of its competitor. The firms are given one chance to set their prices (this is known as a ‘one-shot’ game). The payoffs of each pricing decision are shown in Figure 1.

If both firms price high (ie, collusive behaviour), they will each receive a payoff of 10. However, if firm 1 prices low while firm 2 prices high, firm 1 will capture the whole of the market and obtain a payoff of 15, while firm 2 earns zero profit. The reverse outcome would be expected if firm 2 prices low and firm 1 prices high. If both firms price low (ie, a competitive oligopoly situation), they each achieve a payoff of 5, which is lower than the collusive outcome.

Figure 1 shows that both firms could obtain higher profits by colluding (ie, both pricing high) rather than competing (ie, both pricing low). However, there is a strong incentive to deviate from the collusive pricing and price low. In technical terms, pricing low is the ‘dominant strategy’ for both players, as it is always the best response to whatever the other player does. As a result, the only attainable (stable) outcome in this game is for both firms to price low, which is the competitive (non-coordinated) outcome. Bad news for the oligopolists, good news for consumers—so far.

**Repeated interaction**

If the firms set their prices repeatedly (ie, they compete with each other over and over again for a long period of time), they are able to (tacitly) communicate their intention to collude with each other over time.<sup>3</sup> This is where strategic interaction and signaling between oligopolists comes in. As a result, a collusive outcome (high, high) may be attainable over a longer time period. However, it is important to note that each firm will continue to have a strong incentive to deviate from the collusive behaviour. In order to sustain the collusion, the firms must have in place a punishment mechanism, such that when other participants detect a deviation they will

be able to punish the cheater by returning to competitive behaviour. The question that arises is how harsh the punishment should be to deter a firm from deviating. This relates to the **effectiveness** of the punishment mechanism.

An interesting observation from Figure 1 is that participants cannot punish the cheater directly by, for example, reducing only the cheater’s profit to zero. Instead, they have to rely on the interdependency between their own price and output decision (and their payoff) and the cheater’s payoff. Firms can expand their production, reduce their prices or increase their advertising to win customers from the cheater. Thus they would punish themselves as well as their rival. For example, in Figure 1, if firm 1 cheats, firm 2 has to lower its own price from high to low in order to retaliate. As a result, the payoff of firm 2 is also affected. Therefore, the question that needs to be addressed is whether participants in the tacit collusion would be willing to retaliate when they detect a deviation if there are (potentially negative) implications for their profits. This relates to the **credibility** of the punishment mechanism.

The remainder of this article discusses the conditions that make punishment mechanisms effective and credible. The box below demonstrates their assessment by the CFI in practice.

**Effectiveness of punishment mechanism**

How can participants in a coordinated oligopoly ensure that a punishment is sufficiently harsh to prevent any future deviation? This question can be answered by examining the incentive to cheat.

In the presence of a punishment mechanism, when faced with the decision of whether to deviate, a firm will compare the gains from the short-term deviation (ie, before retaliation) with the losses it will incur following the punishment. Two factors are therefore important in the decision to deviate.

- **The relative sizes of the profits arising under the collusive and non-collusive outcomes.** A firm will have a strong incentive to cheat if the gains from deviation are greater than the future losses (compared with the collusive outcome) it will incur when all firms revert to competitive behaviour (assuming that such reversion to pricing low is the strategy followed by all firms—this is a kind of ‘tit-for-tat’ strategy). Using Figure 1 as an example, in the collusive equilibrium firm 1 has a payoff of 10. However, if it cheats, it can increase its payoff by 5 (to 15) in each period before firm 2 retaliates. Following the retaliation, firm 1 will only obtain a payoff of 5 in each period of retaliation.

**The retaliation mechanism in *Airtours/First Choice***

The effectiveness and the credibility of the punishment mechanism were addressed by the CFI in the *Airtours/First Choice* merger. The European Commission had concluded that the tour operators competed with each other on a range of aspects of capacity (eg, hotel rooms and flight seats). Thus, if a deviation were detected, the firms could expand their capacity. This would increase supply in the market and therefore lower the prices that all competitors (including the cheater) are able to charge. Furthermore, vertically integrated travel agents/tour operators could punish a particular tour operator (eg, *Airtours*) by engaging in ‘directional selling’. This takes place when the travel agents have a preference for the product of a particular supplier (often the ‘in-house’ tour operator) over other products.

The CFI tested the effectiveness of the punishment mechanism, and found that it was not effective in preventing deviation for the following reasons.

- Delayed detection. The tour operators had to purchase capacity at least one year in advance (the planning stage), making it less visible to other tour operators. It

would therefore be difficult to detect a deviation from agreed capacity in sufficient time.

- Delayed retaliation. The rivals could increase capacity only one season after the deviation, reducing the effectiveness of retaliation. Furthermore there was a limit to which the rivals could extend their capacity in the short run (ie, within the same holiday season) and the extra capacity was likely to be of poor quality.
- The ineffectiveness of directional selling. The CFI found that only 16% of *Airtours* sales could be affected by directional selling, making it a less effective punishment mechanism.

Furthermore, the CFI questioned the credibility of such retaliation. It found that the tour operators had little incentive to carry out costly retaliatory actions. The product in the market was a perishable good. Thus, excess capacity could not be stored and could have had a significant negative impact on the profitability of the tour operators. As a result, the decision to expand capacity would not be taken lightly.

- **The relative weight placed on future profits compared with short-term gains.** If the firm places more weight on the current profits (ie, short-term gains from deviation) than on future losses resulting from the punishment (ie, the firm has a high discount rate), it is more likely to deviate. Friedman (1971) found that if firms place enough weight on the future (ie, they have sufficiently low discount rates), coordination will be sustainable regardless of the ratio of the gains from deviation to the losses from punishment.<sup>4</sup> This is because if the firm’s discount rate is sufficiently low, the weighted losses from punishment will always outweigh the short-term gains from deviation.

Thus, a punishment mechanism is effective if it increases the present discounted value of future losses above the short-term gains from deviation. There are two dimensions to punishment: severity and timing. It is important that the punishment follows the detection quickly, as this reduces the gains from deviation. Some industry characteristics may affect the effectiveness of retaliation in a particular market—a selection of these characteristics is provided in Table 1.

It is important to note that some of these factors also affect the incentive to deviate. For example, if market demand is elastic then a firm can capture a large number of customers by deviating from the collusive

**Table 1 Effect of market characteristics on the effectiveness of retaliation**

Characteristic of a market	Severity of retaliation
Frequency of orders	Frequent orders enable retaliation to take place soon after deviation. This reduces the gains from deviation. Furthermore, the cheater can observe the link between deviation and punishment (if retaliation is delayed, this can be difficult)
Elasticity of (market-level) demand	If market demand is elastic, the punishment will be more severe. This is because a small price reduction by participants results in a large increase in volume sold
Demand growth	If demand is expected to grow in the future, retaliation is more severe. This is because the cheater will lose higher future profits after retaliation
Homogeneity of products	Punishment is more effective in homogeneous products. If the punisher lowers the price, more customers will switch from the cheater if products are identical
Symmetry of firms	The punishment is generally more severe if the punisher is large and the cheater is small
Multi-market firms	If both the punishers and the cheater operate in more than one market, the punishment is more severe as it can extend to multiple markets
Inventories and excess capacity	Retaliation is more severe in industries with excess capacity. This is because the punishers are able to expand the output significantly and quickly

Source: Motta, M. (2004), *Competition Policy: Theory and Practice*, Cambridge University Press.

price. Therefore, it may be difficult to predict the combined effects of these factors on the feasibility of tacit collusion.

## Credibility of punishment

Once the deviation has been detected, how willing to retaliate will the firms be if this retaliation has the potential to negatively affect their profits? As with a firm's decision to deviate, the decision to punish will be determined by the relative sizes of losses from punishment and the profits from returning to collusive behaviour. If losses from punishment outweigh the profits from returning to collusive behaviour, the firm will choose not to punish. There are two forms of punishment which can be credible.

The first is a trigger strategy. This takes place when, following the detection of a deviation, all firms return to a competitive oligopoly equilibrium thereafter. This can be illustrated with the example of the 'prisoners' dilemma' in Figure 1. If firm 1 is pricing high and firm 2 is cheating and pricing low, the firms have payoffs of 0 and 15 respectively. Thus, it is profitable for firm 1 to punish firm 2 by pricing low in the periods after the cheating because its payoffs will increase from 0 to 5. In addition, the profits of firm 2 will fall from 15 to 5 for those subsequent periods. Thus, the reversion to the competitive equilibrium is profitable for all participants except for the cheater (compared with the situation where there is cheating). As a result, firm 2 is aware that it is profitable for firm 1 to punish it, which makes the threat of punishment credible.

However, this might not always be the case. Some types of collusion can only be sustained with a harsher punishment. For example, firms might decide to price at cost (ie, achieve zero profits) in order to drive the cheater's profits to zero. However, once the deviation has been detected, what incentive will the firms have to carry out the punishment?

This type of punishment can be credible if it takes the form of a 'carrot and stick' strategy. It involves imposing a harsh punishment (harsher than returning to the competitive situation) on all firms when a deviation is detected. However, all firms revert back to the collusive equilibrium after the punishment has taken place. In this case, firms have an incentive to participate in the punishment as they expect the future gains from collusion to outweigh the losses from punishment. Abreu (1986, 1988) and Abreu, Pearce and Stacchetti (1986) discuss a credible carrot and stick retaliation mechanism, in which all firms must participate in the punishment before they can revert to collusive behaviour.<sup>5</sup> In this case, if one firm does not participate in the punishment, this is in itself

deemed a deviation from the collusive outcome and subsequently triggers another punishment phase.

In practice, deviation from collusive behaviour can be difficult to detect. A change in a rival's price could be due to an increase in its costs, for example, rather than a conscious decision to deviate from the collusive behaviour. However, to prevent any deliberate deviation, the firms must impose a punishment. Green and Porter (1984) describe a model in which firms agree on a specific price (a trigger price), such that when the market price falls below it they enter into a price war and then revert to collusion after the punishment phase.<sup>6</sup> This strategy is credible in certain circumstances. However, it may lead to price wars when demand is low and the market price falls below the trigger price. This is despite the fact that firms have little incentive to deviate in periods of low demand, since they will be sacrificing high profits in the future.

## Conclusion

Economic theory has most to say about coordination—and punishment—through pricing. In specific cases, there may be other, non-price, mechanisms that can be used to help sustain tacit collusion. An example of such a non-price punishment mechanism is the one investigated in the music recording joint venture between Sony and Bertelsmann Music Group (BMG). The European Commission's decision suggested that other major recording companies could punish the 'cheater' by excluding it from their compilation albums or refusing to license tracks for compilation albums released by the deviator.<sup>7</sup> This punishment could be significant as multi-artist/labels compilations account for approximately 15–20% of the overall market for recorded music. The Commission, however, found no evidence of such behaviour in the periods following what it considered a deviation from the common pricing policy.

In the context of a merger, when the assessment of the punishment mechanism takes place it is important to examine both sides of the punishment mechanism—the effectiveness of the punishment threat in preventing deviation, and the willingness of firms to punish the cheater once deviation takes place.

- The condition for an effective punishment mechanism is that the losses (compared with the collusive position) in the long run outweigh the short-term gains from deviation.
- For a punishment mechanism to be credible, the profits from reverting to the collusive equilibrium must outweigh the short-term losses that a firm imposes on itself in order to punish the deviator.

Assessment of these conditions might not be straightforward in practice, however. If a qualitative approach to assessment is employed, a number of assumptions are required.

- **Time period before retaliation.** How long is too long for retaliation to be effective? In the *Airtours* decision, the CFI concluded that the punishment one season after deviation was not sufficiently timely to make it effective.
- **Strength of punishment.** How harsh is sufficiently harsh to prevent deviation? In the *Airtours* case, the CFI concluded that the expansion of capacity by up to 10% by other firms would not impose a sufficiently effective deterrent to deviation.

- **Credibility of punishment.** How substantial are the self-imposed losses from punishment before firms decide not to retaliate? In *Airtours*, the CFI assumed that a capacity war in one season would be sufficiently costly for firms to prevent them from punishing the cheater in the event of deviation.

The CFI's *Airtours* assessment based on these assumptions led it to conclude that the retaliation mechanism was not sufficiently effective to sustain long-term coordination. More importantly, this judgment laid the foundations for the current approach to coordinated effects—and punishment mechanisms in particular—that is followed by European competition authorities.

<sup>1</sup> Case No IV/M.1524 - *Airtours/First Choice*, September 22nd 1999.

<sup>2</sup> Case T-342/99, *Airtours plc v Commission of the European Communities*, June 6th 2002, paras 194–95.

<sup>3</sup> The interaction must be repeated indefinitely or a very large number of times. Alternatively, the participants must not know when the interactions are to stop.

<sup>4</sup> Friedman, J.W. (1971), 'A Non-cooperative Equilibrium for Supergames', *Review of Economic Studies*, **28**, pp. 1–12.

<sup>5</sup> Abreu, D. (1986), 'Extremal Equilibria of Oligopolistic Supergames', *Journal of Economic Theory*, **39**, pp. 191–225; Abreu, D. (1988), 'On the Theory of Infinitely Repeated Games with Discounting', *Econometrica*, **56**, pp. 383–96; Abreu, D., Pearce, D.P., and Stacchetti, E. (1986), 'Optimal Cartel Equilibria with Monitoring', *Journal of Economic Theory*, **39**, pp. 251–69.

<sup>6</sup> Green, E.J. and Porter, R.H. (1984), 'Noncooperative Collusion Under Imperfect Price Information', *Econometrica*, **62**, pp. 87–100.

<sup>7</sup> Case No COMP/M.3333–*Sony/BMG*, July 19th 2004, para 115.

If you have any questions regarding the issues raised in this article, please contact the editor, Derek Holt: tel +44 (0) 1865 253 000 or email [d\\_holt@oxera.com](mailto:d_holt@oxera.com)

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