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*Title* **Optimal Fining Policies**

*Date:* **February 2005**

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**Paper presented at the *Remedies and Sanctions in Competition Policy* Conference, Amsterdam Centre for Law and Economics**

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## **Abstract**

This paper discusses three types of fines: optimal fines, the fine according to the US sentencing guidelines and the fine according to the EU guidelines. These fines are compared with respect to their deterrent effect and their implementability. The optimal fine is equal to the social cost of the infringement. According to Posner and Easterbrook (1981), the social cost of the infringement is defined to be the loss in consumer surplus. A fine equal to the loss in consumer surplus ensures that anticompetitive behaviour resulting in a net loss of consumer surplus is deterred. Additionally, behaviour that is a strict breach of competition law, yet increases total surplus, is not deterred, because the fine forces firms to compare the potential cost-savings with the deadweightloss arising from the conduct. However, some drawbacks of such an optimal fine also exist. First, estimating the loss in consumer surplus or the probability of detection raises problems. Second, the optimal fine may turn out to be too high for the firm's ability to pay. Nevertheless, fines according to the US and EU guidelines could be improved with regard to their current measurement of the harm of the conduct.

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## 1 Introduction

The aim of this paper is to examine the fining guidelines of the European Commission and the US sentencing guidelines in the light of a theoretically “optimal” fine. The paper addresses this question as follows. Section 2 gives an overview of the levels of fines imposed by the European Commission and the US Department of Justice between 1998 and 2003. Section 3 discusses theoretically optimal fines, especially from the point of view of efficient deterrence. A graphical example is given to illustrate the application of the optimal fine in the case of a cartel. Section 4 describes current fining policies in the US and the EU according to the guidelines behind the policies. A numerical example of the functioning of the guidelines is given for the second-largest member of the graphite electrode cartel, UCAR. Section 5 considers potential problems in the implementation of the optimal fine. In light of the findings regarding the optimal fine, section 6 discusses possible implications for the EC and the US guidelines. Section 7 concludes with a summary of the main findings.

## 2 EU and US fines: an overview

Fines are the sanction of choice in many competition cases. In this section, an overview of the total and average level of fines between 1998 and 2003 is given. The section is based on information regarding fining decisions described in the annual Report on Competition Policy by DG Competition between 1998 and 2003 as well as the fining decisions described in the workload statistics of the Department of Justice Antitrust Division between 1998 and 2003. Note that EC fines do not reflect all decisions leading to a fine during the year. In fact, Figure 1 and Figure 3 represent 37 out of 61 fining decisions imposed by the Commission between 1998 and 2003. However, given that these are fining decisions mentioned in the annual Report on Competition Policy, they can be taken as an indication of the most important fining decisions in a given year. Note also that the majority of the cases described refer to Art. 81 cases. This could be due to the fact that there are generally less Art. 82 fining decisions and that fining levels for Art. 82 are substantially below those for Art. 81 cases.<sup>1</sup> Figure 1 shows the absolute level of fines imposed for cases reported by the annual Report on Competition Policy. The figure shows a tendency for fine levels to increase between 1998 and 2003. According to a speech given by Prof. Mario Monti in 2003,

*“... In 2001 the Commission adopted 10 cartel decisions, imposing total fines nearing € 2 billion (a figure which is higher than the sum of all the fines imposed in the past EU history of anti cartel enforcement). In 2002 this level of cartel-hunting activity continued with 9 cartel decisions*

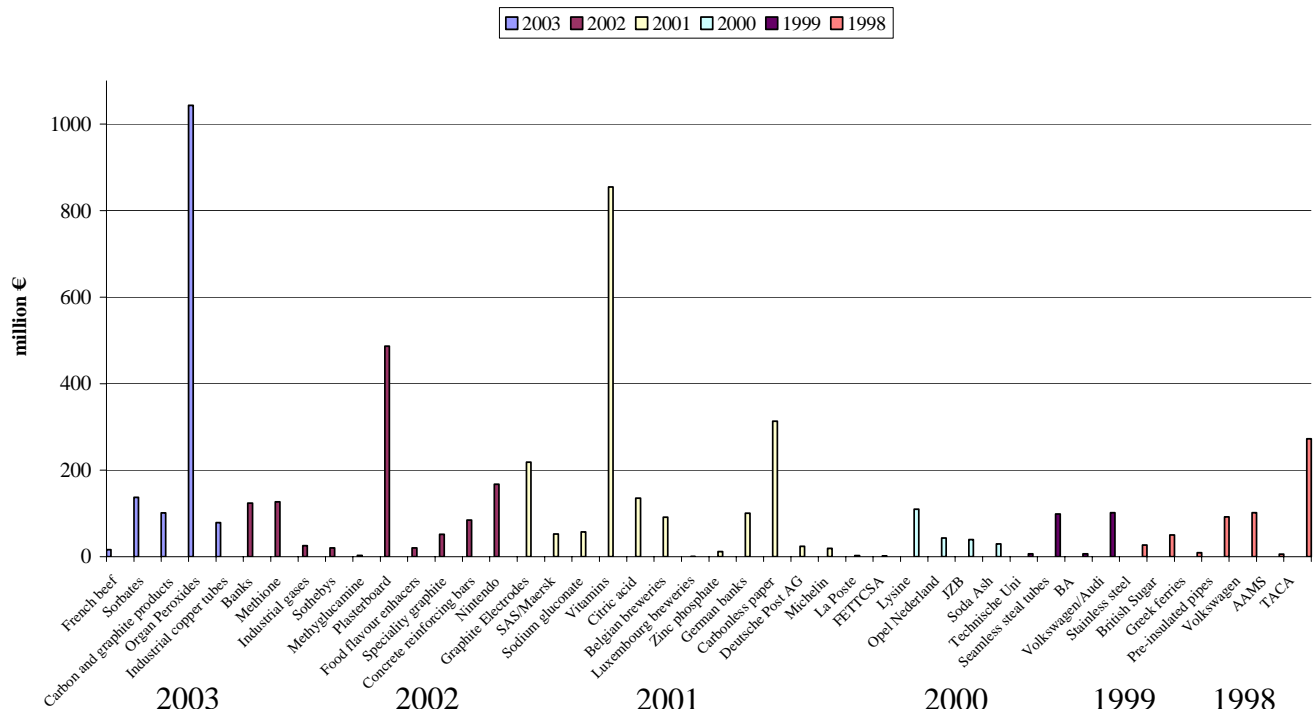
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<sup>1</sup> According to Geradin and Henry (2005), fines for breaches of Art. 82 have “more often than not been below the €25 million threshold”. The authors analyze 61 fining decision from 1998 to the end of 2004, of which 13 decisions are Art. 82 cases.

*adopted with total fines nearing € 1 billion. I can assure you that the Commission will seek to maintain strong emphasis on this activity in the future too.”<sup>2</sup>*

Figure 1 also shows the large fines imposed on the Vitamins cartel (2002), equal to €855 million, the Plasterboard cartel (2002), equal to €478 million and the Organ peroxide cartel, equal to €1 billion.

**Figure 1: Fines imposed by the European Commission in cases reported by the annual Report on Competition Policy between 1998 and 2003 (million Euro)**



Source: Case summaries from the annual “Report on Competition Policy” from DG Competition.

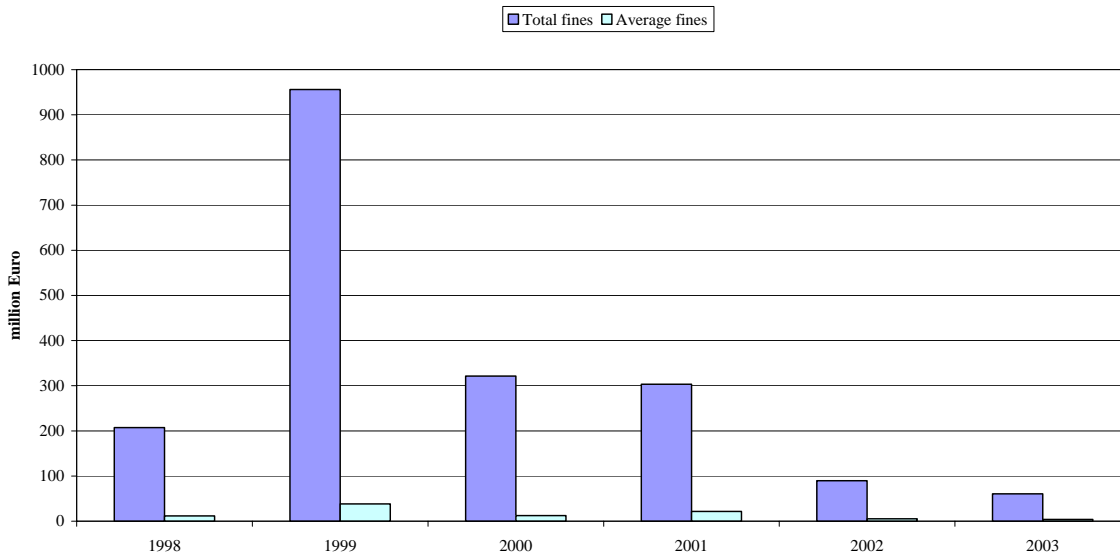
Figure 2 and Figure 3 show total and average US and EU fines per year from 1998 to 2003. Figure 3 shows that total fines per year and average fines per case in the EU have increased in the past three years compared to the previous three years. US fines appear to have decreased, with a peak in 1999, which can be explained by the fine of \$500 million against F. Hoffmann-La Roche (a member of the vitamin cartel), the largest fine ever imposed in a criminal prosecution of any kind.<sup>3</sup> Figure 3 clearly shows that the total amount of fines collected per year by the European Commission has increased between 1998 and 2003. An examination of Figure 3 and

<sup>2</sup> EU competition policy after May 2004, speech given by Prof. Mario Monti at the Fordham Annual Conference on International Antitrust Law and Policy on 24 October 2003.

<sup>3</sup> Status Report: An Overview of Recent Developments In the Antitrust Division’s Criminal Enforcement Program.

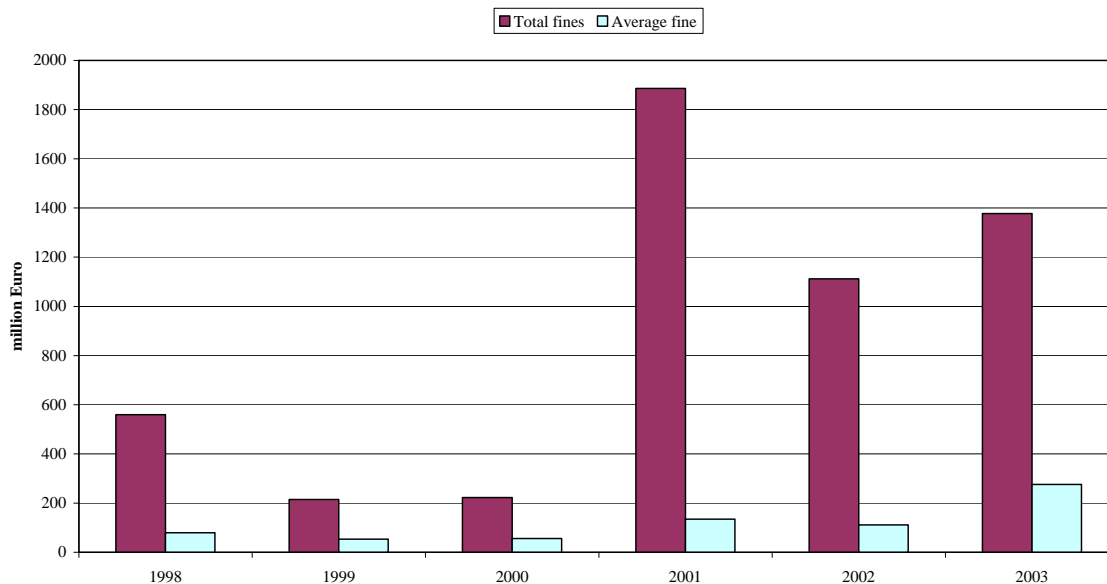
Figure 2 shows that both total and average fines in the European Commission are higher than in the US between 1998 and 2003. One reason for this difference is that fines are not the main remedy in the US, where deterrence against competition policy infringements such as price-fixing, bid-rigging and market allocation schemes works through a number of factors beside corporate fines, e.g. private treble damages action, jail sentences and fines for individuals. Thus, one of the findings, which can be deduced from the difference in fining level, is that fines represent the principal tool in the European Commission's enforcement of EC competition law. In view of the increasing level of EU fines, the paper examines the determination of fines according to the guidelines and according to the optimal fine as described by Posner and Easterbrook (1981).

**Figure 2: Total fines per year and average fines per case imposed by the Department of Justice from 1998-2003 (million Euro)**



Source: DOJ Antitrust Division, Workload Statistics FY 1994-2003. The totals do not include fines agreed to by defendants in plea agreements during the fiscal year but not yet imposed by courts. US \$ are converted to € using historical Interbank exchange rates on the last day of each year.

**Figure 3: Total fines per year and average fines per case imposed by the European Commission from 1998-2003 (million Euro)**



Source: Annual Report on Competition Policy for the year 1998 to 2003. Based on 37 out of 61 fining decisions between 1998 and 2003.

### 3 The optimal level of fines

The following section discusses the definition of the optimal fine from the point of view of deterrence and gives a graphical example of the deterrent effect of the optimal fine, assuming that fines are the only sanction available. However, fines represent the principal tool in the European Commission's enforcement of EC competition law.

#### 3.1 DEFINITION OF THE OPTIMAL FINE

The main aim of fines focussed on in this paper is to ensure deterrence. One way to ensure that the aim of deterrence is fulfilled is to set the fine as high as possible. However, this creates two problems. First, the principle of proportionality is laid down in European law.<sup>4</sup> This principle states that the burden of the penalty imposed on the party should not exceed what is necessary to achieve the public interest. Second, fines that are higher than the harm caused by a particular type of conduct may discourage firms to engage in conduct, which increases total surplus.

<sup>4</sup> Article 3b) of the E.C. treaty describes the principle of proportionality as follows: "Any action by the Community shall not go beyond what is necessary to achieve the objectives of this Treaty."

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For example, Posner (1976) mentions the possibility of firms spending large amounts on advertising that neither serves to inform consumers better nor improves the product. If firms could be convinced to limit their advertising expenditure, costs would fall. By cooperating in advertising or research, or by merely sharing important information, a cartel may be able to reduce costs. In order to sustain these gains, Sproul (1993) points out that horizontal price-fixing may serve the purpose of preventing firms from competing away the benefits that induce firms to cooperate to generate these cost savings. Finally, Martin (1999) shows that joint profit-maximisation requires output to be distributed among firms so that marginal costs are the same for all firms. To the extent that the high-cost firm reduces its output and accepts a lower market share, the units produced at a lower cost represent an efficiency gain.

“Optimal fines” are fines, which are proportional to the harm caused and which do not induce firms to forego behaviour that increases surplus. The question then remains at what level optimal fines should be set in order to deter harmful conduct, while remaining proportional.

Posner (1976, 2001) proposes to set fines equal to the cost of the violation imposed on society:

*"The penalty for an antitrust violation should be calculated to impose on the violator a cost, whether in pecuniary or non-pecuniary terms, equal to the cost that his violation imposed on society. This criterion is not derived from notions of symmetry or from the biblical notion of an eye for an eye. It is a criterion of efficiency."<sup>5</sup>*

Posner (1967, 2000) adds that this cost should be multiplied by the inverse of the probability of detection.<sup>6</sup> Multiplying the cost by the inverse of the probability of detection ensures that the fine accounts for the fact that companies discount the fine by the probability of getting caught.

### 3.2 THE DETERRENT EFFECT OF THE OPTIMAL FINE

Figure 4 shows a graphical analysis of the welfare effects of market power, e.g. a monopolist or full collusion of identical firms operating under identical cost conditions. For simplicity, the graph assumes a linear demand curve and constant returns to scale technology, implying linear marginal costs of  $MC$ . In the case of perfect competition, the price is  $P_{pc}$  and the quantity is  $Q_{pc}$ .<sup>7</sup>

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<sup>5</sup> The idea that penalties should be equal to the harm they impose was introduced by Becker's (1968) article "Crime and Punishment".

<sup>6</sup> Strictly speaking, the multiplier should be equal to the probability of detection and conviction – in other words the probability that the fine is actually imposed on the undertaking. For simplicity, the article assumes that infringements, which are detected, also lead to the imposition of a fine.

<sup>7</sup> The effect of market power is compared to the limiting case of perfect competition. A better comparison would be to use the competitive condition in the absence of the infringement, as described in Section 5.1 in the calculation of the but-for prices.



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If market power is at its maximum, price increases to  $P_c$  from the price under perfect competition,  $P_{pc}'$ , and quantity decreases to  $Q_c$  from  $Q_{pc}'$ . Although the firm's profit increases by area  $(P_{pc}', P_c, A, C)$ , the profit is a pure transfer from consumers' surplus and does not represent an increase in surplus. In fact, total surplus decreases by the triangle  $(C, A, D)$ . Clearly, this is harmful behaviour and should be prevented.

To determine the optimal fine that will prevent this kind of behaviour, the social cost of the infringement needs to be estimated. Depending on the welfare standard used, the social cost can be defined as either the net loss in surplus of the infringement, which is the deadweightloss triangle, area  $(C, A, D)$ , or the loss in consumer surplus, which is equal to the increase in profit due to the increase in price, area  $(P_{pc}', P_c, A, C)$ , plus the deadweightloss.<sup>8</sup> If the fine is set equal to the deadweightloss, firms will not be deterred because - at least in the case of a straight demand curve - the area of the deadweightloss is always smaller than the area of the profit rectangle and the infringement will not be deterred. However, Posner and Easterbrook (1981) suggest that the optimal fine should be equal to the profit above the marginal costs under perfect competition plus the deadweightloss. In this case, the fine amounts to area  $(P_{pc}', P_c, A, D)$ . The fine forces the violators to disgorge the profit above the original marginal costs,  $(P_{pc}', P_c, A, C)$ . The fine is exactly greater than the profit rectangle by the amount of the deadweightloss. Thus, the infringement is deterred.

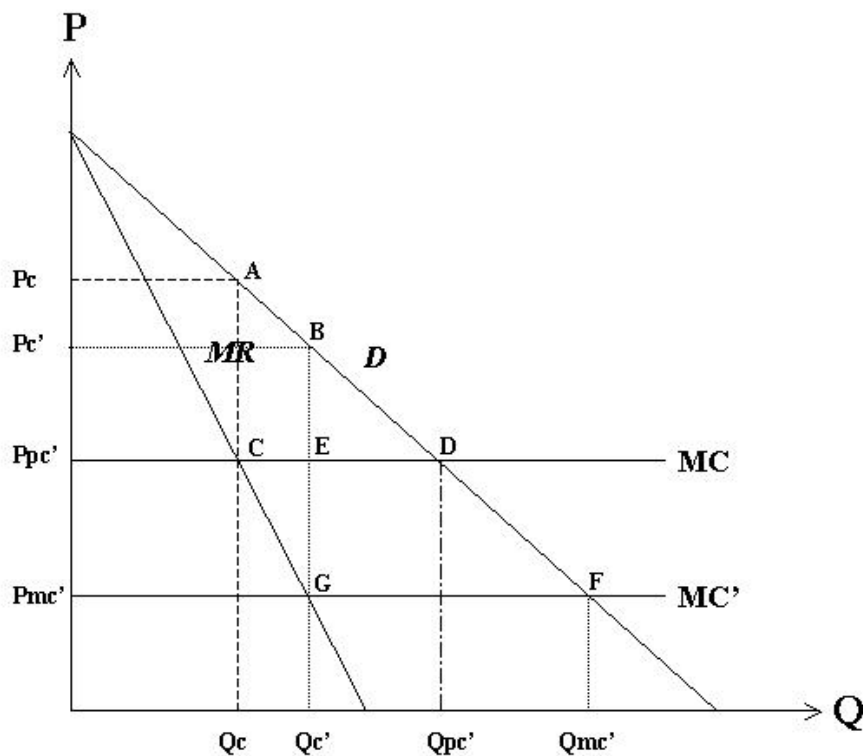
If there are efficiency gains as a result of the infringement, the effects of the infringement on surplus differ. Suppose that marginal costs decrease from  $MC$  to  $MC'$  due to efficiency gains explained in Section 3.1. Price increases to  $P_c'$  and quantity decreases (compared to the quantity under perfect competition) to  $Q_c$ . As a result of the reduction in marginal costs, surplus increases by the rectangle  $(P_{pc}, E, G, P_{mc}')$ . The net increase in surplus is the difference between this gain and the decrease in surplus, triangle  $(E, B, D)$ . In the second case, the net gain is positive and from the point of view of total surplus, this type of behaviour should not be deterred. If the fine is set equal to the deadweightloss, the potential infringer is not deterred. From the point of view of total surplus, this is desired. However, a fine equal to the deadweightloss does not guarantee that only potential infringers with cost savings larger than the deadweightloss are deterred. The fine does not force the potential violator to compare the profits due to cost-savings with the deadweightloss because the fine is easily paid out of the profits induced by higher prices. However, the potential violator can be forced to compare the profits due to cost savings with his deadweightloss if the fine is set equal to the loss in consumer surplus, area  $(P_{pc}', P_c', B, D)$ , consisting of the profit induced by higher prices  $(P_{pc}', P_c', B, E)$  and the deadweightloss, area  $(E, B, D)$ . Having disgorged the profit due to higher prices, the potential infringer compares the

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<sup>8</sup> Other costs of market power such as the resources in obtaining and maintaining a position of power are not shown. The figure also does not show the loss in productive efficiency, which could arise when a firm operating with market power has higher costs than if it were operating in more competitive environments, or any other costs which arise due to higher market power.

cost-savings with the remaining fine to be paid, the deadweightloss triangle  $(E,B,D)$ . The potential infringer can only obtain a net gain from his offence after being fined by ensuring that his cost savings, and thus the profits due to these cost-savings are larger than the deadweight loss. As long as the cost-savings are smaller than the deadweight loss, the net gain of the price-raising behaviour for the firm is negative and the behaviour is deterred. Conversely, if cost-savings are larger than the deadweightloss, the best alternative for the firm is to set the price equal to the original marginal costs under perfect competition,  $MC$ , avoid the fine completely and reap the gains from the entire amount of the cost saving. To see that evading the fine is the best alternative, note that if the firm increases its price slightly above the marginal costs,  $MC$ , under perfect competition, the fine to be paid will always be greater than the gain from higher prices by the amount of the deadweight loss. The fine induces firms to set prices to  $MC$  instead of  $Pc'$ . However, this is only the case for a linear demand curve. For non-linear demand functions, it may be profitable to set prices higher than the marginal cost and accept the fine.

**Figure 4: Welfare effects of two types of infringements**



Source: The figure derives from Williamson (1968). Although it was intended for a single efficient firm, it can be extended to a group of firms, acting as cartel, or to a joint venture, or indeed any behaviour in which firms jointly maximise profits. In the case of harmful breaches of competition policy, area  $(Ppc', Pc, A, D)$  is the profit rectangle due to higher prices and area  $(C, A, D)$  is the deadweightloss. In the case of "efficient" breaches of competition policy, area  $(Ppc', Pc', B, E)$  is the profit rectangle due to higher prices and area  $(Ppc', Pmc, G, E)$  is the profit rectangle due to cost-savings. Area  $(E, B, D)$  is the deadweightloss triangle.

The fine is optimal from the point of view of total surplus. Behaviour that decreases surplus is deterred, whereas behaviour that increases surplus is not deterred. Indeed, for efficient breaches of competition law, profit-maximising firms prefer to set their prices equal to the original

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marginal costs and avoid the fine. In the case examined, both types of infringers prefer to avoid the fine and hence the optimal fine will never be levied. Moreover, the fine is proportional to the harm caused to consumers.

## 4 Fining policies in the US and EU

Having described the optimal fine in theory, this section describes how fines are determined according to the fining guidelines in the US and the EU. Using the method to determine fines as described in the guidelines as a proxy for how antitrust authorities determine fines for breaches of competition law raises some problems. First, the guidelines are not binding.<sup>9</sup> Second, the Commission and the Antitrust Division of the DOJ may adjust the fine according to the specific economic context of the infringement. Third, companies use past cases involving fines to understand how fines are determined. A complete analysis of the fining policy would need to consider all fining decisions. Finally, fines determined according to the guidelines are subject to appeal. Whish (2001) examined major fining decisions of cartels between 1986 and 2000 that have been appealed at the Court of First Instance. All of the decisions examined resulted in a reduction of the level of the fine. The inclination of the Court of First Instance to reduce fines has also been mentioned in more recent work by Geradin and Henry (2005). According to their empirical evidence, in over 50% of judgements by the Court of First Instance, the reduction of the fine granted was between 7% and 25%, and appeals have never lead to an increase in fines. Nonetheless, the guidelines can be considered as an explanation of how fines should be determined.

### 4.1 THE US SENTENCING GUIDELINES

Chapter Eight of the Federal Sentencing Guidelines Manual, which deals with the sentencing of organisations, was adopted in 1991.<sup>10</sup> Chapter Eight was issued despite determined opposition from the Federal Judges Association, who tried to prevent the guidelines by claiming that they were unconstitutional. Indeed, the guidelines are aimed at constraining the discretion of judges

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<sup>9</sup> Factors that are not considered in the guidelines, but which constrain fining decisions include general principles of EC law such as the fairness/equitable doctrine and the doctrine of proportionality. Other constraints include the maximum permissible fine. Under Article 15(2) of Regulation 17 (First Regulation Implementing Articles 85 and 86 of the Treaty), the Commission may fine companies up to 10% of the worldwide turnover of the company preceding the decision. In the US, the statutory maximum for fines according to the Sherman Act (15 U.S.C. §1) is US \$10 million, or twice the gross (pecuniary) gain or gross (pecuniary) loss to consumers if the fine determined exceeds US \$10 million.

<sup>10</sup> U.S. Sentencing Commission Guidelines for the United States Courts, Chapter Eight and Section 2R1.1: Bid-Rigging, Price-Fixing or Market Allocation Agreements among Competitors. The guidelines have been revised since 1987 and the amended version on which this article is based is the 1991 guidelines

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over criminal fines, probation and non-criminal (for example restitution) sanctions. They are further intended to increase both fine and non-fine criminal sanctions.<sup>11</sup>

#### *4.1.1 Determination of the base fine*

Fines according to the US guidelines consist of determining a base fine, which is increased according to aggravating and attenuating factors. The base fine for bid-rigging, price-fixing or market allocation agreements among competitors is determined by 20% of the volume of affected commerce during the whole duration of the cartel. The 20% incorporates both the gain to the organisation from the offence as well as the harm caused by the offence. According to the guidelines, “It is estimated that the average gain from price-fixing is 10 per cent of the selling price. The loss from price-fixing exceeds the gain because, among other things, injury is inflicted upon consumers who are unable or for other reasons do not buy the product at the higher price. Because the loss from price-fixing exceeds the gain, subsection (d) (1) provides that 20 per cent of the volume of affected commerce is to be used in lieu of the pecuniary loss in [calculating the base fine].” Reasons for specifying a percent of the volume of the commerce include “to avoid the time and expense that would be required for the court to determine the actual gain or loss. In cases in which the actual monopoly overcharge appears to be either substantially less than 10 percent, this factor should be considered in setting the fine within the guideline fine range”.<sup>12</sup>

#### *4.1.2 Aggravating and attenuating factors*

The base fine is adjusted to reflect aggravating and attenuating circumstances, which determine the culpability score. Aggravating factors include firm size, past history of violations and obstruction of justice. For example, organisations should add five points to their culpability score if they employ 5,000 or more staff, if "an individual within high-level personnel of the organization participated in, condoned or was wilfully ignorant of the offence" or if "tolerance of the offence by any other authoritative personnel was substantial throughout such a unit".<sup>13</sup> According to the guidelines, the purpose behind increasing fines for larger corporations is based on three interrelated principles. First, an organization is more culpable when individuals who manage the organization participate in criminal conduct. Second, as organizations become larger and their managements become more professional, criminal conduct by such management is increasingly a breach of trust. Finally, as organisations increase in size, the risk of more serious criminal conduct also increases.

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<sup>11</sup> Parker and Atkins (1999) do not find a statistically significant change in the level of structure of corporate monetary guidelines imposed under the guidelines between 1992 and 1995 compared with pre-guidelines cases after controlling for the harm attributed to the criminal offence. However, Alexander, Arlen and Cohen (1999) find that fines and total penalties imposed were higher than they were before the guidelines.

<sup>12</sup> Section 2R1.1: Bid-Rigging, Price-Fixing or Market Allocation Agreements among Competitors.

<sup>13</sup> Chapter Eight of the Federal Sentencing Guidelines.

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Factors that decrease the culpability score include the reporting of the offence, full cooperation from the organisation or clearly demonstrating recognition. Additional points may be subtracted if the organisation has an effective program to prevent and detect violations of law, unless an individual with substantial authority participated in the violation.

The culpability score establishes the maximum and minimum multiplier for the base fine, which in turn determines the minimum and maximum fine. In determining the amount of the fine within the applicable guideline range, the court should consider factors such as the need for the fine to reflect the seriousness of the offence, the need to provide just punishment, adequate deterrence, the organization's role in the offence, any non-pecuniary loss caused by the offence, prior civil or criminal misconduct by the organisation other than that under current investigation and other factors. By the Sentencing Reform Act 1984, the judge is required to select a fine within the range determined by the multiplier, provided that the fine is below the statutory maximum for fines. The maximum fine allowed according to the Sherman Act (15 U.S.C. §1) is US \$10 million or, if the fine determined is larger US \$10 million, the alternative maximum of twice the gross gain or the gross loss (i.e. the pecuniary loss to the consumer). For example, in the sentencing decision examined in section 4.1.3, the gross gain was estimated by taking double the 10% overcharge and multiplying it by the total volume of affected commerce for the charged conspiracy period from all conspirators.

#### *4.1.3 Example of a fining decision*

To obtain an overview of the fining method behind the guidelines, the application of the guidelines in the determination of the fine for the US leg of the graphite electrode cartel, UCAR International, is described in Table 1. UCAR was accused of price-fixing in the United States from 1992 to 1997. The memorandum was filed in April 1998 by the District Court for the Eastern District of Pennsylvania and follows the US guidelines in the calculation of the fine.<sup>14</sup>

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<sup>14</sup> United States of America v. UCAR International Inc., Criminal No. 98-177, filed 4/12/1998.

**Table 1: Determination of the fine for UCAR according to the US guidelines**

<b>Fine in US \$ million after each step</b>	<b>Culpability score</b>	<b>Base fine</b>
US \$142.6 million		20% of the volume of commerce of US \$713 million of UCAR's US sales between July 1992 – June 1997
<b>Aggravating and attenuating factors</b>		
	+ 5	Starting point as fixed in the guidelines.
	+ 4	Over 1,000 employees and high-level personnel involved.
	- 2	Acceptance of responsibility and full cooperation.
US \$199.64 to US \$399.28 million	= 7	Culpability Score of 7 implies a minimum multiplier of 1.40 (40% increase in the base fine) and a maximum multiplier of 2.80 (180% increase in the base fine), yielding a fining range of US \$199.64 to US \$399.28 million.
US \$110 million		Alternative fine because of UCAR's inability to pay (15.4% of US volume of commerce)

Source: Government Sentencing Memorandum, *United States of America v. UCAR International Inc.* Filed 4/21/98.

The fining range is determined by calculating 20% of the volume of affected commerce over the entire duration as a starting fine. Subsequently, for each factor, such as the size of the undertaking in terms of the number of employees the corresponding points with which to increase or decrease the culpability score can be read off the guidelines. There is a direct quantitative link between these factors and the fining range though the use of the culpability score, which determines the fining range. However, neither the guidelines nor the decision offer an explanation of how the alternative fine should be determined in case of inability to pay.

## **4.2 THE EC GUIDELINES**

It was only in 1995 when the Court of First Instance said for the first time that it was 'desirable' for the method used to calculate fines to be set out in such a way that firms can determine the fine themselves to challenge its fairness.<sup>15</sup> As a result, the Commission published a notice in 1998 to describe the factors to be taken into account when determining the fine: the *Guidelines on the Method of Setting Fines Imposed pursuant to Article 15(2) of Regulation 17 and Article 65(5) of the ECSC treaty*.<sup>16</sup> As described in the introduction of the guidelines, their aim is to increase the transparency and coherence of Community decisions, as well as to raise the level of fines. The determination of the fine according to the guidelines is described below.

<sup>15</sup> Richardson (1999).

<sup>16</sup> Guidelines on the method of setting fines pursuant to the EEA competition rules in the Official Journal of the European Communities C 10/17 (16.1.2003).

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#### 4.2.1 Determination of the base fines

Before the adoption of the guidelines, the basis for the fine was determined by “taking a certain percentage of turnover in one year of the different participants in the ‘relevant’ market”.<sup>17</sup> The methodology behind the determination of the percentage in setting of the base fine was not clearly explained in decisions. Thus, when the case went to court, arguments revolved around what sales needed to be included. To avoid arguments about which sales should be included, the present guidelines dissociate the fine from turnover. Other reasons for reducing the link between turnover and fines included the view that turnover data is a business secret and that there is no clear relationship between turnover and the harm caused by an infringement or the benefit gained by a company.

The starting point of the 1998 guidelines consists of a base fine, which is determined according to the gravity and the duration of an infringement. The gravity of an infringement depends on its nature, its actual impact on the relevant market and the size of the geographic market. According to these factors, infringements are classified into the following categories: minor, serious or very serious infringements.

- Minor infringements, which “might be trade restrictions, usually of a vertical nature, but with a limited market impact and affecting only a substantial but relatively limited part of the Community market” result in a likely fine of €1,000 to €1 million.<sup>18</sup>
- Serious infringements, which “will more often than not be horizontal or vertical restrictions of the same type as above, but more rigorously applied, with a wider market impact, and with effects in extensive areas of the common market. There might also be abuse of a dominant position”.<sup>19</sup> Serious infringements imply a total fine of €1 million to €20 million.
- Very serious infringements “will generally be horizontal restrictions such as price cartels and market-sharing quotas, or other practices which jeopardize the proper functioning of the single market, such as the portioning of national markets and clear-cut abuse of a dominant position by undertakings holding a virtual monopoly”.<sup>20</sup> The likely total fine is above €20 million.

The actual figure within each of the categories further depends on the effective economic capacity of the offender to cause damage to other firms and especially consumers. The guidelines also state that “account may be taken of the fact that large undertakings usually have legal and economic knowledge and infrastructures which enable them more easily to recognize that their

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<sup>17</sup> For example, in *Cartonboard*, the basis for the fine was 9% of turnover of the last year the cartel was in operation for the ringleaders and 6% for passive members of the cartel (Joshua and Camesasca 2005).

<sup>18</sup> Guidelines on the method of setting fines pursuant to the EEA competition rules in the Official Journal of the European Communities C 10/17 (16.1.2003).

<sup>19</sup> Ibid

<sup>20</sup> Ibid

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conduct constitutes an infringement and be aware of the consequences stemming from it under the competition law.” For example, in *Carbonless Paper*, the base fine for three cartel members was increased by 100% in order to take account of their size and resources.<sup>21</sup>

The second factor considered in setting the base fine is the duration. The amount defined according to gravity is not increased for infringements continuing for less than one year. Infringements that last for one to five years imply an increase of up to 50% of the amount determined according to the gravity. If the infringement continues for more than five years, the amount determined according to gravity is increased by 10% per year. One of the purposes behind increasing the fine for infringements with a longer duration is to increase the incentive to denounce cartels early.

#### 4.2.2 *Aggravating and attenuating circumstances*

Aggravating factors, which increase the base fine, include circumstances such as repeated infringements of the same type by the same undertaking, refusal to cooperate with or attempts to obstruct investigations, playing the role of leader in the infringement, retaliatory measures against other undertakings and lastly, the need to increase the penalty in order to exceed the gain made as a result of the infringement. For example, the base fine for ABB, a member of the pre-insulated pipes cartel, was increased by 50% because of it pressurised other cartel members to enter into an agreement. The list of factors is non-exhaustive and other factors may be considered. Conversely, attenuating circumstances, which lead to a reduction in fines include circumstances such as playing an exclusively passive or follow-the-leader role, non-implementation in practice of the offending agreements, termination of the infringement as soon as the competition authority intervenes, infringements committed unintentionally and cooperation by the undertakings. As in the case of aggravating factors, the list is not exhaustive and other factors, such as a crisis in an industry, have led to a reduction in fines. For example, in the UCAR fining decision examined, UCAR pleaded for a reduction of the fine because the “graphite electrodes industry as a whole and UCAR in particular was facing economic difficulties in the early 1990s”.<sup>22</sup> Finally, the application of the leniency notice if the firm furnishes complete immunity from fines for the first company providing the Commission with enough evidence to launch a dawn raid or find a cartel infringement and a reduction in fines if the firm gives evidence which is significant.

Under Article 15(2) of Regulation 17 (First Regulation Implementing Articles 85 and 86 of the Treaty), the Commission may fine companies up to 10% of the worldwide turnover of the year preceding the decision.

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<sup>21</sup> Wils (1998).

<sup>22</sup> Commission Decision of 18 July 2001, Case COMP/E-1/36.490 – Graphite electrodes.



### 4.2.3 Example of a fining decision

In Table 2, the determination of the fine by the Commission for UCAR’s European anti-competitive practices is described. The nature of the infringement was deemed to be very serious because UCAR had engaged in market sharing and price-fixing practices, which were implemented with full knowledge of the illegality of the actions. The cartel arrangements “permeated the whole industry, were mostly conceived, directed and encouraged at the higher levels of the undertakings concerned and operated entirely for the benefit of the participating producers and to the detriment of their customers and ultimately the general public”.<sup>23</sup> In considering the actual impact of the infringement, the decision notes that during the time of the cartel agreement, prices nearly doubled. Moreover, the producers represented almost 90% of the worldwide and EEA market for the product and the prices were not only agreed but also announced and implemented. Hence, the amount for gravity for the two main producers, UCAR and SGL, was selected to be €40 million.

**Table 2: Determination of the fine for UCAR according to the EC guidelines**

Fine after each stage in million €	Base fine
40	Gravity: The nature of infringement was deemed to be very serious.
62	Duration of infringement: 5 years and 9 months, implying an increase of 55% of the amount determined according to gravity and result in a base fine of €62 million.
	Individual fine
99.2	Aggravating factors imply an increase of 60% of the base fine
84.1	Reduction of fine due to the maximum limit on fines (10% of world-wide turnover)
50.4	40% reduction due to application of leniency policy
50.4	Total fine

*Source: Commission Decision of 18 July 2001, Case COMP/E-1/36.490 – Graphite electrodes*

Aggravating factors include UCAR’s role as one of the ringleaders and instigators of the cartel and the continuation of the infringement after the investigations started. Although UCAR was not the first company that provided the Commission with decisive evidence, it contributed substantially to establishing important aspects of the case and the Commission therefore granted a reduction of 40% of the fine.

<sup>23</sup> Commission Decision of 18 July 2001, Case COMP/E-1/36.490 – Graphite electrodes.

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## 5 Implementation of the optimal fine

In the following, problems relating to the design of the optimal fine are described. For example, competition authorities need to estimate the loss in consumer surplus resulting from the anticompetitive behaviour as well as the probability of detection expected by the firm in order to set the optimal fine. Moreover, firms may expect a lower fine than the optimal fine, engage in harmful conduct, and the optimal fine will be levied on them. The question, which then arises, is whether courts are willing to impose the optimal fine. Additionally, in some cases it may be profitable for firms engaging in efficient breaches of competition policy to pay the fine instead of setting prices equal to the original marginal costs. Allowing anti-competitive behaviour – despite the increase in total surplus – sends the signal to offenders that a price is being put on their behaviour rather than that the behaviour is being sanctioned. This may create extra costs due to increased infringements that may offset the increase in surplus if efficient breaches of competition law are allowed.

### 5.1 ESTIMATING THE LOSS IN CONSUMER SURPLUS

Measuring the loss in consumer surplus due to the offence is complicated because prices and marginal costs, which would have occurred in the absence of the actual behaviour, need to be estimated. In general, two different types of approaches exist to estimating but-for prices and quantities.

The first approach consists of taking the cost, price and quantity information before and during the time of the infringement from affected companies to calculate but-for prices in the market using statistical models. Insights regarding but-for prices can be drawn from the calculation of damages in the US, where damages are calculated by trebling the overcharge, i.e. the difference between the actual price and the but-for price. The latter can be estimated with the help of statistical models such as residual models, which estimate a price equation for the non-conspiracy period (in the case of cartel) and forecast but-for prices in the conspiracy period. Alternatively, but-for prices can be estimated by considering the entire time period for which data is available and setting a dummy variable to zero during the non-conspiracy period and to one during the conspiracy period. The important elements in such an analysis will be the extent of competition in the absence of the offence, how much market power the individual company would have attained, and how an alternative arrangement between firms would have influenced the cost structure.

The second approach uses benchmarking to determine but-for price. This method considers products in similar sectors in other countries and uses the prices of the products as a starting point to determine but-for price. These benchmark prices are then adjusted for differences in the

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cost level. One advantage of the benchmarking approach is that it does not depend on information collected from firms involved in the conduct, which makes it less subjective.<sup>24</sup>

Once the profit of the infringement has been estimated, the deadweightloss needs to be determined. The deadweightloss is easy enough to measure if price, quantity and costs under the infringement and under the alternative competitive condition (assumed to be perfect competition in our simple diagram) are known and a straight-demand curve is assumed as well as constant costs. If this information is not given, the deadweightloss can be estimated using the rate of return on sales, computed by dividing accounting profit adjusted for the normal rate of return on capital (the opportunity costs of investment) by revenue, an estimate of the elasticity of demand and the revenue under the infringement.<sup>25</sup>

## **5.2 ESTIMATING THE PROBABILITY OF DETECTION**

An estimate of the probability of detection is needed for the calculation of the optimal fine. In general, the probability of detection of certain kinds of anti-competitive behaviour depends on a multitude of factors, such as the firm's subjective expectation of being caught, the industry and the type of anti-competitive behaviour. Moreover, if the probability of conviction and detection depends on the price charged, firms set their prices to influence the probability of detection. Similarly, the probability that the determined fine is actually paid depends on whether the firm will successfully appeal against the fine or whether the firm has the ability to pay the fine. Determining the probability of detection of infringements is complex, if not impossible because the total number of infringements in a market cannot be estimated. However, Bryant and Woodrow (1991) examine a sample of price-fixing cases from 1961 to 1981 and find that the probability of getting caught is in the range of 13% to 17% in a given year. The authors' results are based on approximate conspiracy durations calculated from data reported for a large sample of US Department of Justice price-fixing indictments. D. Ginsburg, Assistant Attorney General for Antitrust estimates that enforcers detect no more than 10% of all cartels.<sup>26</sup>

## **5.3 ABILITY TO PAY EXTREME PENALTIES**

According to the findings above, the optimal fine would need to be around six to ten times the social costs. However, the firm's ability to pay effectively limits the deterrent effect of any

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<sup>24</sup> Sanctioning pursuant to the Norwegian Competition Act, Oslo 25 March 2001.

<sup>25</sup> Martin (1994).

<sup>26</sup> Connor and Lande (2004).

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fine.<sup>27</sup> Moreover, if the fine is larger than the firm's ability to pay in terms of stockholder's equity, the firm is technically bankrupt.<sup>28</sup> A bankrupt firm imposes social costs above the costs due to the loss in consumer surplus, which include termination of employment and a diminishing of the tax base. If courts want to avoid these costs, they may be unwilling to impose the optimal fine.

Indeed, according to Werden and Simon (1987), firms would need assets six times higher than annual sales for a firm to pay the optimal sale. As a consequence, they conclude that most price fixer should go to prison.<sup>29</sup> Craycraft, Craycraft and Gallo (1997) analyze the effect of the firm's ability to pay on the fine levied and find that all firms in their sample of 262 price-fixing firms between 1955 and 1993 were able to pay the actual fine imposed. However, only 47, or 18% of the sampled firms were able to pay the "optimal" fine.<sup>30</sup> All 262 firms were able to pay the fine actually levied as well as the maximum fine out of cash on hand, defined as cash immediately available, and short-term investments, i.e. treasury bills.<sup>31</sup> Paying the fine out of cash on hand and short-term investments denies stockholders payment of a cash dividend and also affects payment to short term creditors.

Another problem related to fines adjusted for the probability of detection is the possibility that the fine may be so large that it negatively affects shareholders and courts may be unwilling to impose such extreme penalties.<sup>32</sup> Using stock-market data to assess deterrence, Ellert (in Breit and Elzinga 1986) compares shareholder returns before and after antitrust lawsuits.<sup>33</sup> He finds the effect of FTC action to be negligible, in contrast to actions by the DOJ, which entail negative relative share price performance. After the possibility of private action expires, normal share price behaviour returns and in cases with no possibility of a follow-up, no negative movement of share prices at all is observed. Similarly, Joyce (1989 in Craycraft, Craycraft and Gallo 1997) conducted a study for the DOJ and concluded that fines had little, if any, effect on companies'

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<sup>27</sup> Moreover, if the fine is reduced because of inability to pay, firms may expect that the full amount of the fine will never be levied. Firms can ensure themselves against large fines by transferring or converting wealth so that it is no longer available for paying the fine.

<sup>28</sup> Craycraft, Craycraft and Gallo (1997)

<sup>29</sup> Werden and Simon (1987).

<sup>30</sup> The definition of the optimal fine used in their paper is equal to the harm suffered by victims of price-fixers. Gallo (1994) in Craycraft, Craycraft and Gallo (1997) express the optimal fine as a function of monopoly mark-up, conspiracy sales, and price elasticity of demand as well as the probability of detection and conviction. Gallo's model estimates the optimal fine to be slightly more than two-thirds of the conspiracy sales based on a monopoly mark-up of ten percent, unitary elastic demand and a 15 % probability of prosecution.

<sup>31</sup> Maximum fines reflect the statute in effect at the time (\$50,000 per count until 1974, \$1 million until 1984, twice the pecuniary gain or pecuniary loss till 1990 and \$10 million hence). Craycraft, Craycraft and Gallo (1997).

<sup>32</sup> Whether this is justified or not depends on whether one believes that stockholders can control potential infringers.

<sup>33</sup> Breit and Elzinga (1986).

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subsequent financial strength, which was measured by the firms' credit ratings, based on equity in tangible assets.

#### **5.4 DISADVANTAGES OF ALLOWING ANTI-COMPETITIVE BEHAVIOUR**

Clearly, the stigmatising effect of being convicted for illegal or criminal behaviour represents a deterrent effect for companies and contributes to creating a norm of engaging in fair business. Allowing behaviour that is illegal neutralises this effect. Hence, allowing anti-competitive behaviour because total surplus increases and companies can pay for the harm caused (and there may even be a method to pay back victims) does not necessarily increase overall welfare. Moreover, companies that achieve considerable cost-savings despite anti-competitive behaviour are likely to be few, so that the costs of allowing this type of behaviour in terms of the foregone increase in surplus may be smaller than the additional costs due to sending the wrong message that anti-competitive behaviour is allowed if it increases surplus.

### **6 Implication for fining policies**

Having described the optimal level of fines and the current fining policy under the EC and the US guidelines, the following section reconsiders the EU and the US guidelines in the view of the findings of the advantages and disadvantages of the optimal fine. Despite difficulties in its implementation, the main idea behind the optimal fine, which is that fines should be equal to the social cost of the conduct, defined as the loss in consumer surplus by Posner and Easterbrook (1981), is worth considering for the fining guidelines. However, fines are part of an overall enforcement system, which must ensure, at a reasonable cost, compliance with the law. Therefore, other factors, which do not influence the social cost of the conduct and which are not accounted for in the optimal fine but which affect enforcement costs should also be considered.

#### **6.1 US SENTENCING GUIDELINES**

One of the advantages of the US guidelines is their transparency, which is one of the prerequisites for optimal fines. The deterrent effect of the optimal fine is based on the assumption that companies can estimate the expected costs of an infringement. It is expected that companies' behaviour would be more influenced if, as a result of more transparency, they have a greater understanding of how fines are determined. However, if potential violators are risk-averse with regard to how fines are determined, uncertainty regarding the fining method and the

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level of fines may increase the deterrent effect compared to a more predictable fining policy.<sup>34</sup> The transparency of the US guidelines derives from using a fixed percentage of companies' turnover as the base fine as well as their 'catalogue' system that allows companies to look-up factors such as size of their undertaking and prior infringements and the corresponding number of points, which are added or subtracted to the culpability score as a consequence. However, given the broadness of the fining range, as seen in the example for UCAR, and the lack of explanation for the alternative fine in case of inability to pay, estimating the fine for companies may remain unclear.

- The base fine according to the US guidelines is calculated by taking 20% of the volume of commerce affected by the violation of the entire duration of the cartel. However, using a fixed percentage of 20% of the volume of commerce affected to determine the base fine may not be equal to the harm caused in all possible cases. Indeed, a recent study by Connor and Lande (2004) finds that median and average cartel overcharges are between 15% and 36%, with the majority of the results between 20% and 30% percent.<sup>35</sup> Their findings are based on every available economic study of cartels and every final verdict in a US cartel case and would imply an increase of the base fine to better reflect the harm caused. In general, a better proxy for the loss in consumer surplus would be to use the amount of the overcharge in each case instead of a one-size-fits-all approach of using 20% of the volume of commerce affected of the entire duration of the cartel. The disadvantage of moving from a fixed percentage to a case-by-case would be an increase in the resources needed to estimate the overcharge in each case.
- Given that retaliatory and threatening measures taken against another member of the cartel or a third person are successful, their effect should be to increase the harm and should be reflected in the loss of consumer surplus. However, the optimal fine is based on the harm caused by the cartel as a group. Additionally, punishing intent may increase deterrence in general. Hence, factors such as playing the leading role or an exclusively passive role in the cartel are important to determine the individual fine for each cartel member convicted.
- Other aggravating factors such as obstruction of competition authority investigations increase the cost of enforcement. An optimal fine equal to the loss in consumer surplus does not include these enforcement costs. However, the social costs of an infringement include the cost of catching and convicting violators. Thus, costs due to obstruction of justice should be added to the optimal fine because violators should be forced to pay for the harm caused and the cost of catching and convicting them.

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<sup>34</sup> Although one would expect that violators are risk-averse (otherwise they would not engage in illegal behaviour), whether potential competition policy violators are risk-averse may be difficult to determine. If potential violators were risk-averse regarding the actual level of the fine, a deterrent fine would consist of a low probability of fining coupled with a high fine.

<sup>35</sup> Note that 20% of the total volume of affected commerce during the whole duration of the cartel is deemed to correspond to empirical estimates of the overall harm caused by cartels by the OECD (2002).

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- Mitigating circumstances such as non-implementation in practice or termination of the agreement as soon as the Commission intervenes lowers the harm due to the infringement and should be reflected in the optimal fine.
  - Effective cooperation by the undertaking (outside of the scope of the leniency policy) lowers the cost of enforcement. Correspondingly, the leniency policy reduces enforcement costs, which are not included in the harm. The optimal fine should be reduced in order to take account of the lower enforcement costs.
  - The guidelines do not mention the need to increase the fine to account for the probability of detection. However, the trebling of damages in the US partly accounts for the fact that not every infringement is discovered and prosecuted. Given that the probability of detection is not necessarily one-third in all cases, it remains unclear to what extent the probability of detection is accounted for.<sup>36</sup> Given also the difficulties in estimating the probability of detection and conviction, as well as the problem of extreme penalties which may be inability to pay, increasing the base fine by the inverse of the probability of detection and conviction may not be feasible. Hence, the advantages of the optimal fine regarding the probability of detection and convictions are not clear.
  - The maximum statutory fine of \$10 million and the alternative fining provisions of “twice the gain derived from the offence or twice the loss to a person not the defendant” supports companies with a larger turnover to the extent that \$10 million may not be the worst-case harm which could result from a violation and twice the gain or loss is not sufficient to deter infringements with a low probability of detection.
  - Compared to the optimal fine, the guidelines disregard the deadweight loss caused by anticompetitive behaviour. One reason for neglecting the deadweightloss may be because it is assumed to be relatively small compared to the transfer of consumer surplus – and compared to the cost of estimating the deadweightloss. In first attempts to measure the deadweightloss, Harberger (1954) estimated a deadweightloss as low as one-tenth of one percent of US national income for 73 manufacturing industries between 1924 and 1928 using a price elasticity of demand of one. Cowling and Mueller (1978) recalculated these findings using a measurement of elasticity that assumes that firms maximize profits and use firm data instead of the industry data. The result was a larger estimate of economic profit because firms making losses due to high costs do not offset the profits of firms exercising market power. Additionally, advertising expenditures were added to the profit. Their resulting estimates of the deadweightloss are up to four times larger than the estimate by Harberger.

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<sup>36</sup> According to Lande (1993), treble damages are probably at most single damages because of their lack of pre-judgement interest, effects of plaintiffs’ attorney fees and costs, umbrella effects of market power, allocative inefficiency effects of market power and other costs.

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## 6.2 EC GUIDELINES

Because a large part of the EU guidelines is derived from their US counterpart such as the focus on aggravating and attenuating circumstances, many of the issues identified with the US guidelines also apply to the EU guidelines.

- The determination of the base fine is deemed to lack transparency because relevant factors for its determination are not quantified.<sup>37</sup> There is no indication of an economic test, which can be applied to determine the starting amount. From the point of view of the optimal fine, a better indicator of the loss in consumer surplus would be to set the fine equal to amount of the overcharge multiplied by the volume of commerce attributable to the infringement during the entire duration.
- As stated in the guidelines, increasing the fine for longer-lasting infringements increases the incentives of companies to apply for leniency. The incentive to report the cartel hinges on fines steadily increasing the longer the infringement occurs, implying that cartel members have more to lose the longer they wait to apply for leniency. However, according to the guidelines, for infringements of medium duration (in general, one to five years) there is an increase of up to 50% in the amount determined for gravity. Unless the fine increases for each year between year one and year five, it is not clear that the incentive to report the offence remains. If the base fine is set equal to the volume of commerce attributable to the infringement during the entire duration, the incentive to report infringements as the duration increases remains.
- If the turnover attributable to the infringement is a substantial part of worldwide turnover, the maximum allowable fine of 10% of worldwide turnover may not be sufficient to deter. Unless a price increase of 10% is assumed to be the hypothetically worst-case arising from anti-competitive behaviour, the limit fails to deter conduct which results in an increase of turnover higher than 10%.

## 7 Conclusion

In this paper it has been argued that optimal fines as defined by Posner and Easterbrook (1981) are desirable from the point of view of total surplus because harmful conduct is deterred while behaviour, which increases total surplus, is not. However, disadvantages of the optimal fine include its implementability as well as the fact that fines are part of an overall enforcement system, which must ensure, at a reasonable cost, compliance with the law. Hence, the implications for the EC and US guidelines are not as clear-cut as it may appear at first. First of all, increasing the fine to account for the probability of detection may not be feasible if the probability of detection cannot be measured or the resulting fine exceeds the firm's ability to pay, imposing extra costs on society due to the bankruptcy of the firm. Second, some aggravating

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<sup>37</sup> See Joshua and Camescasa (2005), Geradin (2005) or Richardson (1999).



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and attenuating factors, which contribute to increasing the cost of enforcement, are not reflected in the loss in consumer surplus. These factors should be considered in the determination of the optimal fine.

Nonetheless, considering that all subsequent adjustments are based on a percentage of the base fine, fines according to the EU and US guidelines could be improved by setting the base fine closer to the level of harm as implied by the optimal fine. For example, it may be worth investigating whether the increase in resources needed to estimate the turnover of the affected commerce as well as the overcharge would not be offset by the improved deterrence by attempting to set the base fine closer to the harm. Additionally, according to the optimal fine, the maximum limit should be set to the worst possible harm that could result from an infringement. For the EC guidelines, this would imply reconsidering the limit of 10% of worldwide turnover. Similarly, the alternative maximum of double the loss or gain in the US may be too low for infringements that are difficult to detect. Given that fining decisions currently do not account for factors such as the probability of detection or the deadweightloss, the trend of increasing fines appears to be a good development.

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## 8 Bibliography

Alexander, C. and Arlen, J. and Cohen, M.A. (1999): *Regulating Corporate Criminal Sanctions: Federal Guidelines and the Sentencing of Public Firms*, Journal of Law and Economics, Vol. XLII

Baker, J. (1988), *Private Information and the Deterrent Effect of Antitrust Damage Remedies*, Journal of Law, Economics and Organization, Vol. 4, pp. 385-405

Becker, G. (1968), *Crime and Punishment: an Economic Approach*, Journal of Political Economy, Vol. 76, pp. 169- 217

Bellis, J.F. (2003), *La Détermination des Amendes pour Infraction au Droit Communautaire de la Concurrence – Bilan de Cinq années d’application des Lignes Directrices de 1998*, 3-4 Cahiers de Droit Européen, p. 377

Besanko, D. and Spulber, D.F. (1989), *Antitrust Enforcement under Asymmetric Information*, The Economic Journal, Vol. 99, pp.408-425

Besanko, D. and Spulber, D.F. (1990), *Are Treble Damages Neutral? Sequential Equilibrium and Private Antitrust Enforcement*, The American Economic Review, Vol.80, pp. 870-877

Block, M., Nold, C. and Sidak, J. (1981), *The Deterrent Effect of Antitrust Enforcement*, Journal of Political Economy, Vol. 89. pp. 429-445

Breit, W. and Elzinga, K.G. (1986), *Antitrust Penalty Reform: An Economic Analysis*, American Institute for Public Policy Research, Washington

Byrant, P.G., and Woodrow E.E. (1991), *Price Fixing: The Probability of Getting Caught*, Review of Economics and Statistics, Vol. 87

Connor, J.M. and Lande, R.H. (2004), *How High Do Cartels Raise Prices? Implications for Reform of Sentencing Guidelines*, American Antitrust Institute, Working Paper

Cowling, K. and Mueller, D. (1978), *The Social Costs of Monopoly*, The Economic Journal 88, pp. 727-748

Cyrenne, P. (1999), *On Antitrust Enforcement and the Deterrence of Collusive Behavior*, Review of Industrial Organisation, Vol. 14, pp. 257-272

Easterbrook, F. (1985), *De-trebling Antitrust Damages*, 28 Journal of Law and Economics, pp. 445

---

Feinberg, R.M. (1985), *Enforcement and Effects of European Competition Policy: Results of a Survey of Legal Opinion*, Journal of Common Market Studies. Vol. XXIII, No. 4, pp. 373- 377

Gallo, J.C, Dau-Schmidt, K., Craycraft, J.L. and Parker, C.J. (2000), *Department of Justice Antitrust Enforcement, 1955-1997: An Empirical Study*, Review of Industrial Organisation Vol. 17, pp. 75-133

Geradin, D. and Henry, D. (2005), *The EC Fining Policy for Violations of Competition Law: An Empirical Review of the Commission Decisional Practice and the Community Courts' Judgment*, The Global Competition Law Centre Working Papers Series 03/05

Harberger, A.C. (1954), *Monopoly and Resource Allocation*, American Economic Review 44, pp. 77 - 87

Lande, R.H. (1993), *Are Antitrust 'Treble' Damages Really Single Damages*, 54 Ohio State L.J. 115

Martin, S. (1999), *Industrial Economics*, Prentice Hall, New Jersey

Parker, J. and Atkins, R. (1999), *Did the Corporate Criminal Sentencing Guidelines Matter?*, Journal of Law and Economics, Vol. XLIIV

Polo, M (1997), *The Optimal Prudential Deterrence of Price-Fixing Agreements*, University of Bocconi, Working Paper, available at [http://www.igier.uni-bocconi.it/folder.php?vedi=&nascondi=&tbn=albero&id\\_doc=986&id\\_folder=182&pg\\_int=998&tb\\_int=pagine](http://www.igier.uni-bocconi.it/folder.php?vedi=&nascondi=&tbn=albero&id_doc=986&id_folder=182&pg_int=998&tb_int=pagine).

Posner, R.A. (1976 & 2001 second edition), *Antitrust law: An Economic Perspective*, University of Chicago Press, Chicago

Posner, R.A. and Easterbrook, F.H. (1981), *Antitrust: Cases, Economic Notes and Other Materials*, St. Paul, Minn.: West Publishing Co., 2nd ed. 1981

Sproul, M.F. (1993), *Antitrust and Prices*, Journal of Political Economy, Vol. 101, No. 4, pp. 741-755

Souam, S. (2001), *Optimal Antitrust Policy Under Different Fine Regimes*, International Journal of Industrial Organization, Vol. 19, pp.1-26

Richardson, R. (1999), *Guidance without Guidance*, E.C.L.R. Issue 7, Sweet and Maxwell Limited

Whish, R. (2001), *Competition Law Fourth Edition*, The Bath Press, UK

---

Werden and Simon (1987), *Why Price Fixers Should Go to Prison*, The Antitrust Bulletin, pp. 971

Williamson, O.E. (1968): *Economies as Antitrust Defense: The Welfare Trade-offs*, American Economic Review 59, pp. 954-59

Wils, W.P.J. (1998), *The Commission's New Method for Calculating Fines in Antitrust Cases*, 23 E.C.L.R., 255

Wils, W.P.J. (2001): *Does the Effective Enforcement of Articles 81 and 82 EC Require not only Fines on Undertakings but also Individual Penalties, in Particular Imprisonment*, 2001 EU Competition Law and Policy Workshop

### **Other documents**

§1 and §2 of the Sherman Act, 15 USC §1 and §2, available at <http://www.usdoj.gov/atr/public/guidelines/201436.htm#1>.

Antitrust Division of the Department of Justice, Workload Statistics FY 1994 - 2003, available at <http://www.usdoj.gov/atr/public/12848.htm>.

Commission Decision of 18 July 2001, Case COMP/E-1/36.490 – Graphite electrodes. OJ L100/1, available at [http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/l\\_100/l\\_10020020416en00010042.pdf](http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/l_100/l_10020020416en00010042.pdf).

EU Competition Policy after May 2004, speech given by Prof. Mario Monti at the Fordham Annual Conference on International Antitrust Law and Policy on 24 October 2003, available at <http://europa.eu.int/rapid/pressReleasesAction.do?reference=SPEECH/03/489&format=HTML&aged=0&language=EN&guiLanguage=en>.

Guidelines on the Method of Setting Fines Pursuant to the EEA competition rules in the Official Journal of the European Communities C 10/17 (16.1.2003), [http://europa.eu.int/eur-lex/pri/en/oj/dat/1998/c\\_009/c\\_00919980114en00030005.pdf](http://europa.eu.int/eur-lex/pri/en/oj/dat/1998/c_009/c_00919980114en00030005.pdf).

OECD (2002), *Hard Core Cartels: Recent Progress and Challenges Ahead*, Law Enforcement and Co-operation, Publications and Documents

Section 2R1.1 of the US Sentencing Guidelines: Bid-Rigging, Price-Fixing or Market Allocation Agreements among Competitors. Section 2R1.1, which deals with antitrust offences and is the focus of this section, is available at [http://www.ussc.gov/2004guid/2r1\\_1.htm](http://www.ussc.gov/2004guid/2r1_1.htm).

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Report on Competition Policy, published in conjunction with the General Report on the Activities of the European Union, years 1998–2003, available at [http://europa.eu.int/comm/competition/annual\\_reports/2003/final\\_en.pdf](http://europa.eu.int/comm/competition/annual_reports/2003/final_en.pdf).

Sanctioning pursuant to the Norwegian Competition Act, Oslo 25 March 2001, available at [http://www.konkurransetilsynet.no/archive/Internett/publikasjoner/Skriftserien/01\\_01\\_Sanctioning.pdf](http://www.konkurransetilsynet.no/archive/Internett/publikasjoner/Skriftserien/01_01_Sanctioning.pdf).

United States of America v. UCAR International Inc., Criminal No. 98-177, filed 4/12/1998, available at <http://www.usdoj.gov/atr/cases/f3800/3838.htm>.

U.S. Sentencing Commission Guidelines for the United States Courts, 18 U.S.C. Chapter 8 of the Sentencing Guidelines, dealing with the sentencing of organisations is available at <http://www.ussc.gov/2004guid/CHAP8.pdf>.