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ASSESSMENT OF DAMAGES IN THE DISTRICT HEATING PIPE CARTEL.

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Assessment of damages in the district heating pipe cartel[♦]

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Abstract:

The pre-insulated pipe cartel was established 1990 in Denmark, was extended to Italy and Germany during 1991 and re-organised in 1994 to cover the entire common market. Cartel members engaged in market sharing, price setting, bid rigging, coordinated predation and delaying of innovation. The European Commission fined the cartel in 1998. In 2005 four Danish municipalities successfully sued three cartel members and received large damage payments. The paper reviews the EU case, explains the economics of cartels, describes different approaches to determining damages and shows how this was done in practice.

Keywords: cartel damages, pre-insulated pipes,
JEL: L13, L41, L61/L95

[♦] The author acted as one of two experts on the appraisal of damages appointed by the High Court of Western Denmark in the combined case of the four municipalities v. three cartel members during 2004 to 2005. Thanks are due to Anette Boom and Niels Blomgren-Hansen for comments on an earlier draft.

1. Introduction and motivation

Following a complaint of their Swedish competitor, Powerpipe, the European Commission paid a surprise visit to nine producers of pre-insulated pipes for district heating systems and their trade association on 28 June 1995. The EU Commission found detailed evidence that the companies had conspired to share markets, fix prices and rig bids in various markets during the period 1990 – 1996 and that they had attempted to eliminate Powerpipe by organizing a boycott of suppliers. According to the decision of the EU Commission taken on 21 October 1998, the cartel continued to operate for nine months after the dawn raid.¹ The European Commission decided to impose fines totalling EUR 92.21 million to the ten members of the cartel. In March 2002, the Court of First Instance reduced the fines by EUR 5.1 million but upheld the decision of the EU Commission in broad terms.² All but one firm (viz. Sigma) appealed this decision to the European Court of Justice that dismissed the appeals on 28 June 2005.³

More than 10 years after the dawn raid, in one of the first serious suits for damages connected to a EU cartel case, four Danish municipalities succeeded in retrieving EUR 21 million in damages. The case was litigated at the High Court of Western Denmark during 2004/5 and resulted in a settlement within court. The damages amounted to 25% of the fine which is significant compared with previous European experience. As a percentage of the damages claimed (EUR 38 mn), realized damages amounted to 57%.

This paper aims at discussing the methods used (and not used) for calculating the damages. The paper is organized as follows: In section 2, I summarize the decision of the EU Commission and the judgements of the European Court of Justice, emphasizing the information that is particularly interesting for the calculation of damages. In section 3, I give a brief account of the modern industrial organization of cartels. Section 4 gives an account of methods that can be used to calculate damages and section 5 describes the methods that were employed by the parties to the Danish case, namely the before and after method and a cost-plus method. Section 6 discusses why the parties did not use supplementary methods such as oligopoly models, econometrics and yardstick or benchmark methods. Finally, section 7 provides a conclusion and broader perspectives on the case.

2. The decision of the European Commission

The cartel was established November or December 1990 in Denmark, extended to Italy and Germany during 1991 and re-organised in 1994 to cover the entire common market. Cartel members engaged in market sharing along national boundaries, price fixing, bid rigging in tenders and procurement auctions, and coordinated predation against the only independent rival, Powerpipe of Sweden. In addition, they used industry standards to delay introduction of new, cost-saving technology. The dawn raid took place in June 1995 but the Commission found evidence that cartel meetings took place until at least March 1996 – albeit more secretly than before. Thus, in Denmark the cartel period ran from late 1990 through the first quarter of 1996.

Four Danish firms, ABB I.C. Møller (ABB in the following), Løgstør Rør (LR in the following), Dansk Rørindustri (a.k.a. Starpipe; DRI in the following) and Tarco made up the core of the cartel.

¹ Case. IV/35.691/E-4 (OJ L24/1; 30.1.1999). See also press release IP/98/917 of 21 October 1998.

² CFI Cases T-9/99 (Henss/Isoplus); T-15/99 (Brugg); T-17/99 (KE KELIT); T-21/99 (DRI); T-23/99 (LR); T-28/99 (Sigma); T-31/99 (ABB).

³ ECJ joined cases C-189/02 P (DRI); C-202/02 P (Henss/Isoplus); C-205/02 P (KE KELIT); C-206/02 (LR); C-207/02 P (Brugg); C-208/02 P (LR); C-213/02 P (ABB).

These four firms controlled fifty percent of production capacity in the EU. In addition, two German firms, Henss/Isoplus and Pan-Isovit, as well as Finnish KWH were significant international cartelists while three companies played only a smaller role in that they only served their local markets and only participated in the cartel for a short period (German Brugg Rohrsysteme, Austrian KE KELIT Kunststoffwerk, and Italian Sigma Tecnologie).

Pre-insulated pipes are used to supply hot water from district heating stations to households in a certain district and to return cold water. The product consists of an inner steel carrier pipe, an outer dense plastic jacket and foam insulation (polyurethane) in between the two pipes. The standard production method around 1990 was discontinuous production of inflexible pipes of standard lengths 6, 12 and 16 meters. Discontinuous production involves filling the void between the inner pipe and the plastic jacket through injection holes in tightly fitting caps at both ends. The standards (e.g. EN243) were set by standard authorities in collaboration with producers, their trade association and customers.

Already before 1990, a more modern, cost-saving technique of continuous pipe manufacturing had been developed. Continuous pipe production first has the insulating foam moulded or sprayed onto the inner pipe after which the outer casing pipe is extruded or wound around the pre-shaped (modified) polyurethane foam. This technique is suitable to big production runs of pipes of the same diameter and results in fast production at a relatively low variable cost: Material costs are reduced due to lower foam overpack, lower filling density and reduced casing pipe thickness. On the other hand, set-up times of continuous production are longer than with discontinuous production and capital costs are higher. Thus continuous production entails less flexibility, lower variable costs and higher fixed costs than discontinuous production making continuous production the obvious choice if the scale is sufficiently large.⁴ The Commission found that cost reductions that would result from the introduction of continuous production would amount to 10-15 percent, according to internal ABB documents.⁵

The markets for district heating pipes in (western) Europe were relatively concentrated in the late 1980s and the four largest players were ABB (40%), LR (20%), DRI (14%) and PanIsovit (12%) so that the four-firm concentration ratio CR4 amounted to 86. The Herfindahl-Hirschman Index, HHI, which incorporates the smaller rivals' market shares, was 2461. This is normally considered a characteristic of highly concentrated markets. Figure 1 illustrates the distribution of market shares.

Customers were district heating stations that could be owned by municipalities or be house-owners' cooperatives. For larger projects, they would typically buy district heating pipes through tenders or EU procurement (60%); for repair or maintenance of district heating systems they would enter fixed-term supply contracts.

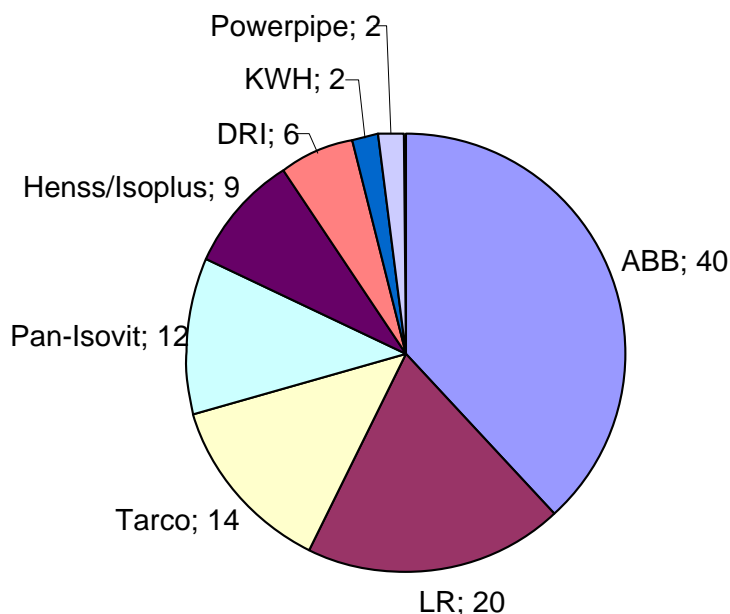
In the EU the turnover in the market was roughly ECU 400 million in 1995. The Member State with the largest consumption was Germany (40%), followed by Denmark (20%). Both of these markets were considered mature and stable so that no growth in revenues was expected. Outside the EU

⁴ Source: <http://www.huntsman.com/pu/index.cfm?PageID=262>

⁵ Case. IV/35.691/E-4 (OJ L24/1; 30.1.1999) at para. 114-115: "Løgstør Rør has for some time sold pipes which are non-standard. They promised to stop this immediately." According to the decision, ABB planned to introduce "ABB slimline quality pipes" in 1994 and obstructed the early introduction of the technology by rivals (LR) before that time. The technology available already 1988 (Decision at 5).

markets were found in Eastern Europe, Scandinavia, and the Baltic Countries. Total revenues in these markets amounted to around ECU 100 million. Russia and China were emerging markets.

Figure 1: Market structure



Source: European Commission decision, paragraphs 8-18, see footnote 1.

The effect of the cartel on prices is discussed inconclusively in the Commission decision at paragraphs 125-126. Prices in Germany were 15-20 percent lower than in Denmark, and it was the stated intention of the cartel to raise German prices by 6-8 percent. Swedish prices were even lower than this, at occasion only half of Danish prices, but the evidence shows that ABB and LR carried out predatory pricing in Sweden and Finland with a view to having local firms exit through bankruptcy or acquisition.

When the cartel was extended to cover the entire EU in 1994, the intention of the cartel was to increase prices by 30-35% in two years and according to minutes from a cartel meeting in the spring of 1995, prices did go up by 15-20 percent during the first year of operation in those markets where the outsider, Powerpipe, was not present.

The decision by the European Commission is nowhere more precise than this when it comes to price effects of the cartel. Legally it is not necessary to show that the cartel was successful in raising prices, just that there has been illegal conduct and indeed the section on restriction of competition (Decision, paragraphs 146-148) includes a long list of illegal elements of agreements and other prohibited arrangements. Thus, private litigation for damages that needs to demonstrate the loss due to higher prices has to estimate the price effects from scratch.

The fines issued by the European Commission and those decided by the Court of First Instance (CFI) are indicated in Table 1.

Table 1: Fines decided by the EC (1998) and later by the Court of First Instance (2002)

Company	Commission fine (ECU)	Fine decided by CFI (EUR)
ABB Ltd.	70,000,000	65,000,000
Brugg Rohrsysteme GmbH	925,000	925,000
Dansk Rørindustri A/S	1,475,000	1,475,000
Henss/Isoplus	4,950,000	4,950,000
Ke-Kelit Kunststoffwerk GmbH	360,000	360,000
Oy KWH Tech AB	700,000	No appeal
Løgstør Rør A/S	8,900,000	8,900,000
Pan-Isovit GmbH	1,500,000	No appeal
Sigma Tecnologie di Rivestimento Srl	400,000	300,000
Tarco Energi A/S	3,000,000	No appeal
Total	92,210,000	87,110,000

Note: In 2005, the ECJ upheld the ruling of the CFI.

Source: European Commission decision, see footnote 1; CFI decisions, see footnote 2.

3. Essential cartel economics

A cartel is a group of firms producing substitute goods that collude or conspire with the aim of raising prices, lowering production and/or sharing markets or customers with the aim of achieving monopoly profits. Cartels have been illegal in the United States since 1890 but have to varying degree and extent been legal in Europe until the 1950s. For customers, the cartel implies that they pay more than they would have, had the firms competed head-on. For society, the cartel implies that less is sold since some customers refrain from buying at all and other customers buy less than they would have had it not been for the higher price (the deadweight loss).^{6,7}

Cartels arise in oligopolies, i.e. markets characterized by a few firms that, exactly because they are few, understand that their profitability depends on their rivals' behaviour. This interdependence means that they think strategically. By entering a collusive agreement or a coordinated practice, the oligopolists can raise prices and possibly achieve monopoly prices. However, high prices create an incentive for the cartelists to cheat on the agreement by undercutting their rivals or increasing output: the cartel price is above the cost of production so extra profits can be earned by cheating. If everybody cheats, the cartel breaks down.

The cartel's solution to this problem is to reach a common understanding that punishment will follow cheating that is thus discouraged. The harsher the punishment, the less likely it is that it will have to be carried out. In the industrial economics literature, there are a number of suggestions as to how a punishment strategy can be concocted. A very simple (and for that reason very popular) version is that cheating triggers a reversion to full competition forever (Nash reversion, see e.g. Friedman (1971a,b)); but there are examples of even better and more complex punishment strategies that involve even lower prices during punishment but a return to cooperation when the

⁶ Good summaries of the modern industrial economics of collusion with a view to competition policy may be found in Bishop and Walker (2002, sections 5.07-31) and in Motta (2004, chapter 4). Advanced treatments may be found in Tirole (1989, chapters 5 and 6) and Martin (2003, chapter 10).

⁷ The payment of damages is related to the overcharge paid for the amounts bought by customers. In principle, customers that bought less (or nothing at all) because of the high price may also have suffered a loss. However, it is considered too difficult to assess just how much more customers would have bought had the price been competitive, so damages are not awarded that correspond with the deadweight loss. One rationale for the fines imposed on the firms that engage in cartels could thus be seen as compensating society for the deadweight loss.

punishment is over (see Abreu (1986)). One well documented example is the triggering of a temporary price war by an unexpected drop in the price, see Porter (1983a,b).

Apart from the detecting and punishing cheating, the cartel will have a problem, if there are some producers of the good that are not members of the cartel or not taking part in the collusive agreement. They then run the risk of being undercut by non-cartel members or even by potential competitors that might enter the industry. The degree to which such outsiders to the cartel pose a real threat depends on the technology that they possess: if their marginal costs are low and ‘flat’ (i.e. relatively independent on the level of output; constant returns to scale) and if capacity is not an issue, then they pose a serious threat to the high price level that the cartel wishes to sustain; on the other hand, if the outsider has a small capacity and/or quickly increasing marginal costs (decreasing returns to scale), then they may be perceived as a mild nuisance that can be largely ignored.⁸ The attempts made by members to first invite their independent rival, Powerpipe, to join the collusive scheme and then to eliminate it should be seen in this light.

4. Calculating damages

In 2001, while the second appeal of the European Commission’s decision was pending before the European Court of Justice (ECJ), four Danish municipalities sued three of the firms (ABB, DRI, LR) that were most active in setting up the cartel in Denmark in an attempt to retrieve some of the extra money that they had spent on district heating pipes due to the cartel overcharge. Tarco was not sued, a controversial act since it had been involved in the cartel and since it was owned by municipalities in Denmark. Total damages claimed amounted to DKK283 million or EUR38 million. Table 2 summarizes the distribution of the claims.

Table 2: Claims made by four municipalities against three cartel members

Million EURO	ABB	LR	DRI	Total
Copenhagen	3.35	4.71	-	8.06
Aarhus	0.81	1.21	-	2.02
Odense	12.92	-	-	12.92
Aalborg	12.65	-	2.42	15.07
Total	29.73	5.92	2.42	38.07

Sources: The various summons of the four municipalities as summarized by PriceWaterhouseCoopers (2002) p. 14.

Essentially the way damages are calculated involve the determination of the quantity, Q , purchased from each defendant and the price, P , paid during the cartel period. This information is relatively easily available by studying the invoices paid. The most problematic part is then to determine the price that would have obtained in the absence of the cartel, the “but-for” price, p . The damages may then be calculated simply as:

$$\text{Damages} = (P-p)Q$$

i.e. the overcharge multiplied by the quantity traded during the cartel period.

⁸ See Scherer & Ross (1988, ch. 7 and ch. 8) for a general exposition of factors that facilitate respectively limit oligopolistic coordination, as well as Motta (2003, ch. 4.2).

The calculation of the “but-for” price, p , involves a counterfactual – what would the price have been but for the cartel? – and hence begs the use of economics. The literature⁹ identifies five different ways of establishing the counterfactual “but-for” price:

1. The before or after method
2. The benchmark or yardstick method
3. The cost-based method
4. Econometric estimation of the effect of the cartel
5. Oligopoly models

1. The before or after method

The before or after method simply alleges that the but-for price would have been the price that existed before the cartel was set up or after it dissolved. Absent an agreement, these prices would constitute the non-cooperative Nash equilibrium of the oligopoly. Arguably, any break-down of the cartel, e.g. a price war during the existence of the cartel, could serve the same purpose although a counter argument would be that according to some theories of oligopoly, price wars could be harsher than the Nash equilibrium.

2. The benchmark or yardstick method

The benchmark or yardstick method suggests using the price that obtains in a comparable market unaffected by the cartel as the but-for price. The challenge is to find such a market. Typically a separate geographic market (country or region) is used.

3. The cost-based method

The cost-based method takes as its starting point that the perfectly competitive price would be marginal costs and that in the long run the price would be competed down to long-run average costs that includes a normal return. The but-for price is then this competitive price. Since marginal costs are not readily observable, typically some average cost concept is used as a proxy and an allowance is made for the normal return. This method typically relies on accounting data.

4. Econometric estimation of the effect of the cartel

The econometric method may be used if there is a time series of prices that extends before and after the cartel period. If the cartel period is already identified, a time series regression that include a dummy variable that takes the value 1 in the cartel period and 0 outside may be used to estimate the price effect of the cartel. The value of the estimated coefficient to the dummy is then essentially the mean of the overcharge, $P-p$.

5. Oligopoly models

Setting up an oligopoly model essentially amounts to describing the market in game-theory terms: Who are the players? What are the rules of the game? And how do their payoffs reflect their actions? Underlying these questions is a hierarchy of important questions that have to be answered, e.g. how may the technologies be described? Are capacity constraints important? How are the markets designed? How do customers react to changing prices, i.e. what is the elasticity of demand? Based on information such as this a model may be constructed that fits the industry at hand and this model may be confronted with available data through calibration or estimation depending on the availability and quality of data. The but-for price would then be the Nash equilibrium of the static version of the model.

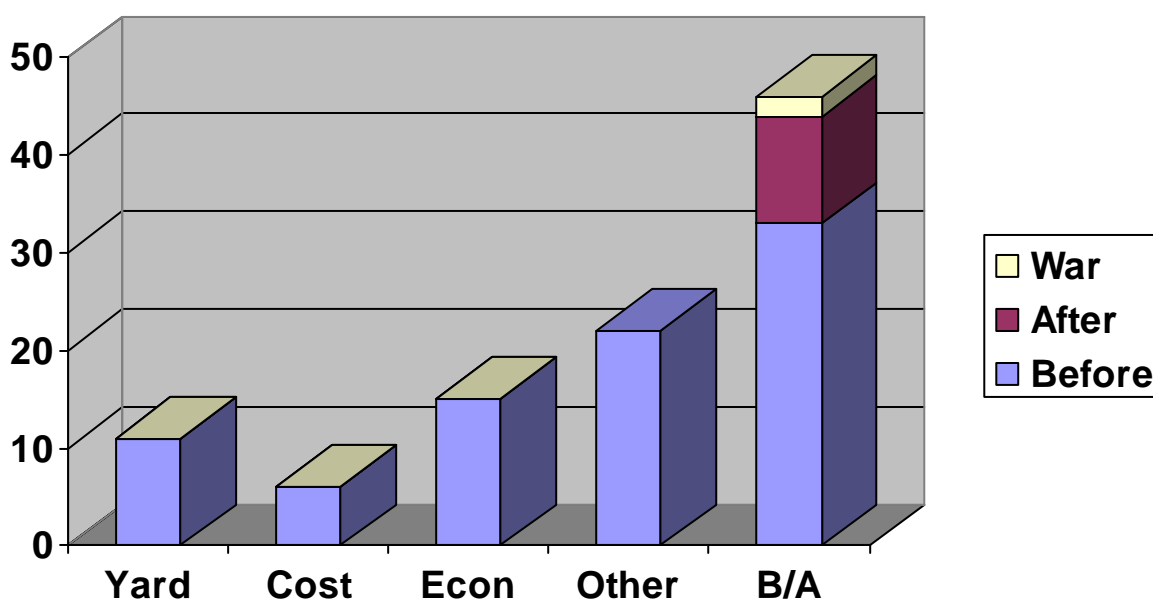
All five methods come in a variety of different shapes and forms. In applying any of the five methods it is obviously important to control for differences or changes in underlying variables such

⁹ See e.g. American Bar Association (1996), Connor (1997, 2001, 2004) and Finkelstein and Levenbach (1983).

as prices of inputs. If, for example, input prices are low before or after the cartel, this may partly explain why prices are lower in the reference period and if the but-for price is not corrected for this, the overcharge will be overestimated. These details are often subject to contention

In a survey of evidence on cartel overcharges, Connor and Bolotova (2005) show that of 512 cartel cases from all over the world, the prevalent method for calculating the overcharge is the before or after method (supplemented with a few that use within-cartel price wars) to estimate the overcharge, see Fig. 2. Econometric modelling is also significant, followed by the yardstick and cost-based methods. The rest (“Other”) signifies that in some of the cases the method for calculating the overcharge was not identified.

Figure 2: The frequency of method of estimating overcharges in a survey of cartel cases



Source: Connor and Bolotova (2005, Table 5).

Surprisingly, none of the methods, except yardstick, provide systematically different estimates of the overcharge; see Connor and Bolotova (2005, 40-41). Overcharges estimated using the yardstick method were on average 11 percent higher than those estimated by the other methods.

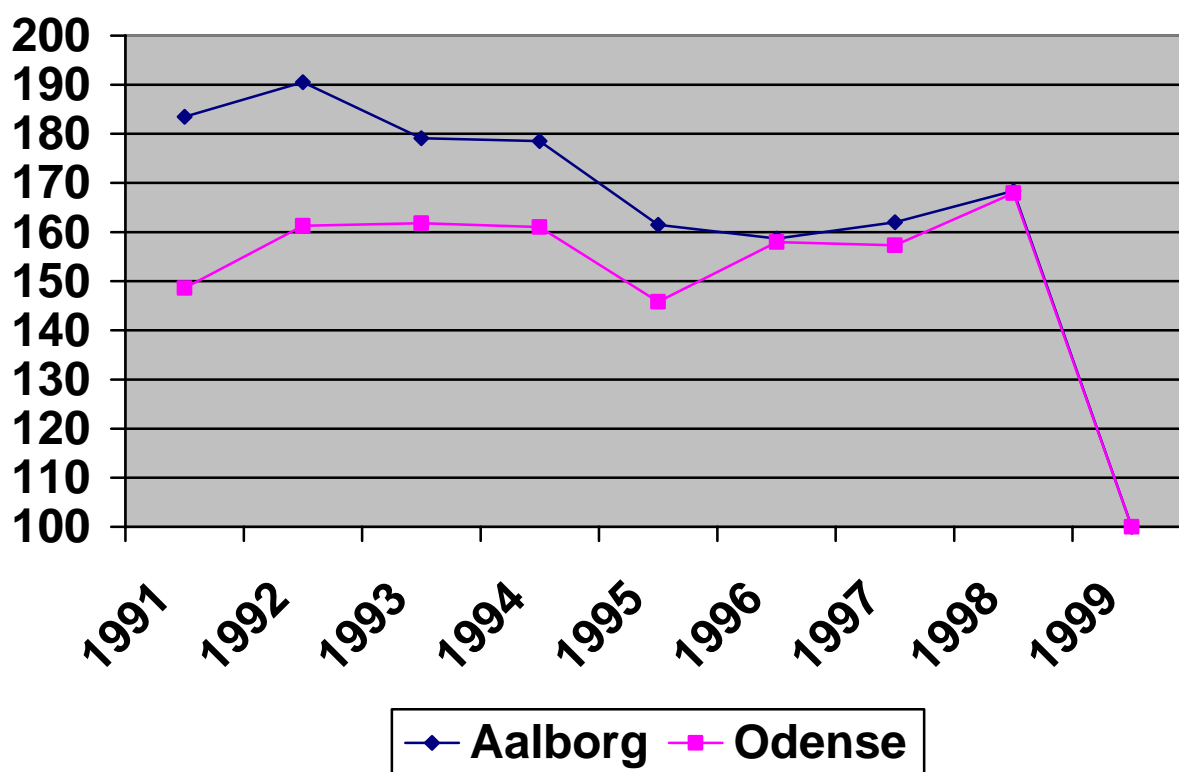
5. Damages in the district heating pipe cartel

After method

In the district heating pipe cartel, the plaintiffs used a relatively simple version of the after method to calculate the damages mentioned in table 2. As a starting point they noted that after the cartel was revealed, the prices observed at the first subsequent tender were on average 35-40 percent lower than during the cartel period and that no other significant factors seemed to be able to explain this. Thus the but for price was essentially taken to be the lowest price obtained in the first tender in each municipality after the cartel was revealed. However, a common price index was calculated to control for changes in other factors that would influence the price of district heating pipes. This index made a coarse correction of the but-for price for changes in the prices of iron, steel, and plastic as well as wages. This was done on an annual basis for the years 1994-1998. The resulting

annual overcharges were then multiplied with the quantities of the invoices for those years and their summation resulted in the damages claimed. The plaintiffs opted to include bendable (flexible?) pipes although these were expressly left out of the EU Commissions decision. The reason for this was that they found the price behaviour to match that of the non-bendable pipes. Examples of the price behaviour are found in figure 3.

Figure 3: Price index for goods delivered from ABB to two plaintiffs/municipalities (1999=100)



Source: KPMG (2003) p. 62 and p. 66.

The defendants criticized the plaintiffs’ method on a number of accounts, including the range of products, the level of detail and disaggregation of the calculation, and the way the price index was calculated, emphasizing for example that plastic was far too crude a measure and that it would be more proper to include “isocyanate”. However, these imprecisions were found to count only relatively little for the size of the calculated damages. See PriceWaterhouseCoopers (2002c). In addition, a defendant argued that if the after method used by the plaintiffs were extended to all customers, then the defendant would have made large losses in all of the cartel period hence showing that the method was unrealistic.

Before method

The defendants then argued that the plaintiffs had used an “after method” and that a “before method” would in principle be at least as valid, so they recalculated the damages using the price of 1990 rather than 1999. As a result, calculated damages dropped by more than 80 percent since 1990 prices were a good deal higher than their 1999 counterparts, thus raising the but-for prices significantly. For example ABB found that the municipalities’ total claim should be €5 million rather than €30 million (see PriceWaterhouseCoopers, 2002d, p. 16). The defendants claimed that the “after price” was negatively affected by low demand in 1999 and that 1990 was much more

representative for the demand and supply conditions during the cartel period making the “before price” the better but-for price.

The weakness of using the before price to calculate the overcharge is that the European Commission in its decision (at par. 29-30) mentions that Denmark was considered a high-price area already by the late 1980s and that they found that ABB initiated a series of meetings with LR, Tarco and DRI already in 1988-9. The Commission decided not to include the two years prior to November 1990 in the cartel period even though LR had acknowledged that the anticompetitive behaviour had started already in 1988-1989; see the decision at par. 151. So it seems that the European Commission opted for the safe evidence and decided not to decide on the degree of competition during 1988-1990.

Cost-based method

One of the defendants also provided an alternative calculation of the damages based on the cost-based method.¹⁰ Normally, the starting point for the cost-based method is the calculation of unit costs (i.e. total costs divided by the number of units produced of a given good). A normal return on capital is added to the unit costs and the result is an estimate of the but-for price. Due to the large number of goods produced by the defendants and the inherent problems in distributing common costs among these, the defendants opted to use an approach – the economic profit method – that would circumvent these problems.

Economic profit is the extra profit a company earns more than the normal return on capital. It can be thought of as the opportunity cost of capital: what would the capital be worth in the second most attractive use? Thus if economic profit is 0, then the company’s owners earn as much investing their money in the particular industry as they would have if they moved their capital to the second best alternative. Economic profits of zero do not imply that accounting profits are also zero: to the contrary if economic profits are zero, then accounting profits must be positive to provide the normal return on capital. Economic profits are competed down to zero when competition is very intense, as for example in the reference model of perfect competition.

The defendant decided to estimate the overcharge as the positive economic profit earned in the cartel period taking the firm rather than the single good as the unit of analysis. The defendant calculated earnings before interest, taxes, depreciation and amortization (EBITDA) and related that to the invested capital (operational assets, financial assets and equity). The requirement to normal return on capital was then varied between 0 and 15 percent and depending on this number, corresponding overcharges were calculated.

Using this method, the damages that were to be paid would be much reduced compared to the claims made by the plaintiffs. The precise number would obviously depend on the required normal return on capital, but in roughly speaking the defendant’s calculation amounted to one fifth of the claims.

The economic-profit method was criticized on a number of accounts. Most obviously, the normal return on capital is not a well-defined concept. It would, among other things, depend on the company’s risk profile. Secondly, it is not obvious how many of the assets to include.

Furthermore, it requires that the company is run efficiently. Industrial organization acknowledges the possibility that limited competition can have a negative impact on firms’ efficiency and costs; they may have too high costs and innovate to little due to the lack or competitive pressure (Motta,

¹⁰ PriceWaterhouseCoopers (2002e).

2004, p. 39). The fact that costs are too high may be due to lacking incentives to cut costs but also that the “Darwinian process” of eliminating inefficient competitors is obstructed.

Lacking incentives to cut costs were already described by Adam Smith but treated extensively by Leibenstein (1966, 1973) who coined it X-inefficiency. X-inefficiency describes the idea that the quiet life of market power leads to reduced focus on cost cutting. The idea was criticized by Stigler (1976) who argued that profit maximizing firms would minimize costs, but modern principal-agent analysis has shown that it is possible to combine profit maximization with lack of cost minimization due to separation of ownership of control in complex organizations: owners delegate responsibility for costs (among other things) to managers who may have their own agenda, see e.g. Hart (1983). Empirically, recent research indicates that competition increases productivity and lowers costs, see e.g. Nickell (1996) and Nickell, Nicolitsas & Dryden (1997).

The “Darwinian selection” of efficient firms at the cost of less efficient firms is obstructed when competition is limited or absent. In a competitive situation, efficient firms will grow and inefficient firms will shrink to eventually disappear if they do not manage to become more efficient. Empirical results show that cost reductions and productivity increases in an industry (producing telecommunications equipment) are a result of closure of old, inefficient firms and the appearance of new, efficient ones, see Olley and Pakes (1996).

In sum, the cost-based method suffers from the possibility that reduced competition may have inflated the costs in three ways: First, because the owners may not have had full control over managers’ incentives to cut costs; second, because, a high price may have allowed inefficient firms to survive; and third because the cartel may have delayed the introduction of new, cost-cutting technologies (continuous production of pipes).

The settlement that they reached in 2005 totalled €1 million which was 57 percent of the damages claimed by the municipalities. The settlement was roughly half way between the damages calculated by the plaintiffs using the after method and those calculated by the defendants using the before method and the cost-based (economic profit) method. Thus it constituted a genuine compromise and reflects the legal uncertainty of the parties as to what the court would have decided, had it been called upon to do so.

From an economic point of view it is interesting that the parties abstained from using three of the five methods mentioned in section 4 above.

6. Methods not used

In their litigation, the parties to the suit for damages only used the before and after methods supplemented by the cost-based method in its economic-profit version. It is interesting, that the plaintiffs and the defendants agreed not to employ the three remaining methods. It could have provided extra evidence and made the calculation of damages more precise. Recall that Connor and Bolotoya (2005) find that the different methods normally concur, although the yardstick methods has a tendency to overestimate the overcharge compared with the other methods; see section 4.

The yardstick method was not used since the cartel was not limited to the Danish market according to the decision of the European Commission. However, the cartel was extended to Germany only during the early 1990s and indeed prices in Germany was 15-20 percent lower than in Denmark. Thus it might have been possible to use the situation of Germany in e.g. 1991 to calculate a but-for price in Denmark.

The econometric method regresses the price paid by the plaintiffs on a number of background variables that aim at controlling for changes in input prices, changes to technology, demand

variations unrelated to prices and of course the existence of the cartel. The parties decided that this method was not practical since “the method requires data of a level of detail that it is not possible to provide in this case.” (PriceWaterhouseCoopers, 2002a, p. 22). However, the background material to the case included quite detailed information on prices both in terms of the level of disaggregation in the product dimension and in terms of the time series properties. Thus it is not clear that this method could not have been used.

Finally, and perhaps most regrettably, the parties decided not to build an oligopoly model to fit the industry. The reasons for not doing this build on misinterpretation of economics to a large extent. Although the parties show knowledge of other models of short-term oligopolistic competition, it is decided that the relevant model would have been the Cournot model where firms compete in quantities. This particular oligopoly model is then criticized on the following grounds:¹¹

- The method does not take capacity utilization among cartel members into account.
- It assumes a homogeneous product and high barriers to entry.
- It assumes that competitors are naïve and that they don’t take entry and exit of competitors into account.
- It does not take parameters such as marketing and product differentiation into account.

The method was dismissed on the basis of this critique and the non-availability of data. Since all of the critique of the Cournot model above that is in and of itself a problem: A modern view of Cournot sees it as the possible outcome of capacity choice followed by price competition; see Kreps and Scheinkman (1983). While it is true that the standard introductory textbook Cournot model assumes a homogeneous product and a fixed number of firms (and hence high barriers to entry), the model may be easily adapted to accommodate both product differentiation and entry; see e.g. Martin (2001, chapter 3). In Cournot fully rational players find a Nash equilibrium, so the third critique is not valid either; and the model can be adapted to endogenize product differentiation and advertising/marketing, see e.g. Friedman (1983).

Thus all in all, the critique of the Cournot model is erroneous – but that does not mean that a Cournot model should be used to analyse the industry at hand. The oligopoly model would quite obviously have to be adapted and calibrated to take account of the particulars of the district heating pipe industry. The parties would have had to discuss what kind of competition would be a reasonable assumption (tenders for a large part of the contracts); they would have had to discuss existing technology and the introduction of new production methods and how that would affect costs (think of the evidence on the delayed introduction of continuous pipes); they would have had to provide evidence on capacity constraints and utilization; and they might have had to discuss the likely changes to the industry structure that might have followed a competitive scenario that would have led to bankruptcies, mergers and acquisitions.

7. Conclusion

The European Commission successfully decided to fine ten producers of district heating pipes for cartel behaviour in the first half of the 1990s. The evidence provided by the Commission to convict the cartel included showed that the cartel existed and demonstrated that it had been operating at least between 1990 and the spring of 1996. In the decision by the Commission it is strongly hinted that the cartel might have operated before 1990 and that it could still be operating at the time of the

¹¹ See PriceWaterhouseCoopers (2002a, p. 16).

decision (1998). However, the Commission nowhere indicated, let alone quantified, the effect of the cartel on prices.

Hence the customers when deciding to sue cartel members for damages were provided with strong evidence on the existence of the cartel and the cartel period, but were left to demonstrate that they had in fact suffered damages and what the size of those were. In the process of proving damages, the plaintiffs used two out of five methods, arguably the most low-tech methods from the toolbox (the before and after method and the cost-based method). In future cases it is to be hoped and expected that the evidence is consolidated better through the use of high-tech economic evidence (especially econometrics and tailor made oligopoly models). If employed sensibly, this would likely improve the precision of the estimate of the overcharges and damages. As private litigation becomes more prevalent in European antitrust, legal counsel and courts will hopefully experience a better use of economics.

The recent history of the district heating pipe industry provides further perspective on the case: In 1999, LR bought Tarco's district heating pipe production. ABB's district heating pipe production was first bought by ALSTOM and in 2005, ALSTOM and LR merged to form a LOGSTOR. Measured by the market shares of Figure 1, the combination would control 74 percent of production. DRI still exists as an independent competitor. However as the four-firm concentration ratio approaches 100 percent, the firms may not have to agree explicitly to reach a common understanding of what prices should be. In Germany a new cartel case has recently (2005) been opened by the public prosecutor in Munich for cartel behaviour on the German market.¹² Thus oligopolistic coordination of one sort or the other seems to be a permanent feature of this industry.

¹² See Staatsanwaltschaft München I (2005)

Literature

Abreu, Dilip (1986) “Extremal equilibria of oligopolistic supergames”, *Journal of Economic Theory* 39: 191-225.

American Bar Association, Section of Antitrust Law (1996) *Proving antitrust damages – Legal and economic issues*, Chicago: American Bar Association.

Bishop, Simon and Mike Walker (2002) *The economics of EC competition law*, London: Sweet & Maxwell.

Connor, John M. (1997) “The global lysine price-fixing conspiracy of 1992-1995”, *Review of Agricultural Economics* 19(2): 412-427.

Connor, John M. (2001) “‘Our customers are our enemies’: the lysine cartel of 1992-1995”, *Review of Industrial Organization*, 18(1): 5-21.

Connor, John M. (2004) “Global cartels redux: the amino acid lysine antitrust litigation (1996)” in John E. Kwoka, Jr. & Lawrence White (eds.) *The antitrust revolution: Economics, competition, and policy*, 4th edition, Oxford University Press: 252-276.

Connor, John M. and Yulija Bolotova (2005) “Cartel overcharges: survey and meta-analysis”, *draft*, 03 October 2005, Purdue University, West Lafayette.

Finkelstein, Michael O. and Hans Levenbach (1983) “Regression estimates of damages in price-fixing cases”, *Law and Contemporary Problems* 46(4): 145-169.

Friedman, James (1971a) “A non-cooperative equilibrium for supergames”, *Review of Economic Studies* 38(113): 1-12.

Friedman, James (1971b) “A noncooperative view of oligopoly”, *International Economic Review* 12(1): 106-122.

Friedman, James (1983) “Advertising and oligopolistic equilibrium”, *Bell Journal of Economics* 14: 464-473.

Hart, Oliver (1983) “The market mechanism as an incentive scheme”, *Bell Journal of Economics* 14: 366-382.

KPMG (2003) *Aalborg, Århus, Odense og Københavns Kommuner: Rapport om erstatningsopgørelser i forbindelse med kommunernes handel med Alstom Power Flowsystems A/S I perioden 1991-1998 [in Danish: Report on calculation of damages in connection with the trade between [ABB] and the municipalities during the period 1991-1998]*, Copenhagen.

Kreps, David and Jose Scheinkman (1983) “Quantity precommitment and Bertrand competition yield Cournot outcomes”, *Bell Journal of Economics* 14: 326-337.

Martin, Stephen (2001) *Advanced Industrial Economics* (2nd edition), Oxford: Blackwell.

Motta, Massimo (2004) *Competition policy – theory and practice*, Cambridge: Cambridge University Press.

Nickell, Stephen (1996) “Competition and corporate performance”, *Journal of Political Economy* 104: 724-746.

Nickell, Stephen; Daphne Nicolitsas and Neil Dryden (1997) “What makes firms perform well?” *European Economic Review* 41: 783-796.

- Olley, Stephen and Ariel Pakes (1996) “The dynamics of productivity in the telecommunications equipment industry”, *Econometrica* 64: 1263-1297.
- Porter, Robert H. (1983a) “Optimal cartel trigger price strategies”, *Journal of Economic Theory* 29: 313-338.
- Porter, Robert H. (1983b) “A study of cartel stability: the Joint Executive Committee, 1880-1886”, *Bell Journal of Economics* 14(2): 301-314.
- PriceWaterhouseCoopers (2002a) ALSTOM PowerFlowSystems A/S, Delrapport A: Teoretisk og analytisk referenceramme for opgørelse af den økonomiske effekt af en antaget karteldannelse; [in Danish: Report A: Theoretical and analytical framework for determination of economic effects of an alleged cartel formation], Hellerup*
- PriceWaterhouseCoopers (2002b) ALSTOM PowerFlowSystems A/S, Delrapport B: Beskrivelse af sagsøgernes erstatningsberegningsmodeller [in Danish: Report B: Description of plaintiffs' models for calculating damages], Hellerup.*
- PriceWaterhouseCoopers (2002c) ALSTOM PowerFlowSystems A/S, Delrapport C: Bemærkninger til sagsøgernes erstatningsberegningsmodeller [in Danish: Comments on the plaintiffs' models for calculating damages], Hellerup
- PriceWaterhouseCoopers (2002d) ALSTOM PowerFlowSystems A/S, Delrapport D: Alternativ beregning af erstatningskravet baseret på ALSTOMs faktiske handelstransaktioner [in Danish: Alternative calculation of damages based on ALSTOM's actual transactions], Hellerup.
- PriceWaterhouseCoopers (2002e) ALSTOM PowerFlowSystems A/S, Delrapport E: Alternativ beregning af erstatningskravet baseret på ALSTOMs økonomiske overskud (Economic Profit) [in Danish: Alternative calculation of damages based on ALSTOM's economic profit], Hellerup (Confidential).*
- Staatsanwaltschaft München (2005) *Anklageschrift*, Beglaubigte Abschrift, Munich 18.03.05.
- Tirole, Jean (1989) *The theory of industrial organization*, Cambridge, Mass.: MIT Press.