frontier economics

Bulletin

MARCH 2009

Games people play

INSIGHTS INTO TACIT COLLUSION

Economic theory helps us to identify the factors that may influence the success of a tacit cartel – so-called co-ordinated effects in merger cases. But there is little guidance on which factors are most important. To fill this gap, Frontier has developed an interactive "collusion game". This bulletin shares the insights we have gained from playing the game with teams of regulators, lawyers and economists.

In concentrated markets, or following a merger that increases concentration, competition authorities are on the look-out for "co-ordinated effects" or "collective dominance" – legal names for the economic concept of tacit collusion. The concern is that, even without an explicit cartel, firms will be able to co-ordinate their behaviour and so blunt the force of competition.

Tacit collusion has traditionally been analysed by going through a "checklist" of factors thought to facilitate co-ordination. This list has its roots in the economic theory of collusion: on it, therefore, one finds such features as market

→

concentration, repeated interaction, product homogeneity, transparency, stable demand, symmetric firms, barriers to entry, and so on.

However, such an approach took a knock in 2001, when the decision by the European Commission (EC) to block the Airtours/First Choice merger because of concerns about collective dominance was overturned by the Court of First Instance (CFI). In its judgment, the CFI described the need to put some structure around the checklist by identifying conditions necessary for collusion; and the number of collective dominance cases brought by the EC fell. However, they have recently increased again, most notably with respect to the Sony-BMG merger (where the EC ultimately concluded there were no concerns). Despite this activity, there remains a lack of practical guidance as to the relative importance of different checklist factors. If some indicate tacit collusion, but others do not, which way should the decision go?

IT'S ONLY A GAME

To illuminate the debate, we developed a game designed to test players' ability to co-ordinate their behaviour in different market conditions. The basis of the game is a "prisoner's dilemma": players' collective interests are served by co-operating, but individual players can gain by cheating at the expense of their rivals. (In the classic version of game, a prisoner gets off scot-free by testifying against a fellow prisoner, but only if that behaviour is not reciprocated.)

Our game is a simplified version of the complex real-life interactions between firms. At each point it offers the two players, or teams, only two choices: to price "high" (i.e., collude) or "low" (i.e., cheat). Like prisoners in separate cells, no team knows what the other chooses to do until afterwards. But, as the figure shows, the pay-off depends on how the competing team behaves.

	Y colludes (prices high)	**Y cheats** (prices low)
X colludes (prices high)	**Successful collusion** *(10,10)*	**Y steals the market** *(-5,20)*
X cheats (prices low)	**X steals the market** *(20,-5)*	**All-out competition** *(0,0)*

Pay-offs for team X and Y (X,Y) in Frontier's version of the traditional "prisoner's dilemma" game

If such a game is only played once, both teams have the incentive to price low, whatever rivals do. But if the same game is repeated, building a reputation for co-operation may benefit both teams, since "cheating" is discouraged by the prospect of retribution. Playing this same game over many rounds mirrors the real world, in which firms may face continuing competition from the same rivals.

All our participants started by playing the basic game. Two teams played each other for 10-20 rounds (the number was not revealed in advance). At the end of each round, the teams found out what their opponents chose last time, and could

respond accordingly. This made it possible for a tacit "price high" understanding to develop, together with the ability to punish "cheats".

However, in 60% of these basic games, one or other team cheated in the first round. After getting off on the wrong foot, teams achieved successful collusion in only a few subsequent rounds. When co-operation was achieved in the first round, there was greater opportunity to develop a tacit understanding – collusion was attempted in half of all subsequent rounds and those attempts were successful two-thirds of the time. Still somewhat short of perfect collusion, teams' strategies were often passive-aggressive: collusion in the early rounds was followed by cheating when teams anticipated the game was about to end.

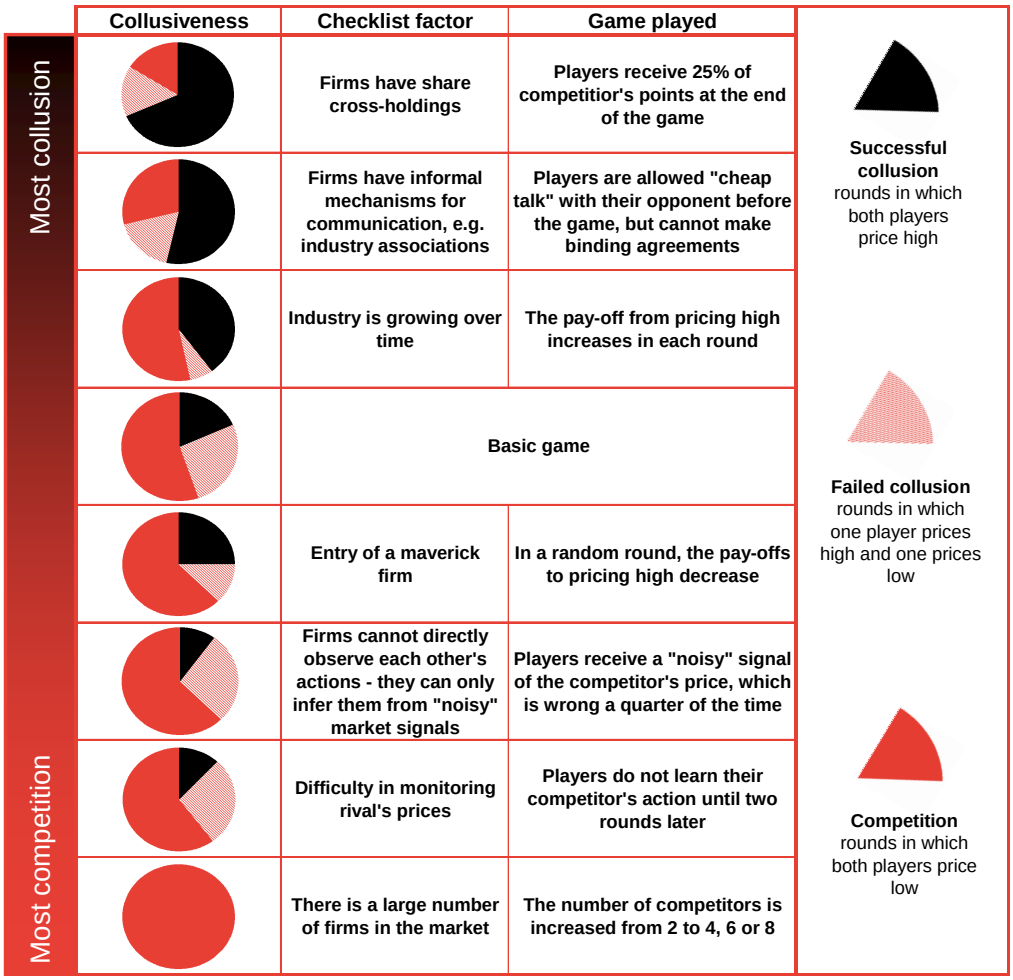
CHECKING THE CHECKLIST

Our teams were then asked to play variants on the basic game, each time against a different opponent, to explore the influence of different checklist factors. Some, such as product heterogeneity, multi-market contact and technological differences, were beyond the scope of simple modifications to the game; but many, such as transparency, market growth, market concentration and maverick entry, were possible to mimic. The table overleaf shows our results.

In one version, competitors have shareholdings in each others' firms. The incentives to collude are greater, since a deviation that hurts your opponent also, to some extent, hurts you; participants achieved collusion in about two-thirds of the rounds. Another variant models rising demand by increasing the benefits of collusion in successive rounds. Here too, there was more collusion – achieved twice as often as in the basic game. Allowing teams "cheap talk" – a non-binding conversation before the game – also boosted collusive behaviour significantly.

Other variants of the game were less conducive to collusion. In one we involved every team, mimicking a market with six to eight firms in it. Successful collusion required every team to decide to price high in the same round. In practice, we found not one team prepared to price high in any round. In a less extreme case, we simulated the risk of market entry by a single "maverick" firm, by warning players that the pay-offs from pricing high would be cut at a randomly-chosen point in the game. The result was intriguing: there was more out-and-out competition than in the standard game but also more successful collusion before entry of the maverick firm. Players were attempting to make hay while the sun shone.

Market transparency features high on the authorities' checklist, and it is not hard to see why. Suppose firms set high list prices but use off-invoice discounts. It might take a firm some time to learn that it was being under-cut. Such a situation makes firms nervous that they are being cheated on without knowing it. To mimic this kind of market, each team was only told what its competitor did after another two rounds. The prospects for successful collusion fell dramatically.



CONCLUSION

So which were the key factors? Three stood out: the number of players and a lack of market transparency both diminished the prospects for collusion, while formal or informal links between firms boosted its prospects. However, the results also illustrate the extent to which establishing co-operation depends on the semi-random chances that nervous players will make the same call. As in the real world, "cheating" could be perpetuated when, after one decision to price low, would-be colluders felt it was too late to go back.

Moreover, the game may overstate the likelihood of collusion by offering only two price choices. In the real world, each player may be faced with a wider spectrum of pricing possibilities, and the chances of both hitting of the same "collusive" price would be correspondingly less. Nonetheless, the games tellingly illustrate the way in which certain factors on the checklist are most likely to influence the results.

CONTACT	**David Parker** david.parker@frontier-economics.com
	David Foster david.foster@frontier-economics.com
	Frontier Economics Ltd
	FRONTIER ECONOMICS EUROPE BRUSSELS | COLOGNE | LONDON | MADRID
	www.frontier-economics.com