

## EXPERIMENTS ON THE ABUSE OF A DOMINANT POSITION

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## 1 INTRODUCTION

Article 82 of the EC Treaty, dealing with abuse of dominant position, states:

“Any abuse by one or more undertakings of a dominant position within the common market or in a substantial part of it shall be prohibited as incompatible with the common market insofar as it may affect trade between Member States.

Such abuse may, in particular, consist in:

- (a) directly or indirectly imposing unfair purchase or selling prices or other unfair trading conditions;
- (b) limiting production, markets or technical development to the prejudice of consumers;
- (c) applying dissimilar conditions to equivalent transactions with other trading parties, thereby placing them at a competitive disadvantage;
- (d) making the conclusion of contracts subject to acceptance by the other parties of supplementary obligations which, by their nature or according to commercial usage, have no connection with the subject of such contracts.”

In plain economic language, the article forbids firms to abuse a dominant position, and it gives four examples of possible abuses; of course, other price or non-price strategies may be considered an abuse as well. The text raises questions about exactly what constitutes a dominant position, and about what types of behavior could constitute an abuse. Concerning the latter, one notices that the examples that are given all deal with the relation between the dominant firm and its customers, or even (as in (b)) the final consumers. {Note (to be discussed further): (a), (c) and (d) refer to “trading partners” or “other parties”, which can also include competitors, certainly as regards (c) and non-discrimination in a vertical integration setting}

As the examples in the text of the Treaty all deal with straightforward monopolistic exploitation, we immediately notice a difference between Article 82 EC and Section 2 of the Sherman act in US Antitrust law. While the latter (only) aims at preventing “monopolization” of markets, Article 82 EC primarily seems to focus on constraining monopolies. While the difference may be explained by historical factors, with the main goal of policy in the US being to prevent dominant firms coming into existence, and European industrial policy accepting that large firms may be necessary to successfully compete on world markets, it is relevant for this article. A large portion of the literature in experimental economics originates in the US, hence, one should not expect it to deal with exploitative behavior, but rather be

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more focused on exclusionary behavior. This is not to say that the US is not concerned about exploitative behavior, rather in the US that behavior is countered by sector specific regulation. Consequently, the literature on regulation may be relevant for this paper as well. We, however, did not look into that literature.

As the French and German texts of Article 82 only speak of “abusive exploitation”, there has, in fact, been a discussion about whether Article 82 only aimed to deal with exploitative behavior, or whether, like Section 2 of the Sherman act, Article 82 could also catch “monopolization”, i.e. anti-competitive behavior directed at competitors of the dominant firm. In *Continental Can*,<sup>1</sup> the ECJ (European Court of Justice) made it clear for the first time that Article 82 does indeed apply also to anti-competitive conduct that weakens competition that is already weak. Since *Continental Can*, the ECJ has confirmed on various occasions that Article 82 may apply to anti-competitive conduct. A particularly clear statement is found in *Hoffman-La Roche*,<sup>2</sup> where the ECJ used a wording that it has frequently used since then

“91 (...) The concept of abuse is an objective concept relating to the behavior of an undertaking in a dominant position which is such as to influence the structure of the market where, as a result of the very presence of the undertaking in question, the degree of competition is weakened and which, through recourse of methods different from these which condition normal competition in products or services on the basis of the transactions of commercial operators, has the effect of hindering the maintenance of the degree of competition still existing in the market or the growth of that competition.”

It is important to note that Article 82 EC does not forbid certain types of behavior as such; only dominant firms are forbidden from using such strategies. Consequently, it is important to know when a firm is considered to be in a dominant position. In one of the early cases arising out of Article 82 EC, *United Brands*,<sup>3</sup> the ECJ gave a definition of dominance that it has frequently relied upon since. One year later, in *Hoffmann-La Roche*,<sup>4</sup> the ECJ somewhat refined that earlier definition, and that definition still stands today:

“38. The dominant position thus referred to relates to a position of economic strength enjoyed by an undertaking which enables it to prevent effective competition being maintained on the relevant

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<sup>1</sup> Case 6/72 *Europemballage Corp and Continental Can Co Inc v. Commission*, [1973] ECR 215, [1973] CMLR 199.

<sup>2</sup> *Supra*.

<sup>3</sup> Case 27/76, *United Brands Co and United Brands Continental BV v. Commission* [1978] ECR 207, [1978] 1 CMLR 429, para. 65.

<sup>4</sup> Case 85/76, *Hoffmann-La Roche & Co AG v. Commission* [1979] ECR 461, [1979] 3 CMLR 211.

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market by affording it the power to behave to an appreciable extent independently of its competitors, its customers and ultimately of its consumers.”

In economic terms, one would say that a dominant position is a position in which the firm has a “reasonably large” degree of market power. In assessing whether or not a firm is dominant, the Commission and the Court place great emphasis on the market share of the firm. Already in *Hoffmann-La Roche*,<sup>5</sup> the Court held that very large market shares are in themselves indicative of dominance:

“41. Furthermore, although the importance of market shares may vary from one market to another the view may legitimately be taken that very large market shares are in themselves, and save in exceptional circumstances, evidence of the existence of a dominant position.”

While it is not possible to give an exact boundary, it is frequently stated that if the market share is above 50%, dominance is essentially presumed, while to date, there have been no cases where a firm with a market share of 40% or less was found to be dominant. Of course, market shares are a very imperfect proxy for market power and, indeed, both the European Commission and the ECJ have frequently been criticized for attaching too much weight to market shares when assessing dominance and for paying relatively little attention to other market characteristics, such as entry barriers.

To summarize our explanation of Article 82: under EU competition law, firms are not forbidden from having market power, however, firms that do have market power are banned from certain business strategies that other firms are free to use. Presumably, the idea is that welfare and consumer surplus can be hurt if dominant firms would be allowed to engage in them.

Experimental economics could contribute to policy in three ways. First, if dominant firms have the ability to set prices above the competitive level, to sell products of an inferior quality, or to reduce the rate of innovation below the level that would exist in a competitive market, experiments can be conducted to see whether dominant firms will indeed engage in such practices. Secondly, where theories are too weak to distinguish normal competitive behavior from anti-competitive behavior, experiments might help out to see which theory is applicable or is the most relevant one. Thirdly, when making their decisions, antitrust officials rely on a variety of formal and informal arguments; experiments may be useful to see to what

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<sup>5</sup> *Supra*, note 4.

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extent these arguments hold water. Conversely, antitrust cases may be a source of inspiration for experimental economics. Indeed, as we will see in this paper, there are plenty of allegedly abusive strategies that do not seem to have been formally investigated in the laboratory.

After we have put together all bits and pieces, the following questions should be answered in this article:

1. Is it the case that most experiments on abuse of dominant positions focus on predation?
2. Is there scope for further experiments within the sphere of abuse of dominance?
3. Is the gap between experimental research results supplied by the literature and the demand of case handlers due to the inherent boundaries of experimental research as such?
4. What are the lessons from this paper for using experimental research in antitrust enforcement?

The remainder of the paper is organized as follows.

[To be added: here we should also make clear on what we will be focussing on in this overview.]

## **2. ABUSES**

As is well known, Article 82 EC has given rise to far fewer cases than under other major provisions of EC competition law, such as Article 81 EC or the Merger Control Regulation. Annex I provides an overview of the relevant case-law of the ECJ/CFI and the decision practice of the European Commission under Article 82 EC (please bear in mind the methodological notes).

That table indicates that, since the inception of the EC in 1958, there have been 50 relevant Commission decisions under Article 82 EC, 26 of which were brought before the ECJ or CFI by way of judicial review (resulting in 10 annulments). In addition, there are 17 relevant ECJ

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decisions in preliminary ruling procedures, answering questions put by national courts. In order to be complete, the table should also include the decisions of national courts and NCAs.<sup>6</sup> This is however beyond the scope of the present research effort.

In comparison, in the Netherlands, of the {...} decisions taken by the Dutch competition authority (NMa) in 2003, 159 dealt with article 24 of the Mededingingswet, the Dutch equivalent of Article 82 EC. In only two of these decisions, the NMa came, however, to the conclusion that a dominant position had been abused. In 79 cases, the complaint was dismissed immediately, without any investigation; in the remaining cases, that conclusion was reached after a brief investigation. The conclusion is that there are frequent complaints about abuse, but that most often these are unjustified; see Hetteema (2005). The two cases in which NMa concluded that there was an abuse are CR Delta (case 3353) and LOI (case 3125). The latter case concerns predatory pricing; the former is about non-linear pricing and loyalty discounts in particular. In both of these cases, one can doubt whether the Dutch competition authority rightly found an abuse of a dominant position.

In the light on the table at Annex I, there are five broad groups of practices that have been dealt with by the Commission and the ECJ/CFI over the years:

- i) pricing practices, including excessive prices, predatory pricing and price squeeze;
- ii) rebates, actually a subset of pricing practices, but which has received so much attention that it is worth treating it separately. It includes loyalty rebates, non-linear rebates and selective ('fighting') rebates;
- iii) discrimination, comprising discrimination between customers (exploitative practice) and discrimination towards competitors in a vertical integration setting (which also has an exclusionary impact);
- iv) various forms of refusal to deal, concerning either the supply of goods, of IP rights or information, of physical facilities (including the so-called "essential facilities" cases) or refusal to enter into standard cooperative (and pro-competitive) arrangements for the industry in question;
- v) various types of non-price contractual practices, including tying and exclusivity deals.

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<sup>6</sup> Indeed, Article 82 EC is directly effective in its entirety and has been used by national courts over the past decades. As for NCAs, some of them were empowered to apply Article 82 EC before 2004, and they are now in any event with the entry into force of Regulation 1/2003 on 1 May 2004.

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These groups of practices are discussed below.

## **2.1. Pricing practices (excluding rebates)**

### **2.1.1 Excessive Pricing**

This is the complaint that price is too high. Such complaints have to be dealt with under European antitrust law, but, as described above, there is no equivalent in US law; that law deals only with monopolization. In Europe, antitrust authorities find it difficult to decide when a price is *too* high, hence, there are relatively few cases under this category [check].

Several methods have been proposed to decide whether price is too high:

- (i) Price cost comparison,
- (ii) Price comparisons,
- (iii) Investigation of the rate of return.

In the first method, one investigates what the costs,  $c$ , are in producing the product and then looks at the price cost margin, or Lerner index

$$(2.1) \quad L = \frac{p - c}{p}$$

which indeed is a measure of market power. Once having calculated the index, a judgment call has to be made: how high is  $L$  allowed to be, and what to make of fixed costs? This is not so easy, one gets into all kinds of accounting issues. It seems not so obvious what the contribution of experimental economics (EE) could be in this domain.

In the second method one compares the allegedly excessive price to the price of similar products, or to the price of the same product in different jurisdictions. The idea is that if the prices do not differ too much, the one price cannot be abusive. This certainly holds if the second price has resulted from competitive conditions.

This raises an interesting question for EE. Roughly speaking, standard economics predicts that

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$$(2.1) \quad p = p(c, m)$$

In words: the price that a firm charges depends on the firm's cost structure,  $c$ , as well as on the market conditions,  $m$ . The second test for abusive pricing builds on  $p$  depending on  $m$ . How strong is this effect according to EE: is monopoly pricing substantially different from pricing in duopoly or oligopoly situations?

The third test does not look at prices, but at profits, or, more specifically, to returns on investment. One compares the ROCE (Return On Capital Employed) to the WACC (the Weighted Average Cost of Capital), the return that investors in the company would be satisfied with, as it provides an adequate return for the risk that is taken. The idea is that if the ROCE is much higher than the WACC, the price must be too high. This method originates in regulated industries, where it is known under the name: rate of return regulation. What has EE contributed to this field? To what extent is that relevant for competition policy?

### **2.1.2 Predatory Pricing**

This is the abuse that seems to have attracted most attention from experimentalists. It is interesting to speculate why.

The case law with respect to predatory pricing in Europe is limited (four cases), but it has attracted remarkable attention, the *Akzo* and *Tetra Pak II* cases having become leading precedents under Article 82 EC. The last two cases, *DP AG (Parcels)* and *Wanadoo Interactive*, date from 2001 and 2003 respectively and are likely also to have an impact, since they pick up on suggestions made in the *Notice on Access Agreements* in 1998 and update the law in the context of multi-service industries (including network industries). Until then, the law was reasonably clear and had remained unchanged since *Akzo*. A price is predatory if it is below marginal cost, or if it is below average cost and in part of an explicit plan to eliminate a competitor. Note that the latter respect implies that predation cannot be inferred from market and cost data alone: one needs to know the *intentions* of the firm. This has consequences for EE and seems to call for the strategy method being employed.

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The economic literature has focused on the question whether the cost test as described above is suited to separate prices that a “really” predatory (i.e. profitable only because of induced changes in the behavior of competitors or of the market structure) from prices that are normally competitive. The literature argues that the test is too strict, hence, is misspecified: under a variety of conditions, a firm will wish to charge prices that are below cost. Secondly, there is an extensive literature dealing with the question under which circumstances predatory pricing can be a rational business strategy. We will not redo that analysis here, but rather refer the reader to Bolton et al (?). The main message coming out of that paper is that market structure is important; in particular, only if recoupment of the initial losses is possible, can predation be profit maximizing.

The economics literature has identified a certain number of situations (models) in which predation could indeed be rational. The EE literature could make contributions to answering two questions:

- (i) Does predation happen in the cases in which theory predicts it could happen?
- (ii) Does predation happen in other situations?

The EE literature seems to focus mainly on the first question. Our reading of it is that predation does not always happen in the theoretical cases where it could, hence, it is ever less likely than the theory tells it to be: predation indeed, might be rare as a unicorn.

### **2.1.3. Price squeeze**

There are only two relevant cases of price squeeze, namely *Napier Brown* and *Deutsche Telekom*. The latter case illustrates very well the current state of the law.

There the Commission decided that DT's wholesale and retail charges for access to the local loop amounted to a margin squeeze. That is, the spread between DT's wholesale tariffs for unbundled access to its subscriber lines and the weighted average of its corresponding retail services tariffs (analogue, ISDN and ADSL connections) left DT's competitors an insufficient margin to compete for retail subscribers, as the spread was lower than DT's own downstream product-specific costs.

The Commission defines price squeeze as “an insufficient spread between a vertically integrated dominant operator's wholesale and retail charges... especially where other

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providers are excluded from competition on the downstream market even if they are at least as efficient as the established operator”<sup>7</sup>. The benchmark retail margin is therefore that of the dominant operator.

## **2.2. Rebate practices**

The practice of the Commission and the case-law of the ECJ/CFI contain a remarkably high number of cases concerning rebate practices. EC law remains relatively strict on this issue to this day, allowing dominant firms very little margin to offer rebates to their customers, except for linear rebates which are directly linked with cost savings on the volume of the order.

### **2.2.1 Non-linear pricing (Quantity Discounts)**

One of the two abuse cases in which NMa intervened in 2003 (*CR Delta*) involved discounts, that is non-linear pricing. In certain respects, this case is similar to the *Michelin II* case, the most recent case on these matters in EC competition law (together with *British Airways/Virgin*). Both cases, despite the criticism from commentators (especially economists), were confirmed by the CFI.

In *CR Delta*, the NMa objected to three discount schemes by the company:

- (i) The quantity discount scheme;
- (ii) The loyalty rebates;
- (iii) The incentive scheme to induce farmers to participate in the testing program.

The quantity discount scheme is very simple: if the annual monetary value of demand exceeds certain thresholds, the buyer gets a certain discount over the entire volume. In the present case, the discount scheme was as in Table 2.1.

Volume (€)	Discount (%)
< 1000	0
$1000 \leq V < 1500$	1
$1500 \leq V < 2000$	2
$2000 \leq V < 3000$	3

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<sup>7</sup> Ibid. at Rec. 108.

$3000 \leq V < 4000$	4
$4000 \leq V$	5

**Table 2.1:** discounts in the CR Delta case

In general such discount schemes are allowed if they can be justified on the basis of cost savings. In the present case, NMa was not convinced by the explanation given by the company and argued that, in fact, the discount scheme functioned as a loyalty scheme. In its arguments, NMa relied on those of the Commission in *Michelin II*, in particular, it considered the period (1 year) and the cumulative nature (discount over the entire volume) to be anti-competitive. In its decision, NMa did not refer to an economic model to substantiate its claim. In fact, it is not clear that the decision is the correct one from the economic point of view. Interestingly for this paper is the fact that NMa refers to a behavioral aspect: farmers that are close to a threshold would be induced to stay with the company CR Delta in order to reach the next level. It would be interesting to do experiments to see whether this effect is real. More generally, what does EE say about quantity discounts: do they induce loyalty?

### **2.2.2. Loyalty rebates**

In CR Delta, the loyalty rebate took the following form: a farmer that takes of least 90% of its supplies from CR Delta got a discount of 1%, a farmer that bought only from CR Delta got a discount of 2%. The scheme was never implemented, but it was announced and NMa argued that the announcement as such was anti-competitive. Loyalty schemes play, at least in part, on certain consumer characteristics, hence, they might be a fertile ground for EE. We do not know what the EE literature has yielded in this respect. Similarly, the announcement effect might have been investigated, or might be worthwhile to invest in the EE-literature.

CR Delta is offering two types of products: tested products of known quality (market F) and products that still have to prove themselves (market P). CR Delta needs the cooperation of farmers to test products from market P and to possibly transform these into profitable products on market F. To induce farmers to test, it gives a reduction of 10% of its F products to those farmers that were willing to engage in a certain amount of testing of P products. The price reduction was viewed as a reward for participation, but NMa argued that it induced “testers” to buy the F product from CR Delta, hence, that it foreclosed the market for competitors. Obviously, if the reward for testing had been lump sum, farmers would have had

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less of incentive to buy P from CR Delta. Again we do not know of papers in the EE literature dealing with this or similar pricing strategies.

### 2.2.3. Selective rebates ('fighting' practices)

There are two cases of 'fighting' practices, where the dominant firm systematically set out to underbid its competitors, namely *Irish Sugar* and the *Cewal* case, which concerned 'fighting' ships on cargo shipping lines.

## 2.3 Discrimination

EC competition law deals with three broad types of discrimination:

- i) First-degree price discrimination: Discrimination among the customers of a dominant firm (see the classical cases *United Brands* or *Michelin I*). These are cases where price discrimination is used to extract the most profit from individual customers who are in the eyes of the competition authority in a similar position and should thus pay similar prices.
- ii) Third-degree price discrimination: A sub-set of the former type, which is more likely to fall foul of EC competition law, is discrimination among customers according to the Member State where they are located. This type of practice, even if it may be linked to differing preferences amongst national markets in various Member States, runs against the market integration objectives of the EC Treaty. A pre-eminent example of this is found in the *Tetra Pak II* case.
- iii) Another sub-set of first-degree price discrimination that has appeared in recent times; here a vertically-integrated firm with a dominant position on, say, the upstream market, would discriminate in favor of its own downstream subsidiary and against the competitors of that subsidiary. The objective there is no longer just exploitation, but also exclusion. See here the *HOV SVZ/MCN* case for an example.

Above we already discussed second-degree price discrimination. Here, we wish to focus on third-degree price discrimination, which is charging different prices in different markets.

The economics of (monopolistic) price discrimination is well understood: if it leads to expanding the size of the market, it is most likely to be welfare improving; otherwise most

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likely it is not. Article 82 forbids price discrimination by a dominant firm, hence, the law might be more strict than is desirable from the point of view of economic welfare. EU competition law is, however, not only guided by that objective, but also by this (more important) objection of market integration.

[A discussion on price discrimination in the EE literature is to be added here.]

## **2.4 Refusal to deal**

Cases where a dominant firm refuses to supply an existing customer or a potential competitor probably offer the largest contrast between EU and US policy. Ordering the dominant firm to supply is a strong interference with business freedom and in this domain European policy has typically been much more interventionistic. The figures at Annex I indicate that this is the largest group of practices.

Refusal to deal cases can be split in a few sub-categories:

- i) refusals to supply a good: these are the “classic” cases where a dominant firm ceases to supply its competitors (*Hugin, Hilti*) or its established distribution channels (*United Brands, Commercial Solvents*);
- ii) refusal to grant access to production facilities, including the so-called “essential facilities” cases. These were popular in the 1990s and include precedents such as *Bronner, London European/Sabena* and *Sea Containers / Stena*;
- iii) refusal to grant access to IP rights and other valuable information. These include cases such as *Magill, IMS Health* and the recent Commission decision in *Microsoft*;
- iv) refusal to cooperate in normal industry practices, such as interlining (*British Midland*).

It is here that the special responsibility towards competition that a dominant firm in Europe is said to have is playing an important role. In *Commercial Solvents*, for example, a pharmaceutical company cancelled orders for a certain raw material, presumably expecting to be able to buy it cheaper elsewhere. When the alternative supplies did not prove satisfactory, it turned to the original supplier again, but it did not want to supply anymore, as it wanted to vertically expand into the downstream product market itself. The ECJ ruled that the dominant

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producer of the raw material had abused its dominant position as its strategy could eliminate all competition from the market. *Hugin* is essentially similar: a manufacturer no longer wanted to supply spare parts to a retailer is it wanted to build up its own spare parts business. In *United Brands*, UBC wanted to punish a distributor for the fact that it had participated in a promotional campaign of a competitor of UBC. According to the ECJ, the counter-measure of no longer supplying this distributor was not proportional and, hence, abusive. It is remarkable that, in all these (older?) cases, there is little attention to efficiency arguments: the dominant firm is simply said to have a responsibility to keep competition alive.

Essential facility cases are special cases of refusal to deal: a competitor needs access to the upstream production facilities of the dominant firm in order to be able to profitably compete on the downstream market. The question now is under what conditions, and against which terms, the dominant firm should be forced to share its facilities. Three important recent cases are *Magill*, *Bronner* and *IMS Health*. Also these decisions have been criticized for being too interventionistic and for eliminating firms' incentives to invest. It should be noted here that the so-called "essential facilities doctrine" originates in the US, and that it has also been extensively criticized there; see Areeda (1990).<sup>8</sup>

In *Magill*<sup>9</sup> broadcasting stations were not willing to hand over their programming data to a publisher who wanted to publish a complete programming guide. The ECJ argued that the refusal to supply prevented a new product, for which there was apparent demand, from coming on the market, hence, that the refusal to supply constituted an abuse according to Article 82(b).

In *Bronner*<sup>10</sup> the ECJ has, for the first time taken a very different attitude. In this case, the ECJ shows its awareness of the investment issue and it shows restraint in granting a competitor access to the facilities of a dominant firm. *Bronner* deals with a small newspaper company, with low circulation, that wants to get access to the nationwide distribution system of a larger competitor. *Bronner* argues that its circulation is too small for it to have its own viable system, hence, that it should get access to the unique nationwide distribution system, that of its competitor. The ECJ, in essence argues that, given the current market shares, the claim might be true, but that this fact does not justify getting access. If *Bronner* would have an equal market share as the leading firm, then a nationwide distribution system would be viable from

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<sup>8</sup> P. Areeda, Essential facilities: an epithet in need of limiting principles, (199) 58 *Antitrust Law Journal* 841.

<sup>9</sup> Case C-241, 241/91P *RTE & ITP v. Commission*, [1995] ECR I-743, [1995] 4 CMLR 718.

<sup>10</sup> Case C-7/97 *Oscar Bronner GmbH & Co KG v. Mediaprint* [1998] ECR I-7791 4 CMRL, 112

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*Bronner* itself; hence, the competitor should not be forced to share. It has been argued in Bergman (2000)<sup>11</sup> that this Bronner-test constitutes a formidable hurdle for new entrants: it may simply not be feasible to reach a comparable market share within a reasonable time frame.

[Material about *IMS Health* to be added]

More generally conclude about the conflict between IP Law and Competition Law and the trade-off between investment and diffusion as a worthwhile area for EE.

## 2.5 Non-price contractual practices

A number of non-price contractual practices have been found abusive over the years. Here as well, the *Tetra Pak II* case provides an illustration of a large number of such practices. The main ones are:

- i) tying and bundling, dealt with in greater detail below;
- ii) exclusive deals, in particular agreements whereby the dominant firm becomes the exclusive supplier of the other contracting party (*Soda Ash*);
- iii) display exclusivity, especially in the well-known *Van den Bergh Foods* case involving ice-cream freezers.

In the 1970s, there were a number of cases where it was alleged that the enforcement of IP rights (essentially to prevent parallel trade) constituted an abuse of dominant position (*Deutsche Gramophon, Parke Davis*). However, the ECJ always stood by its position that the mere exercise of IP rights did not constitute an abuse in the absence of concrete evidence of anti-competitive effect.

As seen above, Article 82(d) specifically lists bundling as a possible abuse. There is a rather large recent economics literature dealing with the question of whether, and in which circumstances, tying might be bad for welfare. Three leading cases in this domain are *Hilti*, *Tetra Pak II*, and *Microsoft*. Quite surprisingly, there appears to be little experimental work dealing with tying and bundling.

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<sup>11</sup> M. Bergman, The Bronner case – A turning point for the essential facilities doctrine? [2000] ECLR 59.

### 3. OTHER SURVEYS OF EXPERIMENTAL EVIDENCE

We are not the first attempting to review the experimental literature that contributes to antitrust issues. There are at least two other articles that should be mentioned here. The most comprehensive overview is Wellford (2002). Many of the experimental studies she reviews, however, are not directly related to the narrower focus of our overview. Nevertheless, there are some general conclusions that are interesting to be reiterated here (see p.41 in Wellford's article):

1. *“Institutional form matters more than theory and policy imply. In fact, institutional effects often dominate the effects of structural characteristics of the market. (For instance, the competitive outcome is more robust than economic theory suggests, markets with single sellers do not necessarily lead to monopoly outcomes in certain institutional settings.*
2. *Standard theories of noncooperative equilibria assume that all market participants have complete information on the payout functions of others, an assumption that is likely to be violated in most field markets. However, these theories actually predict better in laboratory markets under conditions of private rather than complete information.*
3. *Predation is difficult to generate behaviorally in a market context, even under market conditions designed to give the theory its “best shot”.<sup>12</sup>*
4. *Market power, when it exists, may be exercised. The effect of institutional form, the nature of capacity, the divisibility of production, and the presence of human buyers are important in determining whether or not it will be. When market power exists and prices are supracompetitive, it is often the case that market power is not exercised fully (in the sense that sellers with market power do not withhold production to the extent that theory predicts). Rather, the presence of market power seems to facilitate tacit collusion.”*

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<sup>12</sup> In anticipation of what follows below, our reading of the literature regarding predatory pricing is somewhat in contrast to Wellford's third point. Experimental economists have pointed out at least three economic environments in which predatory pricing consistently emerged in the laboratory.

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Another important fact Wellford points out is that most laboratory studies to date have omitted two features that are crucial to antitrust issues, namely possible entry and the threat of antitrust enforcement. Thus, it is likely that results are biased towards more collusive outcomes. In the light of these two omissions, it is worthwhile noting that many market environments that Wellford reviewed are quite competitive nevertheless.

Another (more personal) review is Davis and Wilson (2002) who propagate the incorporation of experimental work into the development of antitrust policy. We agree with their assessment that appropriately designed experiments can uniquely provide important insights relevant for competition policy. They illustrate this point by reviewing some of their experimental work on detecting price fixing in sealed bid auctions, enforcement standards for merger-specific efficiencies and differentiated product competition and the antitrust litigation model.

In order to economize on space, when we review the experimental literature on abuse of a dominant position below, we will usually not provide details on the economics of potentially abusive practices such as predatory pricing, price discrimination, etc. For this we refer to e.g. Motta (2004).

## **4. EXPERIMENTS ON PRICE DISCRIMINATION**

### **4.1 Price Discounts<sup>13 14</sup>**

Davis and Holt (1994) report on posted-offer markets with and without the possibility for sellers to grant price discounts. In the markets with possible discounts, sellers first post prices and then buyers are randomly selected from a waiting queue and are given the opportunity to shop. A buyer given the possibility to buy, can request a private discount that the seller may or may not grant. Davis and Holt make a couple of observations: First, sellers in their posted-offer markets do offer discounts if given the opportunity. Second, list prices in the markets with possible discounts are generally higher than in markets without discounts. Third, the effect of discounting on transaction prices varies. In some markets sellers appear to compete both on list and discount prices leading to low transaction prices and very competitive

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<sup>13</sup> Grether and Plott (1984), Ethyl case, has to be added later.

<sup>14</sup> In Davis and Milner (2004) different rebate schemes that participants can choose from are exogenously implemented and the focus is not antitrust issues; we probably should ignore this one.

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outcomes. In other markets sellers post very high list prices and then try to price-discriminate among buyers that leads to high transaction prices and losses in market efficiency (sum of buyers' and sellers' realized earnings as a percentage of the maximum possible aggregate surplus).

Davis and Holt's (1998) paper on conspiracies and secret price discounts is an interesting extension of their 1994 paper discussed above.<sup>15</sup> Using again posted-offer markets, they implement four treatments: The first is, as a benchmark treatment, a "pure" posted-offer market with no room for conspiracy. The common feature of all other treatments is that sellers have the opportunity to talk to each other prior to posting prices.<sup>16</sup> In the first of these conspiracy treatments all trades must be made at the posted prices. In the second conspiracy treatment sellers were allowed (upon request from buyers) to grant secret price discounts from their posted list prices. (The discounts could not be observed by other buyers or sellers.) In a third conspiracy treatment, again, secret discounts were allowed, but sellers received ex post information about the other sellers' individual sales quantities before the conspiratorial discussions of the following period started.

Davis and Holt's observations are intriguing. Results in the first benchmark treatment show that without collusion possibilities behavior in the implemented market is competitive. In the first conspiracy treatment that allowed for discussions among sellers but no discounts, Davis and Holt observe that sellers were able to maintain near monopoly prices. However, near-competitive transactions prices were observed in each of the markets where secret discounting was allowed. This demonstrates that allowing for secret discounting introduces monitoring and enforcement problems. Finally, the provision of ex post information about other sellers' individual sales quantities in the third conspiracy treatment seemed to facilitate cooperation in some of the sessions i.e. the recovery of price-fixing arrangements. Although this ex-post information may be unrealistically precise (Davis and Holt, 1996) the last result demonstrates that reporting sales information to a trade association may facilitate collusion as large sales changes may signal aggressive discounting and may for this reason mitigate discounting behavior. In fact, Davis and Holt conclude, "The implication is that antitrust hostility to

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<sup>15</sup> This does not seem to be about dominance, but about collusion.

<sup>16</sup> In the discussions it was forbidden to make physical threats or to discuss post-session side payments, nonpublic information such as unit costs, sales quantities (if these were not announced), or discounts (if permitted).

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agreements to limit or coordinate discounts is well founded, and that trade association activities should receive careful scrutiny in markets where collusion is suspected.” (p.755)

The point of departure of the study by Normann et al. (2004) is the question whether or not—and if so, under what circumstances—large buyers (those who potentially purchase more than others) are granted price discounts. They draw on the theoretical literature that states that whether such discounts are observed depends e.g. on the curvature of the total surplus function over which the parties bargain. (Here, the total surplus function is equal to total benefits minus total costs as a function of the quantity sold to buyers who reach an agreement with the seller.) Theory predicts that price discounts are granted to large buyers in case the total surplus function is concave; that no discounts are granted to large buyers in case the total surplus function is linear; and with a variety of outcomes (including one with no discounts) in case the total surplus function is convex.

Normann et al. test these predictions in markets in which large and small buyers bargain simultaneously with a single seller. Here, large buyers' demand is twice as high as the demand of small buyers and different shapes of the total surplus function are achieved by varying the seller's marginal cost function. The timing is such that first each buyer makes a bid that represents the price at which she is willing to buy a unit (where buyers were not allowed to bid different amounts for different units). The seller observed each bid and then decided whether or not to accept each bid. (Sellers were not capacity-constrained.)

The experimental results strongly support the theory. As predicted, large-buyer discounts are observed only when the total surplus function was concave. The main deviation from theory is that the absolute level of bids sometimes differs from the theoretical predictions.

Normann et al. do not offer specific policy implications of their results. However, it seems safe to say that their results support the view that under certain circumstances the ability of firms (even monopolists) to charge high prices depends on buyers' bargaining power.

The EC approved of several mergers (see e.g. Enso/Stora or ABB/Daimler-Benz) arguing that buyer power in these markets was sufficiently large to discipline the merged entity. It would be interesting to see whether or not that was related to the issues discussed above.

## 4.2 Zone pricing

Deck and Wilson (2003) report results of an experiment regarding zone pricing. They concentrate on the gasoline market and refer to zone pricing as the practice of refiners setting different wholesale prices for retail gasoline stations that operate in different geographic areas or zones. They rightly point out that this is an important public policy issue: On the one hand, refiners claim that they use zone pricing in order to be competitive with local rivals. On the other hand, e.g. antitrust practitioners argue that zone pricing benefits the oil industry and harms consumers. Deck and Wilson design a rich environment. Relevant for the current overview are their experiments on the competitive effects of zone pricing on consumers, retail stations, and refiners and the comparison with the proposed policy prescription of uniform wholesale pricing to retailers. They also examine the issue of divorcement (the legal restriction that refiners and retailers cannot be vertically integrated) that will be discussed in section “vertical integration.”<sup>17</sup>

In their experiments there are four refiners that each produce a specific brand of gasoline and four retailers that each operate two gas stations (at each of which the brand of the corresponding retailer is sold) on a 7×7 grid. Each retailer operates one station at the center of this grid (the “clustered” area) and one in one of the corners of the grid (the “isolated” area). Simulated final consumers are uniformly distributed on the grid with each consumer having inelastic unit demand. As mentioned above, the experiments have a rich design. We will only describe the main features. In the baseline (or zone pricing) treatment, refiners have the ability to set a price for each location that sells its brand. That is, each retailer observes two location specific wholesale prices but could not shift inventory between locations. In the uniform pricing (banned zone pricing) treatment, the retailers must charge the same price for every station selling its brand. In both the zone pricing and uniform pricing treatments, refiners are able to change wholesale prices throughout 600 periods (with each period lasting for 1.7 seconds). Retailers set prices for their two locations that could be adjusted at any time during the 600 periods. Retailers and refiners observe all current retail prices including those set by rival outlets. However, the current wholesale prices are known only by the refiner and the associated retailer. Throughout the 600 periods refiners' uniform costs were constant.

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<sup>17</sup> The authors also investigate the “rockets and feathers” phenomenon (the perception that retail gasoline prices rise faster than they fall in response to random walk movements in the world price for oil) which is, however, beyond the scope of this overview.

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Regarding the comparison of zone versus uniform pricing, Deck and Wilson report the following findings: First, prices in the more isolated areas are higher than prices in the clustered area. Second, under uniform wholesale pricing, prices in the more competitive clustered area actually increase. Simultaneously, uniform pricing does not change prices in the isolated geographic areas that are found to be less competitive. This contradicts claims put forward by proponents of uniform pricing legislation. Thus, uniform pricing actually reduces the welfare of those buyers residing closest to the clustered center area and of those who are on the border of the center and isolated areas. Interestingly, refiners' profits are not affected by the uniform pricing and it is the retailers that extract surplus from consumers. Deck and Wilson offer the following explanation for this finding: "[...] Under uniform pricing, the refiners offer a price that is above the center area zone wholesale price and below the isolated area zone wholesale price. These refiners are balancing extracting economic rents from the isolated stations and remaining viable in the competitive, center area. Thus, a refiner's gains in the center area, due to higher wholesale prices, are offset by reduced earnings in the isolated markets where wholesale prices have decreased and profits are unchanged. With uniform pricing the retailers do not gain a profit margin in the center area but do receive a larger margin in the isolated regions where retail prices are unchanged but wholesale prices have declined." (p.23)

## **5. EXPERIMENTS ON ENTRY DETERRENCE**

### **5.1 Reputation models**

Camerer and Weigelt (1988) test a variant of the chain-store game with private information as introduced by Kreps and Wilson (1982). In this game there is an incumbent who is a monopolist in several markets. Sequentially in each market it faces potential entry. In the first market, first the entrant decides about entry. Then, if entry occurs, the incumbent decides whether to fight or to accommodate. The same happens then in the second market with a different entrant, and so on. The entrants are imperfectly informed about the incumbent's type: with some probability the incumbent is strong (low cost) and would always fight entry; with the complementary probability the incumbent is weak (high cost) such that it would prefer to share the market. Kreps and Wilson's main result is that in a sequential equilibrium the weak

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incumbent might fight entry in the first markets to make the entrants believe it is strong. Only towards the end of the game it would accommodate entry.

Camerer and Weigelt (1988) cast this model in a lender-borrower frame.<sup>18</sup> There is an entrepreneur (player E) who plays a series of eight stage games<sup>19</sup> each time with a different "banker" (player B). At the beginning of an eight-period repeated game, player E is randomly assigned a type: He is either a dishonest or an honest type. The type is revealed to player E but not to players in the role of B. At the beginning of each of the eight periods, a B player decides between lending and not lending money to player E. In case B decides not to lend money the stage game ends. Otherwise, E must decide whether or not to pay back the money. The honest type prefers to pay back the loan whereas the dishonest type prefers to "default," i.e. to renege on loans.

Given the parameters chosen by Camerer and Weigelt, the sequential equilibrium predicts that during the first periods B-players should lend money with certainty while towards and till the end of the game they lend money only with some (constant) probability that is smaller than 1. Dishonest E players are predicted to never default in the first few periods while towards the end of the game they start to default with increasing probability. Surely, in the last period they would, conditional on receiving money, default with certainty.

Camerer and Weigelt find that by and large the sequential equilibrium "predicts reasonably well, given its complexity." (p. 26) Nevertheless, the sequential equilibrium prediction is rejected for some periods of the experiment. In fact, although lending behavior is reasonably close to the prediction, it does not drop as sharply as predicted after the first few periods.

What is more, dishonest E players are reported not to default as early and as often as predicted.

As an explanation Camerer and Weigelt suggest that some fraction of E players, conditional on being a dishonest type, play like honest E players (who prefer to pay back even in the last period). It turns out, that the observed behavior can be partially reconciled with theory by assuming that subjects have a "homemade" prior regarding an E player's type which is different from the one implemented in the experiments.

Neral and Ochs (1992) also use the Camerer and Weigelt (1988) setup. They are able to replicate the results in the latter study when using the same parameters. However, when

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<sup>18</sup> This is an interesting game, but its relation to antitrust and dominance is not so clear; this entire subsection might eventually go out.

<sup>19</sup> The stage game is a simple "trust" game.

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changing payoff parameters (of the E player), the observed change in behavior is in clear contrast to the prediction. More precisely, the sequential equilibrium predicts that if the payoffs of the E player are changed such that the option “default” becomes less attractive, this doesn't change the E players strategy but causes the B player to reduce the probability of granting the loan. However, this counter-intuitive effect is not observed in the data. Quite to the contrary, behavior goes in the opposite direction predicted by theory.

Neral and Ochs also find that this behavior cannot be explained by the presence of “homemade” priors as suggested by Camerer and Weigelt. In his overview Camerer (2003) is thus lead to conclude “it is too much to hope for deviations from sequential equilibrium to be organized, across different experiments, by a single parameter.” (p.???)

Going back to ideas put forward by Selten (1978) on the chain-store game, Brandts and Figueras (2003) suggest that the deviations observed in Camerer and Weigelt and Neral and Ochs could be caused by subjects having problems analyzing games of such length (8 periods). Consequently, they suggest that shorter games should be used to test the notion of sequential equilibrium and reputation building. They run experiments in which either three or six rounds are played. However, the authors conclude, “As a whole, the sequential equilibrium notion does not do well in accommodating the patterns of the behavior we observe.” (p.113) It is true that for some parameter constellation “the sequential equilibrium notion does rather well.” But they continue: “One of the starting points of our study was the hypothesis that shorter games would be a rather favorable environment for the sequential equilibrium notion. This idea is not supported by our results. In a very general sense, one can even say that behavior in the long games is ‘closer’ to a smooth pattern of reputation formation. Common homemade priors, as first suggested by CW [Camerer and Weigelt, 1988], are not able to organize the data from different games.” (p.113)

Jung, Kagel and Levin (1994) implement a version of the original setup introduced by Kreps and Wilson (1982) featuring an incumbent that is either weak or strong (see above). In another version implemented in Jung et al., all incumbents are weak. In both versions it is observed that usually weak incumbents fight entry in the first periods of play such that entry is forestalled for experienced entrants. They also report, however, that “during mixed-strategy play, entry rates increased steadily toward the end of the game, contrary to the stationary entry rates that the model predicts.” (p.90).

## 5.2 Limit Pricing

Cooper et al. (1997a and 1997b) test a game based on the Milgrom and Roberts (1982) model of limit pricing. In this two-period model there is an incumbent confronted with a potential entrant. The privately known cost of the incumbent is either high or low (with equal probability) and entry is only profitable for the entrant if the costs are high. First, the incumbent chooses a price and then, upon observing it, the entrant decides whether or not to enter. Cooper et al. consider two main treatments: one in which the entrant has “high” and one in which the entrant has “low” costs. The game with a low-cost entrant only has a separating equilibrium in pure strategies in which the *low*-cost monopolists engages in limit pricing in order to deter entry. In the game with a high-cost entrant there exist pooling equilibria in pure strategies in which the *high*-cost monopolist engages in limit pricing to deter entry. The main finding of this study is that “limit pricing reliably emerges in both types of games as the theory predicts” (Cooper et al. 1997a, p.663). They continue to report: “Convergence to equilibrium follows a characteristic history of play. Initially, independent of potential entrants’ costs, monopolists largely ignore any threats of entry. Given that entrants can then easily infer the monopolist’s type, entry rates on high-cost monopolists quickly rise, fostering attempts to pool with low-cost monopolists who are not being entered on. In games where pure-strategy pooling equilibria exist, play settles into an ‘efficient’ pooling equilibrium in which low-cost monopolists produce at their full-information output level and high-cost monopolists imitate them, forestalling entry. In games where no pure-strategy pooling equilibria exist, these ‘pooling’ efforts are shattered by increased entry that induces low-cost monopolists to separate to higher output levels” (p.663)

Müller et al. (2004) examine the strategic behavior of incumbents and entrants in experiments that involve two incumbents and one potential entrant. The games are based on Bagwell and Ramey’s (1991) model of oligopoly limit pricing. Incumbents first learn whether the demand is high or low and then choose prices simultaneously. An entrant who does not observe the demand condition directly, tries to infer it from the incumbents’ choices and then decides whether or not to enter the market. The authors run both full-information and private-information treatments. When the entrant’s outside option is low such that only separating equilibria exist, they find that behavior in the full- and the private-information treatments is very similar. Thus, in this case they find evidence for the “no-distortion” equilibrium emphasized by Bagwell and Ramey (19991). In this “no-distortion” equilibrium players act as

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if there was no private information. When the entrant's outside option is high such that both separating and pooling equilibria exist, Müller et al. find that prices charged by high (low) cost incumbents in the private-information treatment are similar to (higher than) those in the full-information treatment. Here the authors also find differences in entry behavior.

### **5.3 Investment into capacity**

Mason and Nowell (1998) consider a simple two-stage quantity-setting duopoly based on Dixit (1979). There is one incumbent and one potential entrant. Upon observing the incumbent's quantity, the entrant has to decide whether or not to enter the market. If it enters it pays a fixed cost. Mason and Nowell run three treatments varying the commonly known fixed entry cost which are large enough such that the subgame perfect equilibrium has the incumbent choosing the smallest output that guarantees the entrant non-positive profits and the entrant chooses to not enter. The experiments consist of 20 periods with random matching and role switching.

Mason and Nowell find that attempted entry deterrence by incumbents is relatively common and that it becomes more common as time unfolds. Also, the frequency of deterrence attempts clearly rises with the level of fixed entry costs. However, a substantial fraction of incumbents do not try to exploit their first-mover advantage choosing lower than entry-detering quantities. This is persistent even towards the end of the experiments. Regarding entrants' behavior, Mason and Nowell find that conditional on the incumbent player deterring entry, about 75% of the entrants stay out whereas 25% enter nevertheless. This is, again, persistent throughout the experiments.

It seems that the softer behavior of some of the entrants can be explained by the fear of punishment which, given entrants' behavior, did occur in the experiments.

Brandts et al. (2004) report on a test of the entry-deterrence model by Bagwell and Ramey (1996). The starting point of the latter paper is the fact that models predicting incumbents installing entry-detering excess capacity perform poorly in empirical studies. Bagwell and Ramey consider a three-stage duopoly game: First, the incumbent can (partially) pre-commit to a certain level of capacity that is costly. Upon observing this choice, the entrant has the same choice that becomes publicly known. Finally, the two firms simultaneously decide whether or not to compete in the market by bearing (the rest of) the costs of capacity. This game has two subgame perfect equilibria in which one of the firms produces and becomes a

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monopolist while the other firm shuts down. However, forward induction selects the entrant's preferred equilibrium.

Contrary to this prediction, Brandts et al. (2004) find that the incumbent becomes the monopolist three times as often than the potential entrant (and that pre-installation is relatively rare for both the incumbent and the entrant). Moreover, over time play does not converge in the direction of the Bagwell-Ramey prediction. An explanation offered by Brandts et al. is that players might enter the game with the belief that the first mover has a strategic advantage and should thus become the monopolist in the market.

Brandts et al. also run a simple Dixit-style control treatment. Here they find that the predicted first-mover advantage is strong even when the incumbents do not engage in entry deterrence. However, when the incumbent pre-commits the advantage is clearly and substantially more pronounced.

#### **5.4 Advertising<sup>20</sup>**

Although not meant as a study of the anti-competitive effects of advertising, Morgan et al. (2005) is relevant for our survey. The authors study advertising and pricing behavior in a model in which consumers are heterogeneous with respect to price sensitivity. Theory predicts that advertising costs act as a facilitating device in that higher costs increase firm profits at the expense of consumers. (Note that, the cost of advertising is, of course, not a strategic variable here.) In fact, in their experiments the authors find as predicted that higher advertising costs decrease demand for advertising and raise advertised prices, and that this is detrimental to consumer surplus. However, as pricing and advertising strategies are observed to be more aggressive than theory predicts, exogenously increasing costs of advertising does not increase firms' profits.

## **6. PREDATORY PRICING**

Since Gomez, Goeree, and Holt (2004) already provide an excellent overview of experimental results on predatory pricing,<sup>21</sup> we will only shortly summarize the main results emerging from this small stream of papers.

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<sup>20</sup> Maybe, we should drop this section as the purpose of the following paper was not to study anticompetitive effects of advertising.

<sup>21</sup> See also Wellford (2002) and Normann and Ricuitti (2004).

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Despite big efforts to provide favorable conditions for predatory pricing to evolve in complete-information posted-offer laboratory markets, Isaac and Smith's (1985) "search of predatory pricing" was unsuccessful. Yet, Harrison (1988) continued the hunt for predatory pricing. He modified the Isaac and Smith design by implementing several simultaneous posted-offer markets and found evidence of predatory pricing. However, replicating Harrison's experiments, Goeree and Gomez (1998) again report little evidence for predatory pricing. They ran, however, a second series of experiments in which Harrison's multiple-market design was modified in two respects. First, instead of letting subjects make entry and price decisions simultaneously, Goeree and Gomez (1998) let sellers first choose markets followed by price announcements. Second, Goeree and Gomez simplify the demand structure. With these changes in place, Goeree and Gomez report that predatory pricing consistently arose in most markets.

Jung, Kagel and Levin (1994) (see section on reputation) report that weak incumbents usually fight entry in the early periods of their two versions of the Kreps and Wilson (1982) model. This can be interpreted as predatory pricing practiced by the weak incumbent. Jung et al. (1994) have therefore provided two more market structures that "readily facilitate predatory pricing" in the laboratory. (p.90)

## **7. VERTICAL RESTRAINTS<sup>22</sup>**

Both Mason and Phillips (2000) and Durham (2000) concentrate on the "double marginalization problem," i.e. the fact that in a vertical relationship, both the upstream and the downstream firm (that are assumed to have market power) each price at a mark-up over their marginal costs. This can be overcome by vertical integration.

Mason and Phillips consider a setup in which upstream firms' profits are independent of downstream firms' actions and where vertical contracts are linear. This implies that vertical integration should raise outputs and lower prices. This is what Mason and Phillips find. In particular, they find that vertical integration increases consumer surplus by about 12% when compared to the setup without integration.

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<sup>22</sup> This section better fits under Article 81, hence, probably eventually it has to go out.

Durham (2000) also studies the presence of a vertical externality and the incentives to integrate. She considers two setups both of which have a monopolist upstream. But whereas in one setup there is also a monopolist downstream, in another setup there is a downstream market consisting of three firms. Durham finds evidence for double marginalization when vertical markets are controlled by monopolists. However, with competition in the downstream market there is no evidence of a vertical externality and prices are consistent with the outcome under vertical integration.

As mentioned above, in their paper on zone pricing in the gasoline market Deck and Wilson (2003) also examine the issue of divorcement, i.e. the legal restriction that refiners and retailers cannot be vertically integrated. To measure the effects of divorcement Deck and Wilson compare behavior in the above mentioned baseline (or zone pricing) treatment with a company operated ("company-op") treatment. In the latter treatment all of the retail stations are vertically integrated, which essentially removes the intermediary and eliminates double marginalization. In fact, the authors find that company-owned stations eliminate the double markup of prices such that all buyers, in clustered or isolated areas, pay lower prices and have substantially higher utility when stations are company-owned. Thus, the conclusion is warranted that in the laboratory markets divorcement legislation harms consumers.

Martin et al. (2001) study the commitment problem of an upstream monopolist. This refers to the fact that without a close vertical relationship an upstream monopolist may not be able to make a credible commitment to downstream firms that it will restrict output. This means that in the absence of a commitment device, downstream firms will not accept contracts that allow the producer to extract full monopoly profits. Again, vertical integration can resolve this commitment problem and enables the upstream monopolist to fully exploit its market power. The basic experimental structure considered by Martin et al. has a single upstream firm that produces an input at constant average and marginal costs and two downstream firms that convert each unit of input into a unit of a homogeneous final good. The upstream monopolist can simultaneously make take-it-or-leave-it contract offers to each of the downstream firms specifying a quantity and a fixed payment it demands for the bundle.

In a first treatment these contract offers become publicly known before downstream firms decide. Public contracts serve as a commitment device such that in this case the upstream

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monopolist can earn the monopoly profit for itself by offering contracts that consist of offering half the monopoly output at half the monopoly profit to each downstream firm.

If, however, the contracts are secret such that a downstream firm will not observe the contract the upstream monopolist offers to the other downstream firm, the upstream monopolist may no longer be able to obtain the monopoly profit. Predictions in this treatment depend on so-called out-of-equilibrium beliefs of a downstream firm concerning the contract that is being offered to its rival. More precisely, if a downstream firm entertains *passive* beliefs, it thinks that its rival receives the equilibrium offer. In this case it can be shown that output is higher, and the upstream monopolists's profits are lower than in the joint-profit-maximizing outcome.<sup>23</sup>

A third treatment implements the case where the upstream monopolist integrates vertically with one of the downstream firms. Here, the integrated firm can commit to sell the monopoly quantity through its downstream subsidiary and not supply the other downstream firm at all. Martin et al. find partial support for the foreclosure theory. When contracts are secret (i.e. in the presence of a commitment problem) outputs are higher and the upstream monopolists' profits are lower than in case contracts are public or in case of an integrated firm (i.e., in the absence of a commitment problem). However, the differences are not as pronounced as theoretically predicted. Moreover, the experimental results differ from the theoretical predictions with regard to the division of profits between upstream and downstream firms. Theory predicts that the upstream firm should have all the bargaining power (by making take-it-leave-it offers) such that it should be able to extract all of the industry profits. This is observed most of the time in the treatment with an integrated firm. However, in the two nonintegrated treatments with public respectively secret contracts, the upstream monopolist only obtains a fraction of industry profits. It seems that the threat of the downstream firms to reject the upstream firm's offer limits the latter firm's bargaining power.<sup>24</sup> Interestingly, this unpredicted bargaining effect provides another rationale for vertical integration despite the presence of other vertical restraints (such as public contracts) that are predicted to solve the commitment problem as well. Martin et al. conclude, "other vertical restraints may not allow the upstream firm to extract as much industry rent as full vertical integration." (p.479)

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<sup>23</sup> There is, however, another equilibrium (with so-called *symmetric* beliefs) in which the outcome is the same as with public contracts. However, Rey and Tirole (200?) argue that the assumption of passive beliefs is theoretically more sound.

<sup>24</sup> Martin et al. discuss (dis)similarities of their treatments with the ultimatum game for which experimental results reject the subgame perfect equilibrium prediction with its extremely asymmetric payoff consequences.

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Note that in all papers on vertical restraints discussed here, firms were never given the *option* to vertically integrate. That is, all papers compare treatments without integration with a treatment in which integration was exogenously imposed. Clearly, it would be very interesting to see what happens in case firms are allowed to vertically integrate endogenously.

## 8. CONCLUSION

Let us now come back to the questions we have posed at the beginning of this overview:

### 1. Is it the case that most experiments on abuse of dominant positions focus on predation?

From this review it seems, but our work is far from complete.

### 2. Is there scope for further experiments within the sphere of abuse of dominance?

See section 2 for some things that antitrust practitioners worry about. One of the things we were surprised about is the relatively limited number of experiments that deal with abuse of a dominant position in the strict sense. It seems that experimental economists have not lead themselves be guided very much by Article 82 cases.

For the next version, we plan to here mention things that future experimental research should concentrate on both from an economist's and a lawyer's perspective. For now we may already mention the following things which appear to be missing in the EE literature::

Experiments on

- Price discrimination (non-linear rebate schemes, loyalty rebates, etc.)
- Bundling and tying
- Refusal to deal in a vertical relationship
- Exclusion and exclusivity clauses<sup>25</sup>

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<sup>25</sup> Within the scope of a recently awarded research grant by the Dutch Science Organization (NWO), the fourth author plans to conduct several series of experiments that will mainly concentrate on the possible exclusion or deterrence of a (potentially) more efficient entrant. Experiments planned concern the effect of contractual

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- Predatory product differentiation

**3. Is the gap between experimental research results supplied by the literature and the demand of case handlers due to the inherent boundaries of experimental research as such?**

On this point the authors need to have further discussions. Our preliminary answer is as follows.

Our answer to this question is No (with some qualifications). It seems fair to say that competition authorities are using more and more economic reasoning when analysing cases and that, in particular, the application of theoretical models of strategic behavior will become more widespread.<sup>26</sup> It is therefore important to have a wealth of empirical evidence showing that the models competition authorities rely on are indeed valid. Such evidence would help policy makers and courts to distinguish “normal” competitive behavior from illegal practices. Surely, there is no shortage of theoretical models of strategic behaviour. What is missing, however, is empirical evidence. Why is this? Upon reflection, the lack of empirical evidence is not surprising as it is in general hard to come by. The main reason is that both theoretical models and business practice crucially depend on private information about costs that is inaccessible for outside observers.<sup>27</sup>

A unique advantage of experimental methods is that all parameters of a market are under control and, more importantly, observable. This is not only true for firms' private information such as costs but also for conspiratorial activities as in Davis and Holt (1998).

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arrangements as in Aghion and Bolton (1987), “naked exclusion” as in Ramseyer et al. (1991) and Segal and Whinston (2000), and spatial entry deterrence as e.g. in Bonnano (1987) or Boyer et al. (2003).

<sup>26</sup> Note for example eminent economic theorists' involvement in antitrust cases. See also Brennan (2000) who reflects on the increasing importance of game theory in antitrust economics. (p.12)

<sup>27</sup> The lack of empirical evidence and the problems of obtaining it are acknowledged by leading economists in the field. In fact, Scherer and Ross (1990) state that it is “difficult to observe systematically the actions taken by incumbents to deter entry” (p.392). Or consider Wilson (1992) who states that “The plethora of predictions obtainable from various formulations indicate that empirical and experimental studies are needed to select among hypotheses. Many models present econometric difficulties that impede empirical work, but this is realistic: the models reveal that strategic behavior can depend crucially on private information inaccessible to outside observers. Estimation of structural models is likely to be difficult, therefore, but it may be possible to predict correlations in the data. Experimental studies may be more effective;” (p.324)

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Let us illustrate with an example. Huck et al. (2002) report on an experiment with bilateral mergers imposed in three- and four-firm Cournot oligopolies with constant unit costs. Theory predicts that these mergers are not profitable for the merged firms (see Salant et al., 1983). While theory predicts aggregate output well, it fails to predict individual quantities. Contrary to the prediction, post-merger markets are not symmetric as merged firms produce a larger output compared to unmerged firms, and unmerged firms yield to the more aggressive behavior of merged firms. As a result, in the markets with initially four firms the merger is profitable in the short run, merged firms break even in the long run. This asymmetry of individual outputs has an interesting implication for the econometric merger analysis. Much of the econometric work on mergers using field data has involved structural estimation based on Nash equilibrium behavior. In such studies, deviations from symmetric Cournot outcomes might be accounted for by differences in firms' marginal cost. In the absence of direct evidence on costs, field-data studies might well conclude that the merger resulted in efficiencies that reduced marginal cost and caused the merged firm to increase output. As the alleged efficiency increase is part of the welfare effect of the merger, conclusions about the desirability of the merger are misled. In the laboratory, the experimenter can control for the underlying parameters, such as marginal cost, and a behavioral hypothesis such as Nash equilibrium behavior can be accepted or rejected based on evidence.

Experimental economics can contribute to observation-based underpinnings of strategic-behavior issues that can inform both theorists and antitrust practitioners. We think this is important as some economists argue that there is some “judicial scepticism” against certain kinds of strategic behavior such as predatory pricing that has led to dismiss charges of such behavior in court cases until recently (see e.g. Bolton et al. 1999). But experimental economists have helped to isolate circumstances under which e.g. predatory pricing is likely to arise (see above). So, all evidence obtained from carefully and appropriately designed experiments should be welcome.

[More material to be added here]

Some caveats need to be mentioned. Clearly, there are many situations where experimental economics will not be helpful assessing antitrust issues. For example, ...

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Another qualification is in order with regard to the specific subject pool used in most experiments (college students). However, it is likely that recent attempts to extend the methods that experimenters usually use will prove successful in increasing the general relevance of experimental procedures obtained using convenient student samples. (See Harrison and List (2004) on the relationship of laboratory and field experiments.)

**4. What are the lessons from this paper for using experimental research in antitrust enforcement?**

[To be added]

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## **ANNEX 1: Overview of the ECJ/CFI case law and the Commission decision practice under Article 82 EC**

The table on the following pages (see separate excel sheet) was established using the following methodology:

- It includes Commission decisions published in the Official Journal (including recent decisions soon to be published). Unpublished decisions, informal pronouncements, etc., which might have been mentioned in press releases or in the Commission Annual Competition Reports, have been left aside. They are usually less significant.
- It includes ECJ cases decided on a preliminary reference from national courts (Art. 234 EC). Appeals to the CFI/ECJ from Commission decisions are dealt with under the corresponding Commission decision.
- It includes only cases decided under Article 82 EC where the Commission or the court identified the abuse in question. There are other cases (essentially from the ECJ) where Article 82 EC was at stake, but where the abuse was not discussed.
- Cases involving Article 82 EC in conjunction with Article 86 EC, although numerous (especially at the ECJ level) were left aside. These cases are not always entirely relevant, since they concern how State measures, in connection with public-sector firms or firms enjoying monopoly rights, can lead to abuses of dominant position. It can be argued that the specific context of these cases colours the discussion therein of what constitutes an abuse
- For each case, the date of the decision is given, followed by an overview of the procedure and the type of abuse involved. There can be more than one per case. Note that in the Commission decisions, there was a finding of abuse for the types of practices indicated on the table for that case (sometimes reversed by the CFI/ECJ on appeal), whereas in its decisions on preliminary rulings, the ECJ sometimes indicated that it did not see any abuse with respect to the types of practices indicated on the table for that case.