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**Incomplete cartels and antitrust policy : incidence and detection**

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# 6

## Summary and Conclusions

“The important thing is not to stop questioning.” – Albert Einstein<sup>1</sup>

### 6.1 Introduction

Standard economic theory of collusion typically presumes cartels encompass all firms in the industry. In practice, however, many cartels did not control all industry supply. In this dissertation, we have analyzed such incomplete cartels from an economic theoretical perspective. We have examined the nature of incomplete cartels and explored ways in which economic theory can be used to detect (incomplete) cartels. In this concluding chapter, we summarize the main findings of this thesis and draw some implications for antitrust policy. Additionally, we outline avenues for future research.

### 6.2 Main Findings

The first main research question that has been addressed in this thesis is: What explains optimal cartel size to be less than maximal? Existing theories of incomplete cartels indicate that the full cartel might not be stable. In many oligopoly models, undertakings that do not take part in a cartel earn more profits than those which form the coalition. This is partly due to the fact that a cartel creates positive externalities for non-conspirators. The price increase and output reduction of cartel members provides an incentive for outsiders to increase production and to charge a higher selling

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<sup>1</sup>See [www.quotationspage.com](http://www.quotationspage.com).

price. Fringe members therefore enjoy the benefit of higher industry prices, but do not incur the cost associated with a reduction in sales. However, no cartel will emerge if every firm expects its rivals to collude. As a result, quite a few theories predict the equilibrium cartel size to be the minimum cartel size that is required to sustain some collusion.

In this dissertation, we have provided an alternative explanation for the existence of incomplete cartels. In a price setting supergame in which firms differ in terms of production capacity it is shown that the full cartel is stable when collusive gains are allocated properly. Consequently, instability of the full cartel is no explanation for the existence of incomplete cartels in this setting. Yet, to establish this particular cartel arrangement typically requires explicit communication between firms, which implies that cartelizing is costly. Arguably, these (expected) costs of colluding are increasing in the number of participants. Under very general conditions, we have shown that the optimal cartel size is not all-inclusive when colluding is costly and the smallest firm in the industry is sufficiently small. Thus, when taking account of the cost of cartelizing, the most profitable anticompetitive agreement can be a cartel with less than one hundred percent market share.

The second major research topic concerns the question: What are the traits of those firms that form the cartel? Descriptive cartel studies suggest that large firms are more inclined to join a cartel. However, existing theories of incomplete cartels remain largely silent about this issue. This is essentially due to the fact that most contributions assume identical firms. In the model presented in this thesis, firms are characterized by their capacity stock, which is taken as a proxy for firm size. We have established a positive correlation between the incentive to collude and firm size. In particular, a sufficiently small seller lacks the incentive to take part in any conspiracy, while a sufficiently large firm always has an incentive to join a cartel. A cartel comprising the largest firms is shown to be a subgame perfect equilibrium of the game, but this equilibrium is not guaranteed to be unique. Additionally, it has been shown that, under certain conditions, firms have an incentive to form the cartel for which total profits are highest. Free-rider incentives might therefore not be as strong as in symmetric oligopoly models. As a consequence, the equilibrium cartel size can be larger than the minimum cartel size required to sustain some collusion.

As to the third main research question, conclusions are less clear-cut. We conjectured that certain industry structures are particularly conducive to the formation of incomplete cartels. The analysis suggests that in industries in which the size distribution of firms is asymmetric and in which one or more sellers are small, optimal cartel size is likely to be less than all-inclusive. However, the possibility of an incomplete cartel in industries with a more or less equal division of production capacity cannot be excluded. What cartel size can be considered optimal will in part depend on the magnitude of the cost of cartelizing, but these are largely unknown. We further explored the impact of changes in the size distribution of firms. Among other things, we have shown by example and by performing simulations that the strongest coordinated effects may come from mergers involving moderate-sized firms. It proved to be difficult to establish more definitive conclusions. A more in-depth analysis on the relationship between industry structure and optimal cartel size is left for future research.

In the second main part of this dissertation, our focus has been primarily on antitrust enforcement. The question that we have addressed is how economic theory can be used to detect (incomplete) cartels. We have made the case that antitrust agencies around the globe should take an increasingly active role in the search for cartels. First and foremost, this is likely to enhance the deterrent effect of antitrust policy. Additionally, it will make authorities less dependent on more passive instruments of enforcement such as the complaint procedure and the leniency program. Arguably, firms will become increasingly sophisticated and it is to be expected that more cartels will hold their meetings in secret and reduce communication and associated documentation to a minimum. A major advantage of economic methods of detection is that the focus is mainly on the consequences of a cartel arrangement. Even though cartel members are likely to find ways to hide their practices, they will have a hard time covering the impact of the cartel contract on the market. Obviously, a cartel might attempt not to attract too much attention, but implementing a cartel agreement while maintaining sufficient competitive appearance is complicated. Thus, a more active detection policy potentially lowers the incentive to join a cartel.

However, the discussion of economic methods currently available to detect cartels reveals that applying these techniques successfully is all but trivial. One potential complication is that detection tests typically require good quality data, which might not be available or difficult (and therefore costly) to obtain. Also, available data sometimes cannot be used due to legal restraints. An economic detection technique is therefore most promising if data are relatively easily accessible. An example of such a method is the ‘variance screen for collusion’ by Abrantes-Metz *et al.* (2006). Basically, this test only requires a sufficient amount of price data. We have argued that the effectiveness of this method in part depends on the (type of) industry to which it is applied. For instance, the variance screen may lead to wrong conclusions when it is applied to industries in which products are only marginally differentiated and in which price-cycles frequently occur. Building on this, we have made the case that detection tests should take account of the idiosyncrasies of the industry under consideration. It has been argued that substantial progress can be made by developing detection methods that are specifically designed for a particular (type of) market.

In this dissertation, we have developed a detection technique that is specifically designed for markets in which firms apply a basing-point system. The basing-point system is often labeled a ‘facilitating practice’ and there have been quite a few (incomplete) cartels that made use of this pricing method. Using a two-dimensional spatial model, we have shown that in competition firms either use their own plant location or the location of their nearest competitor as basing-point. By contrast, under a cartel regime cartel members often will use a basing-point relatively far from their production centres. Hence, basing-point locations potentially reveal something about the likelihood of collusion. Our detection test attempts to trace the basing-points used by firms. As an input, it requires transaction data and customer locations. Basing-points that are far from mill locations and located relatively close together can be marked a tell-tale sign of collusion. Instead, basing-points that are close to firm locations with a larger variance are compatible with competition. To capture this likelihood of collusion, we have introduced a measure that ranges from zero to one. Numbers close to one are indicative of collusion, while numbers close to zero correspond to competition.

In order to deal with large amounts of data as well as with noise in the data, a software has been developed. The application of this method to real-world cases is left for future research.

### 6.3 Implications for Antitrust Policy

The prime goal of antitrust law enforcement is to prevent firms from infringing rules of competition. In light of antitrust law enforcement, therefore, it is important to assess whether or not a policy measure has this intended effect. To illustrate how a certain policy measure might yield an unintended result, consider the study conducted by Albaek *et al.* (1997). This work examines the effect of a policy adopted by the Danish Competition Council in 1993. In an attempt to make markets more competitive, the Council decided that transaction prices should be made public. The idea behind this policy is to make buyers better informed, which then should result in a downward pressure on prices. The authors analyze the impact of this policy on the Danish concrete market. In this market, prices were made public for some types of concrete, but not for others. It is found that publicly known prices rose by 15-20%, while nontransparent prices only rose by 1-2%. According to the authors, there are no convincing arguments that can explain this difference, but the fact that price transparency fosters collusion. This analysis suggests that a government policy that makes markets more transparent may result in more collusive outcomes. Hence, economic theory potentially has an important role to play in shaping antitrust policy.

The research conducted in this dissertation has several implications for antitrust policy. We have argued that economic theory can advise antitrust authorities in the search for cartels. To determine the impact of cartel detection techniques on the incentive of firms to collude is difficult, but not impossible. For example, Posner (1970) proposes as a start to have a closer look at recidivist. In the beginning of modern antitrust policy, recidivist were not punished more severely than other defendants. Nowadays, they are. This provides an opportunity to assess the deterrent effect of cartel detection methods, albeit a crude estimation. However, to perform such an analysis requires detailed information and the data presented in antitrust cases is often quite limited. In particular, case descriptions often lack information on the market share of the cartel. This is problematic as we have shown that the applicability of a detection technique partly depends on the inclusivity of the cartel. In determining the effectiveness of antitrust law enforcement and in particular cartel detection methods it is important that antitrust authorities provide as much detailed information about a cartel as possible.

In particular, it is important to define market boundaries properly. In theories of cartels, industry size is, more often than not, taken as given. In antitrust practice, however, defining this so-called *relevant market* is all but a trivial exercise; the outcome

of which potentially has a major impact on the (potential) case under consideration.<sup>2</sup> It is common practice to define a “market” according to its geographic and product dimension. The well-known SSNIP test is a popular tool to assess which undertakings operate on the same market.<sup>3</sup> SSNIP stands for ‘Small but Significant Non-transitory Increase in Prices’ and it works as follows. Consider some product  $x$ . According to the SSNIP test, there is a separate market for product  $x$  when it is profitable to increase its price with a certain percentage.<sup>4</sup> If, however, following the price increase, many customers opt for product  $y$ , then product  $x$  and  $y$  are considered to be part of the same product market. In a similar fashion, the test may be used to assess how many producers belong to the same market. If a producer  $v$  would find a hypothetical price increase not profitable because it loses too many customers to producer  $z$ , then both suppliers operate on the same relevant market.

Obviously, the market definition is important to determine whether or not a cartel is likely to be all-inclusive. A cartel can truly be considered less than all-inclusive only when non-conspirators operate in the same relevant market. The evidence that was presented in this dissertation is in large part based on the definition of the relevant market as formulated in the various cases. In principle, therefore, there is room for an argument stating that incomplete cartels are not as common, because antitrust agencies around the world might have failed to define properly the market in which these cartels were operating. More precisely, there is a potential risk that the alleged incomplete cartel might well have been all-inclusive when the “true relevant market” was more narrow than was believed by the authorities.

Indeed, it is not so hard to believe that the relevant market is defined wrongly in quite a few cases. Yet, what is more difficult to believe is that antitrust authorities around the globe on a large and systematic scale defined the relevant market too broadly. On the contrary, it is arguably in their interest to make the case that the cartel under consideration caused substantial harm both for customers and the economy at large. Such claims, for example, may contribute to the willingness of the public to invest in antitrust enforcement, which in turn enhances the power of the antitrust agency. As a result, the bias in market definitions used in antitrust practice, if any, would be that the relevant markets are often defined too narrow. In other words, the known number of incomplete cartels in all likelihood forms a lower bound, not an upper bound.

Defining the relevant market properly is important to assess whether or not a cartel is likely to be all-inclusive. This, in turn, is important to determine if a competitive fringe is present and can be used as a benchmark, i.e., whether or not detection techniques that assume incomplete cartels are likely to be successful. The research conducted in this thesis further suggests that, when an incomplete cartel forms, small firms gain market share at the cost of larger undertakings that take part in the cartel. Hence, a decline in total market demand in combination with a more symmetric

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<sup>2</sup>In some cases, however, the relevant market is relatively easy to define. One may think, for example, of bidding rings. It is often not too hard to find out what firms submit bids for well-defined contracts in a certain region.

<sup>3</sup>This test is also known under the header ‘Hypothetical Monopolist test’.

<sup>4</sup>In the U.S. this is typically 5%, while in the European Union it is commonly in the range 5-10%.

division of market shares might indicate collusion. Clearly, such patterns cannot be observed when the relevant market is defined too narrowly.

We have argued that a more active detection policy potentially increases the probability of discovery and therefore raises the expected costs of collusion. In its simplest form, the expected cost of cartelizing equals the monetary penalty times the probability of discovery. Arguably, therefore, an easier route to obtain the same effect is to increase the level of antitrust fines. Yet, it is questionable if fines can be raised sufficiently within the current legal framework. The new European fining policy is illustrative in this respect. In 2006, the European Commission released new fining guidelines ‘Guidelines on the method of setting fines imposed pursuant to Article 23(2)(a) of Regulation No 1/2003’.<sup>5</sup> The new guidelines are meant to determine the level of antitrust fines in a more systematic way. In imposing the fine, the Commission must respect the legal maximum fine as specified in subparagraphs 2 and 3 of Article 23(2) of Regulation 1/2003. The fine cannot exceed 10% of the undertaking’s total turnover in the preceding business year. So far, this legal maximum has been binding in only a limited number of cases. However, as we have shown in Bos and Schinkel (2006), it is to be expected that the legal maximum will be far more restrictive with the new fining guidelines. That is, applying the method laid out in the new guidelines yields a fine that is higher than 10% of worldwide turnover in a wide array of situations. Consequently, even though the Commission announced deterrence as the main objective, it is questionable if this goal can be achieved by an increase in punishments alone.<sup>6</sup>

## 6.4 Future Research

In this concluding section, we discuss some research topics that in our opinion must have a prominent position on the future research agenda. In several chapters, we have already touched upon some issues for which additional research is warranted. The purpose of this section is not to provide a complete overview of these research topics. Instead, we limit ourselves to a brief discussion of two themes that, we believe, are of particular importance.

### 6.4.1 *Cartel Formation with Heterogeneous Firms*

In this dissertation, we have addressed the issue of coalition formation with positive externalities. Like most theories of collusion, the strand of literature concerned with cartel formation assumes identical firms. The outcome of the game under consideration is therefore mainly limited to a prediction of optimal cartel size. To say anything more, one necessarily has to give players an identity, which implies they have to differ

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<sup>5</sup>The 2006 fining guidelines replace the ‘Guidelines on the method of setting fines imposed pursuant to Article 15(2)(a) of Regulation No 17 and Article 65(5) of the ECSC Treaty’ of 1998.

<sup>6</sup>The objective to prevent infringements of the European competition law is mentioned explicitly in recitals 4, 30 and 31 of the 2006 fining guidelines.

in at least one respect. As mentioned before, however, formation games with firm heterogeneity tend to be complex and easily render intractable. Nevertheless, the analysis carried out in Chapter 3 shows that potentially some progress can be made in this field.

The main problem with cartel formation games with firm heterogeneity that are analytically tractable is that it leaves a large class of equilibrium outcomes. As we have seen in Chapter 3, sufficiently large firms always join the cartel independent of the cartel formation game, while sufficiently small firms always lack the incentive to collude. Yet, moderate-sized firms may or may not join, which depends heavily on the cartel formation game. As a result, it remains difficult to predict what stable cartel is most likely to emerge. Nevertheless, we can imagine firms to have a preference ranking for the various stable coalitions.

To provide some preliminary intuition, consider the price setting supergame with capacity constraints developed in Chapter 3. Suppose there is one firm that is sufficiently large so that it has an incentive to join any coalition. Clearly, this firm has a preference for the stable cartel that controls the largest amount of industry capacity, because this is the most profitable cartel. It might be in the interest of this firm to take the lead in the cartel formation process in attempt to make the ‘right’ firms joining the coalition. For example, it can approach its rivals in a certain order so that the largest firms have an incentive to join the cartel, leaving the smallest competitors as outsiders. A better insight of what (type of) firms initiate a cartel arrangement is not only interesting in its own right, but may also yield important insights in light of antitrust enforcement. For instance, ringleaders typically lack the right to apply for leniency. An analysis of such a game has not been pursued in this thesis, but is potentially a very interesting extension of the analysis in Chapter 3.

#### 6.4.2 *Disentangling Overt Collusion and Tacit Collusion*

An important theme, which we have touched upon in several chapters, is the distinction between explicit collusion and tacit collusion. So far, economic theory has mainly focused on the difference between (imperfect) competition and collusion. From an enforcement perspective, however, the key issue is to delineate overt collusion from other sorts of market conduct. The main difficulty is that, according to economic theory, any collusive behavior can be explained as being the result of a tacit coordination of actions. To put it differently, any collusive outcome that can be achieved with talking can also be achieved without talking. As a result, economic theories of collusion have not much to say about the impact of explicit communication between firms on the market outcome. In practice, there arguably is a substantial difference between explicit collusion and tacit collusion. After all, why would firms make the effort to gather together and incur associated costs if there is no additional benefit?

An illuminating discussion on this issue can be found in Whinston (2006). He hypothesizes that the likelihood of overt collusion increases in the additional gains due to talking. In order to clarify the discussion, we can write the net benefits of explicit collusion (*EC*) as,

$$EC = \pi(\text{talk}) - \pi(\text{do not talk}) - T.$$



In every market, firms can obtain a particular market result without explicit communication, which is denoted  $\pi(\text{do not talk})$ . Explicit communication between firms presumably leads to a better coordination of strategies and, as a result, yields additional profits equal to  $\pi(\text{talk}) - \pi(\text{do not talk})$ . Simultaneously, talking makes collusion costly.<sup>7</sup> These (expected) costs are given by  $T$ . Clearly, under the assumption that firms are risk-neutral, ‘talking’ is preferred to ‘not talking’ whenever  $EC$  is positive. A major challenge for economic research is then to identify factors that positively affect  $EC$ .

We can distinguish three categories of factors. First, there are factors that influence the potential size of  $\pi(\text{talk})$ . When expected gains from collusion are small, then there is not much reason to talk. For instance, in industries characterized by many sellers and low barriers to entry the expected profits from collusion are likely to be negligible. Second, one can think of factors that have an effect on  $T$ . Examples include the probability of discovery and the level of punishment. Economists have a relatively good understanding of these first two categories. The third category is more problematic. These are factors that affect  $\pi(\text{talk})$  more than  $\pi(\text{do not talk})$ , i.e., factors that determine the additional gain resulting from explicit communication. Here, the main problem is that factors that positively affect  $\pi(\text{talk})$  typically also have a positive effect on  $\pi(\text{do not talk})$ , which makes the outcome often ambiguous. The key challenge is then to identify situations in which direct communication between firms has substantial added value.

Athey and Bagwell (2001) explains that explicit communication could be important in settings in which firms are heterogeneous and obtain private and imperfect signals of past play. In particular, private information typically yields more volatile market shares and in order to maintain cartel stability firms with a low market share today should be compensated in the future. This potentially provides an opportunity to discriminate between tacit collusion, overt collusion and imperfect competition. Alternating sizes of market shares may indicate overt collusion, stable market shares may be the result of tacit collusion, while less stable but not alternating market shares may indicate imperfect competition.

In principle, this problem could be circumvented by declaring illegal explicit communication between businessmen. Yet, business meetings can yield substantial benefits for society and preventing firms from gathering together is unlikely to be optimal from a social welfare perspective. Allowing firms to meet occasionally then comes with a price, which is the risk of collusion. Indeed, Adam Smith already recognized the risk associated with business meetings. He wrote:<sup>8</sup>

“People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices.”

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<sup>7</sup>Note that we assume ‘false positives’ to be absent. If antitrust authorities would make a significant amount of so-called ‘Type 1 errors’ firms might have an additional incentive to collude explicitly. See Schinkel and Tuinstra (2006) for a discussion and formal analysis.

<sup>8</sup>Smith (1994), p. 148.

However, he also realized that prohibiting explicit communication would not be consistent with a free enterprise system. The next line reads,

“It is impossible indeed to prevent such meetings, by any law which either could be executed, or would be consistent with liberty and justice.”

That said, the main challenge for future research is to identify factors that affect  $\pi(\text{talk})$  relatively more than  $\pi(\text{do not talk})$ , all else unchanged.

