OPTIMAL AND ACTUAL FINES IN CARTEL CASES: THE EUROPEAN CHALLENGE

ENRICO LEONARDO CAMILLI

INTRODUCTION

If the economic analysis has proved to be an essential tool in catching up a more coherent and efficient application of the substantial provisions of antitrust law, the same would happen if economic concepts were utilized in the enforcement of these rules. The increased amount of fines could provide an hint on that point, since it shows a clear turn towards an higher consideration of the deterrent aim of the sanctions for undoubtedly harmful illicit conduct, like the hard-core cartels. Actually the acknowledgement of the rational crime doctrine and thus the effectiveness of the deterrent aim is the essential starting point for an economic analysis of the enforcement. Once recognized the deterrent function, a model of punishment based on the effects of the infringement can be built. In this paper the public enforcement through fines on the firms of antitrust law with regard to hard core cartels is the main topic, as far as they have been the EC main enforcing tools; however sometimes some words will have to be spent on other aspects of the enforcement, like private damages or personal sanctions, given that they have an influence on the public efforts for the implementation of antitrust law, as other antitrust experience, like the US, can show.

Based on the main results of the economics of punishment, an analysis of the elements necessary to set the optimal fine is carried out with specific reference to the hard-core cartels; thus some guidelines are carved out and, within this economic context, even legal concepts like the proportionality of the punishment get the due consideration (chapter 2). Even though the lack of data hinders the

exact application of the theoretical framework in the real world, anyway it can provides some instruments to interpret the current policy and to emend it, if they yields inefficient effects (chapter 3).

The main general result of the paper should be the acknowledgement of the enforcement as a complex system, composed by many elements which all have to be coordinated in a transparent way, in order to have the highest deterrent effect at the lowest costs possible. In particular, with regard to the EC practice on fines, a possible source of inefficiencies could be the "qualitative approach" lying behind the Guidelines. Once a deterrent sanction has to be set within the legal ceilings, the actual effect of the infringement (or a proxy of it) have to be taken into account, leaving aside the tendency to stick to legal categories, even in the enforcement. And if the methodology of such an assessment is clearly made public, the danger of uncertainty is wiped away, whereas legal categories have to be stretched in order to achieve results consistent with the deterrent aim and the proportionality constraint, with a consequent loss of transparency.

1. THE ECONOMICS OF PUNISHMENT

Whenever the legal system prohibits[1] a certain behaviour, automatic compliance of the individuals is not guaranteed, whereas rather often departure from the prescript behaviour would be the rule, if an adequate enforcement system wasn't established. Economic analysis can provide both a systematic explanation of the actual features of the enforcement and useful normative indications in order to establish an efficient application of the law, but in any case it relies on strong assumptions necessary to build up a coherent system. The basic model of enforcement of legal rules through punishment is the Becker's one[2], which it is established on the basic assumption, recalled from Bentham and Beccaria's intuitions, that the "criminal" is a rational individual, which calculates the private gains and harms deriving from his behaviour before deciding whether acting or not.

Therefore the application of economic concepts to the enforcement of legal rules is mainly related to the incentives that the individual has in engaging in certain activities, the costs that the enforcing agent has to afford in order to influence those incentives and the total welfare gain that results from that enforcing activity in comparison with the outcome without the enforcement.

Given this basic feature, the legislator, in order to achieve compliance with the legal rule, can develop some devices aiming at influencing the rational cost-benefit analysis of the offender, generally a legal threat announcing the imposition of unpleasant consequences in case of breach of the prohibition. The channelling effect[3] on the behaviour of the audience of the legal threat is called the *deterrent effect*.

---

[1] Both indirectly through a contractual provision made binding by the legal system, and directly and unilaterally, through a regulation, G. J. Stigler, "The optimum enforcement of laws", 78 *Journal Of Political Economy* 1970 p. 526.

[2] G. S. Becker, "Crime and punishment: an economic approach", 76 *Journal Of Political Economy* (1968), pp. 169-217.

[3] I.e. "the totality of all changes in the behaviour of its audience attributable to existence of a threat." F. E. Zimring and G. J. Hawkins, *Deterrence and the legal threat in crime control,* (1973), p. 71.

The amount of deterrent effect provided by the legal system is influenced by two major variables, the magnitude of the legal threat and the probability that in case of misbehaviour the threat will be applied. According to the Becker's basic model[4] , the individual utility maximizing problem following the introduction of an enforcement system is the following:

$EU^1 = p\ U\ (\ Y - c - f\ ) + (\ 1 - p\ )\ U\ (\ Y\ ),$ (1)

where EU^1 is the expected utility deriving from engaging in the illegal activity, p the probability of being caught, U the utility adjusting factor, Y the net income deriving from the illegal activity, c the costs incurred in case of detection regardless the fine (legal proceeding costs, public credibility losses and so on…) and f the sanction in case of apprehension. If the EU^1 is higher than the utility deriving from the legal activity, there will be underdeterrence, as the compliance with the legal provision is not achieved.

Applying the abovementioned condition to the situation of a cartel is straightforward: assuming that in a competitive environment the extra profits π^* are equal to 0, the amount of deterrent effect needed to avoid that a rational calculator would engage in a cartel can be summarized in:

$E\pi^c = p\ (\ \pi^c - c - f\ ) + (\ 1 - p\ )\ (\ \pi^c\ ) = \pi^* = 0$ (2)

which gives:

$p\ (\ f + c\ ) = \pi^c$ [5] or

$f = \pi^c / p - c$ (3)

Therefore the two variables of the enforcement p (probability of detection and conviction) and f (magnitude of the sanction) are the two major tools in the hands of the enforcement agent. As the efforts aiming at detecting the misbehaviour are costly and assuming a positive link between enforcement expenditure and probability of detection, by increasing that expenses an higher deterrence effect can be achieved, being equal the fine. Otherwise an increase of the magnitude of the sanction may lead to the same result. As assumed in the Becker's model, with the increase of magnitude of monetary sanctions deemed as costless[6], that amount should be kept at the highest feasible level, i.e. up to the ability to pay of the offender, by accordingly tuning the probability of detection at the lowest level, in order to achieve the highest level of deterrence with the lowest use of scarce resources.

However an ever increasing magnitude of sanction imposed vis à vis a decreasing detection expenditure can bear some costs as well.

First of all, in a environment characterised by asymmetric information, judicial errors, particularly of type II (innocents are convicted) can be socially more harmful with very high fine settings besides that they can be more likely if few resources are expensed for the detection. Actually besides the loss due to a reduced deterrent effect, the direct harm suffered by the innocent (which accounts as a social loss as well as private), has to be taken into account, an that increases with higher fines[7].

---

[4] G. S. Becker, *op. cit.*, (1968) p. 177.

[5] That means that if the net gain from joining a cartel is 100, the probability of detection 20% , the nominal fine, in order to achieve complete deterrence has to be 500, see W. P. J.Wils, , *The optimal enforcement of EC antitrust law – Essays in law and economics* (2003a), p. 199 .

[6] Because they simply amount to a transfer of wealth from the offender to the society.

[7] See G. J Stigler, *op. cit.,* (1970) p. 529. A similar kind of cost of high fines in case of error of the offender in carrying on the cost benefit analysis of the crime is the one pointed out by N. Garoupa, "Optimal law enforcement with dissemination of enforcement", 7 *European Journal Of Law And Economics*, (1999), p. 184, referring to the study of L. A. Bebchuk and L. Kaplow,

Secondly an essential drawback pertaining high fines or tough imprisonment periods is the departure from the proportionality principle of sanctions based on the retributive function of penalties: if the convicted offender has to bear a penalty much higher than the actual harm he caused because of the low probability of detection, that exemplary punishment does not only offend the common sense of justice, but economically it could be deemed as a costs born by the individual, which has to pay in excess of the actual damages provoked in order to achieve the social aim of the general deterrence. In last instance that cost is a cost born by the society whose the individual is a component.[8]

In addition high monetary fines have the likely effect of raising the efforts by the offenders not to get detected or convicted[9], accordingly making more costly the detection of the infringement and leading to higher fines in order to achieve the desired deterrent effect, with the danger of a self fuelling vicious circle.

Finally huge monetary sanctions on the firm (as it could be the case in EC competition law) could be seriously dangerous for the existence itself of the organization, as the charge levied, even if constrained on the actual ability to pay of the firm, could lead on the medium term to the bankruptcy; this outcome would be anyway a negative one both for the social costs[10] that a bankruptcy brings about on the shoulder of subjects (the shareholders, the creditors, the employers…) that are not targeted by the deterrent objective of the sanctioning system, for the lessening of competition following the fall down of one player in the market[11], and for the inevitable disproportion of the punishment, as the failure prevents the firm from achieve any revenue for the future.

On the other side, being the enforcement as a whole costly, it has to be assessed whether it is worthy or not fully enforcing the prohibition. That depends on the social harm deriving from the illicit behaviour. Usually the *per se* prohibition of certain acts is due to the presence of negative externalities, according to which the harm caused to the society as a whole is always higher than the private gain[12]. In that case indeed complete *ex ante* deterrence (i.e. a level of sanctions and/or probability high enough to deter every illegal activity) could seem to be a socially adequate task. However is likely not to be a suitable objective, whenever a relatively costly enforcement is required to achieve that goal. Actually the enforcement efforts will be allocatively efficient only up to a point where the marginal cost of that enforcement is equal to the marginal gain for the society due to the reduction of the offences committed. Moreover, the amount of enforcement costs born to catch the guilty have to be added to the amount of the fine imposed, as the offender, by misbehaving, has caused the

---

"Optimal sanctions when individual are imperfectly informed about the probability of apprehension", 21 *Journal Of Legal Studies* (1992), pp. 365-370.

[8] F. E. Zimring and G. J. Hawkins, *op. cit. ,* (1973), p. 42.

[9] W. P. J Wils,., *op. cit.,* (2003a) p. 24.

[10] See C. Craycraft, J. L. Craycraft, J. C. Gallo, "Antitrust sanctions and a firm's ability to pay", 12 *Review Of Industrial Organization*, (1997), p. 175-176.

[11] See F. R. Shoneveld, "Cartel sanctions and international competition policy: cross-borders cooperation and appropriate forums for cooperation", 26 *World Competition*, (2003) p. 448, with reference to the financial difficulties incurred by Sotheby's after the conviction. In the case of bankruptcy, Christie's would acquire a quasi monopoly on the art auctions market.

[12] G. S. Becker, *op. cit.*, (1968) p. 173.

society bearing these costs, so they can be directly related to the offence committed[13].

The application of these principles to naked cartel cases gives again an interesting insight, as the presence of the deadweight loss[14] due to an increase of prices is a social loss which is not recovered by the increase of profits of the participants; therefore there are solid grounds for an effective enforcement of the rules prohibiting cartels through deterrence. Thus the application of the rational crime problem and the use of the deterrence tool seem to be particularly suitable instruments to analyze the enforcement of the antitrust rules[15]. That explains the numerous calls for an increased deterrence effect enforced optimally, coming from the international institutions and the enforcement authorities themselves[16]. However the achievement of perfect competition through antitrust enforcement, i.e. a complete *ex ante* deterrence of every anticompetitive behaviour may not be efficient[17].

Finally, if some costs deriving from the imposition of the fine are assumed to arise, the least costing option would be the fine which implies the lowest amount, given the same deterrent effect. In the case of cartels, where the harm is usually higher than the gain, the gain based fine would be less costly to enforce.

An intermediate solution can be a fine based on the gain plus an additional amount in order to avoid the underestimation of the penalty and the problem of underdeterrence[18].

However, the harm provoked by the infringement could anyway be relevant as a benchmark for the proportionality of the penalty imposed. Indeed, the amount of the penalty spilling over the harm, i.e. above the proportionality principle, should be considered as a cost of the enforcement and taken into account when determining the trade-off between magnitude and probability of fine, as shown above.

---

[13] See A. M. Polinsky and S. Shavell, "Public enforcement of law", in *Encyclopedia Of Law And Economics* (1999) p. 316, K. H. Hylton, *Antitrust Law – Economic Theory And The Common Law Evolution*, (2003), p. 47.

[14] The social losses deriving from a cartel actually spill-over the Harberger triangle, since the x-inefficiencies, the rent-seeking efforts, the productive inefficiencies due to inefficient fringe firms being able to operat at the higher collusive price, the enforcement costs have to be added, see W. H. Page, "Optimal antitrust penalties and competitors' injury", 88 *Michigan Law Review*, (1990), p. 2155, G. Tullock, *Rent Seeking*, (1993). A clear example of the effects of rent-seeking efforts is reported by S. Evenett *et al.*, "International cartel enforcement: lessons from the 90's", (2002), available at www.econ.worldbank.org; p. 8, the US producers of citric acid managed to force the US government to impose antidumping duties on the Chinese producers which were competing very aggressively with the cartel.

[15] See W. P. J Wils., "Should private enforcement be encouraged in Europe ?", in 26 *World Competition*, (2003b) p. 478.

[16] The deterrent objective and the application of economic analysis of penalties are openly deemed to be the main purpose task in many official reports, like OECD, *Hard Core Cartels – Recent Progress And Challenges Ahead*, (2003), p. 27, New Zealand Ministry of Commerce, *op. cit.,* p. 19, Norwegian Competition Authority, *Sanctions Pursuant To The Norwegian Competition Act,* Working paper n. 3 on international co-operation, Oslo 25 March 2001, p. 4 and p. 6.

[17] See K. G. Elzinga and W Breit, *The Antitrust Penalties: A Study Of Law And Economics*, (1976) p. 9 and S. Souam, "Optimal antitrust policy with different regimes of fines", in 19 *International Journal Of Industrial Organization*, (2001) p. 1-26.

[18] A. M. Polinsky and S. Shavell, "Should the liability be based on the harm to the victim or the gain to the injurer?", 10 *The Journal Of Law, Economics & Organization* (1994), p. 436.

2. THE DETERMINATION OF THE OPTIMAL SANCTION IN CARTEL CASES

Once highlighted the most important insights of the economic theory with regard to the enforcement, an attempt to apply these principles in cartel cases will be undertaken with more detail. The lack of relevant information remains the most challenging difficulty, sometimes solved with estimations, some others with a proxy. That's why some guidelines can be usefully derived from the economic analysis, rather that precise formulas.

Since only by knowing in advance all the possible consequences of the behaviour taken, the rational criminal can be influenced, therefore, in order to achieve the desired deterrent effect, the transparency of the sanction policy is of paramount importance. By reference to objective elements in assessing the sanction, the discretion of the authority is greatly reduced, with a more efficient impact of the sanction policy. That's why a great importance is given by the economic literature to quantitative criteria rather than qualitative ones.

2.1. The gain or the harm principle with specific reference to cartel cases

While explaining the deterrence function of the sanction, reference was done to the two concepts of gain (or benefit) and harm yielded by the infringement, as focal elements to determine the penalty. Actually the minimum requirement to achieve deterrence would be, as shown above, a probability-adjusted fine equal to the gain[19]

The determination of the gain is thus given by the mark-up times the affected commerce, or[20]:

$$\pi^c = (p^m - p^c) x = (1 - p^c/p^m)p^m x, \qquad (4)$$

where x is the quantity of products sold at the increased price, i.e. the affected commerce.

Still the gain showed by the equation isn't a precise determination, as the costs of the cartel have to be subtracted[21]and, in case of detection, the legal expenses and the loss of credibility that the firm has to bear.

It turns out that the mark-up imposed times the quantity sold is an abundant estimation of the money pocketed finally by the cartel. On the other hand the availability of that information, especially with regard to past figures, should not be excessively difficult, being necessary only figures on the sales and the mark up; the main obstacle, the determination of the mark-up, requires the identification of a benchmark of the competitive price in absence of the collusion[22]. It seems that the reconstruction of the optimal price is of major interest in many economic policies, from tax to antidumping duties, through access regulation and antitrust as well, and many methods have been put forward

---

[19] See K. G. Elzinga and W. Breit, *op. cit.* ,(1976) p. 117.

[20] See Norwegian Competition Authority, *op. cit.,* (2001), p. 16.

[21] Compared to a monopoly, the cartelization is a more costly way to achieve the monopoly output, regardless the fact that an output verification system or a trigger strategy is used to prevent the participant from cheating, see S. G. Lanning, "The costs of maintaining a cartel", 36 *The Journal Of Industrial Economics*, (1987), p. 172. Moreover some resources have to be spent by the cartel in order to deter entry into the collusive market, see Norwegian Competition Authority report, *op. cit.* ,2001, par. 53 p. 12.

[22] The Norwegian Competition Authority report, *op. cit.* ,2001, par. 54 pp. 12-13 recommends the benchmarking method in order to find the competitive price base.

to calculate it. In determining the cartel's gain two major advantages compared to other sectors can be highlighted:

- the markets most likely to be prone to collusion have some features which can make easier the comparison between different products: homogeneity of the goods and their costs and maturity are the most important[23];
- an ex post analysis is required, since the relevant information to set the fine are related to the past behaviour of the firms. That means that there is no need for prospective analysis on the evolution of the market, like, f.i., in the merger control evaluation.

The determination of the gain thus is relatively easy to assess, given the information that can be carved out by the firms involved, the complainants and the economic studies of the market involved. That's why with regard to the determination of sanctions attention is usually paid more to the economic advantages of the infringement rather that to the harm provoked[24].

By contrast, the determination of the harm is a very difficult task, since it needs much more information, besides the mark up and the sales figures: a measure of the elasticities of demand and supply and the size of the rent seeking efforts can be two examples. Moreover, the necessary data are disputable and can be easily concealed by the firm, besides that they could be dispersed among a huge number of "victims", which yields additional costs in gathering them[25].

The informational advantage of a fine based on the gain rather that on the harm is not the only reason for the adoption of such a base. As it was pointed out above, the size of the financial penalty is likely to influence the enforcement costs. Given that assumption, the lowest fine able to achieve the deterrent effect is the most efficient one, i.e., in that case, the gain based penalty. Moreover, since the base fine has to be adjusted for the probability of detection and the final amount will result in a multiple, the use of the gain principle leaves some room of manoeuvre before the proportionality principle is to be applied, given the fact that instead it is linked to the harm inflicted.

The two main objections raised against the gain principle can be overcome. The event that the private gain spills over the harm[26] is a very unlikely one in cartel cases, which are actually *per se* prohibited by reason of their intrinsic negative externalities. The danger of underdeterrence due to errors in assessing the benefit can be mitigated by recurring to the gross gain measure of the cartel, which is likely to be higher than the money actually pocketed by the company. To that amount the costs of the legal proceeding and the bad advertising are to be subtracted, adjusted for the probability of detection. Thus it is probable that the gross gain measured by sales times the mark up offers the "gain plus" amount[27] required to secure against mistakes in assessing the net gain.

---

[23] See for a summary R. van den Bergh, P. Camesasca, *European Competition Law And Economics,* (2001), pp. 172-173.

[24] M. Van Oers – B. Van der Meulen, "The Netherlands Competition Authority and its Policy on Fines and Leniency", 26 *World Competition* (2003), p. 28 with reference to the legal systems which engage in a gain based sanction.

[25] On the difficulties in calculating the harm see OECD, *op. cit.,* (2002), p. 76; the hurdles arise not only for the determination of the allocative harm, but even for the dynamic losses provoked by the cartel.

[26] Thus the gain based fine will deter from engaging in socially efficient activities, see W. M. Landes, "Optimal sanctions for antitrust violators", 50 *University Of Chicago Law Review* (1983), p. 652.

[27] See. A. M. Polinsky and S. Shavell, *op. cit.,* (1994), p. 436.

2.1.1. The incentive to stick to the cartel and the role of the fine

The application of the gain principle has to be adapted to the fact that the cartel is an unstable setting, continuously exposed to the risk of cheating by the members; the decision whether cheating or not weights the uncertainty deriving from the illegal gain against the certainty of the gain deriving from shrinking; thus in order to exploit this vulnerability and weaken the incentive to collaborate, the enforcement should mainly be focused on the relationship between the illegal gain[28] and the attractiveness of cheating.

On that matter an interesting point has to be focused: while analyzing the rational crime problem it has been stated that the expected profit should be equal to 0 in order to have ex ante deterrence. However that statement doesn't take into account the sustainability constraint of the cartel, given that each participant has an incentive to cheat the others and to profit from an additional gain[29]. The sustainability constraint is such that the present value of the cartel expected profits (PV^c) has to be higher than the present value of cheating (PV^s). Assuming a trigger strategy[30] as punishment device adopted by the cartel in case of cheating, and where is the probability adjusted discount factor, the probability of future interaction being influenced in practice by the probability of detection of the cartel and other factors (changes of demand, technology, etc…), the constraint can be summarized by:

$PV^c > PV^s$ or

$E\pi^c / 1 - > \pi^s + 0$ which gives

$E\pi^c > (1-) \pi^s$ (5)

By substituting the sustainable value of E^c to * in equation (2) the deterrent sanction will be such that:

$E\pi^c = p (\pi^c - c - f) + (1 - p) (\pi^c) = (1 - \Gamma) \pi^s$ or

$f = \pi^c / p - \pi^s (1- \Gamma) / p - c$[31] (6)

Such a fine would lead the cartel to collapse, because the expected (uncertain) profit deriving from the infringement will always be lower than the (certain) additional profit of cheating, assuming that by shrinking the firm doesn't incur into a fine[32]. On the other hand this new setting requires much more information

---

[28] The preference towards the gain principle is clear in Norwegian Competition Authority, *op. cit.,* (2001), p. 5. However the difficulties to assess the gain from cheating advised the Committee not to take into account the gain that the participant would have earn hadn't they collaborated.

[29] A complete analysis of the incentive to cheat is carried on in L Pepall – D. J. Richards – G. Norman, *Industrial organization: contemporary theory and practice,* 2002, p. 369 and ff. Ample reference is given to the formalization thereto, but it is added the influence of enforcement efforts.

[30] Which would revert the market to a non collusive equilibrium, for simplicity here the perfect competitive one with $^* = 0$ for the following periods.

[31] For instance by assuming a discount factor (R) = 0.95, a probability of interaction = 50% so that = 0.47, a probability of detection p = 15%, a $^c = 100$, $^s = 150$ and c = 10, the optimal fine would be 86.

[32] This assumption is likely to be realistic if the firm, together with the decision to cheat, will join an "effective" leniency program, i.e. "it allows a firm that unilaterally defect from a collusive agreement to increase its payoff by reporting information", according to the definition of G. Spagnolo, "DIVIDE ET IMPERA, Optimal deterrence mechanisms against cartels and organized

than the simple determination of the gain of the cartel (^{c}), but where available it would be preferable, as it would lead to a deterrent fine less costly for the society. Indeed the difficulties related to the determination of the alternative gain in case of cheating shouldn't lead to a complete lack of consideration of such an element[33], the lack of binding power being the major weakness of a collusive agreement to be exploited. For that reason the enforcement of an efficient leniency system is of paramount importance for the effectiveness of the sanctioning system.

Hence the basic elements for the assessment of the gain, the affected commerce and the mark-up, are analysed in the following sections, with some hints on the practical difficulties of such evaluations.

2.1.2. The affected commerce

The affected commerce is simply the quantity of goods affected by the increase of price imposed by the participants of the cartel[34]. It's usually measured in terms of sales on annual basis, but it has to be distinguished from the total turnover which is the reference of several sanction rules, included the EC ones. Indeed these rules refer to the turnover as a ceiling for the maximum amount of the sanction, not really as a starting point for its determination. That's why the total (or global) turnover of the firm is taken into account according to these rules.

On the contrary the affected commerce refers only to the goods whose price is either directly or not influenced by the infringement. It can be the same than the total turnover only in the extreme case of a monoproduct firm, whereas otherwise it's a fraction of it. Even if it is a fraction, the most recent estimates on the extent of the affected commerce bring amount on the order of billions of dollars[35], providing thus a considerable size of the gain eventually pocketed by the partecipants

The determination of the affected commerce bears some strong analogies with the definition of the relevant market for antitrust purposes; given that the relevant market is defined as the market which is "…worth monopolising…"[36] as it gathers all the products which are likely to operate as a competitive constraint to the increase of price of a product[37], it looks like the same concept being lying behind both the relevant market and the affected commerce notions. This concept is the *locus* where the market power has been exercised (in the case of an *ex post* analysis on the affected commerce) or could be exercised (in the case of a *ex ante* analysis on the relevant market). Thus the two notions are the different sides of the same concept. A cartel involving only a part of the relevant market would not be sustainable, as the competitors not participating to the cartel would

---

crimes", (2003), *Econometric Society 2004 North American Winter Meetings / Econometric Society*. available at http://repec.org/esNAWM04/up.24618.1049197921.pdf, p. 16.

[33] As it is advised in Norwegian Competition Authority, *op. cit.,* (2001), par. 65 and ff., p. 15.

[34] See OECD, *Hard core cartels – recent progress and challenges ahead,* (2003), p. 8.

[35] See J. L. Clarke and S. J. Evenett, "The deterrent effect of national antitrust laws: evidence from the international vitamins cartel", 48 *Antitrust Bulletin* (2003), p. 719; according to their estimates, the overcharges in the vitamins cartel alone (anyway the biggest ever prosecuted), in the non producer countries (i.e. excluding Japan, USA, France, Germany, among the others) has been of about 2.709 millions of dollars!

[36] S. Bishop – M. Walker, *The economics of EC Competition Law,* (1999), p. 47.

[37] A. Jones – B. Sufrin, *Ec Comeptition Law*, (2001), p. 39.

erode the cartel profits. On the contrary is quite common the existence of multiple cartels involving the same firms operating in different relevant markets, often with some relationship with each other; indeed, once overcome the coordination problems for one product among the same competitors, it's easier to have collusion even for neighbour markets. However in that case each cartel should be seen as a distinct fact with regard to the definition of the affected commerce and the base fine, eventually taking into account the correlation for leniency or aggravating purposes.

Thus the main difference between the two notions would lie on the way to assess them, since for the relevant market a prevision on the future developments of the market following a supposed increase in price has to be forecasted, whereas for the affected commerce an investigation on the extent of the past behaviour is necessary. For that reason therefore the uncertainties and difficulties notoriously related to the definition of the relevant market are less serious for the definition of the affected commerce.

Anyway the relevant market definition could be a useful tool to ascertain the real extent of a cartel or a concerted practice, whenever it is not possible to gather evidences on the full range of products affected by the cartel: if evidences of an explicit agreement was reached with regard a specific market that for sure cannot constitute by itself a separate relevant market, that should lead to a deeper investigation on the real extent of the practice. For instance the full range of participants or of geographic markets involved could be better defined through a deeper analysis on the affected commerce.

Besides that, the knowledge of the market share of the affected commerce owned by each participant gives the possibility to impose to each member a fine proportional to the gain deriving from the infringement, regardless the total size of the firms involved: indeed if the basic criterion was the total turnover, it could be that small firms with high market share in the affected commerce would bear a lower fine than bigger undertakings with lower market shares, even if their gain from the infringement was lower. In that case both the deterrence aim and the proportionality principle would be lost.

Up to now the definition of the relevant market or affected commerce in cartel cases has largely been underestimated, since the fact that the agreement has an anticompetitive object has made useless the investigation on the effect in order to achieve the conviction of the firm. That could be a reason for the actual lack of data on the extent of the markets interested by cartels. However, if the alleged infringement has to be quantitatively judged (and sanctioned) on the basis of the effects that it brings about, the definition of the affected commerce will be crucial and could not be by passed through reference to other means. And as far as the deterrence purpose lies behind the enforcement policy, a quantitative assessment is necessary in order to avoid over or under deterrence. The burden for the enforcing agent would not increase dramatically, since much of the relevant information is related to the past behaviour of the agents; besides that, the instruments for the definition of the relevant market can be useful tools to integrate the evidences already gathered by the enforcing agent.

In fact the affected commerce figure doesn't give the base fine by itself, since the mark-up is the other crucial element, together with the duration of the infringement, to define the gain, which should be used as the base fine.

2.1.3. The mark-up

The determination of the mark-up is probably the most difficult element to assess, since a precise measure of the competitive price that there would have been without the collusion is almost impossible and anyway disputable. Besides the informational gap, a further problem is given by the fact that there are different approaches to assess the market power which is exercised. Different studies provide different measure of the mark-up, but usually the most common cited amount is on the order of 5-10%.

Usually the amount of the mark-up has always been a measure of the market power exercised by the firms and is summarised by the Lerner index:

$$L = (p - c)/p = - 1/\varepsilon^{d}$$

where ε^{d} is the elasticity of demand of the firm.

However in practice the mark up is measured by means of a comparison between the price currently met and the alternative price that would come up in equilibrium if the competitive process was free to operate, i.e.

$$(p^{m} - p^{c})/p^{m}. \qquad (7)$$

In fact the determination of the alternative price (p^{c}) to be used as the competitive yardstick can follow two methods[38]: either by means of the determination of a competitive price that would have happened hadn't had the collusion taken place or by means of an alternative price drafted with reference to other benchmarks, like foreign prices or prices of similar goods (benchmark price). Each method has different features.

Through the first method the reference price can be derived from the information carved out from the affected companies about available costs, price and quantity information. By means of these information an estimation of the demand elasticity and of marginal costs have to be assessed, thus deriving the price that would have come about[39]. Both theoretical and empirical problems come up, since econometric estimates of the necessary variables have to be collected, and meanwhile a credible model of interaction without collusion has to be proposed, in order to interpret the empirical data gathered. (e.g. the application of a Cournot or Bertrand oligopoly). Besides that, the reference price will be influenced by the supposed degree of competition that there would have been without competition, thus leaving room for very discretional evaluations.

The other approach through benchmarking is less dependent on the information provided by the affected firms, since it looks to exogenous elements as starting points for the determination of the reference price, like foreign or historical prices or costs. Two different procedures can be followed: either directly looking for the alternative price[40] or focusing on benchmark mark-up and costs separately, thus deriving the competitive price. In case of foreign information on prices the first obstacle is the need for correction according to the national differences in the level of costs[41], but not according to different competitive pressure or different scales of production[42], since these elements are directly affected by the collusive agreement, so they should be taken into account while calculating the reference price.

---

[38] Norwegian Competition Authority, *op. cit.,* (2001), par. 78 and ff., p. 17.

[39] This is the method utilized in the Corrugated Cardboard case by the Norwegian courts, see Report prepared for the Supreme Court by Olav Magnussen and Victor D. Norman, submitted 10 June 1995 and the ample explanations provided in the Norwegian Competition Authority, *op. cit.,* (2001), par. 80-92, p. 17 and ff. .

[40] Which is the method advised by Norwegian Competition Authority, *op. cit.,* (2001), par. 106.

[41] Norwegian Competition Authority, *op. cit.,* (2001), par.96 p. 20.

[42] Norwegian Competition Authority, *op. cit.,* (2001), par. 96-97, p. 20.

Even though from a theoretical point of view the benchmarking has some flaws with regard to the elaboration of incorrect estimates, in practice the reference to exogenous elements could furnish a more realistic view of a real competitive price, whenever the collusion had influenced the industry structure too, thus the information collected from the affected firms would not be reliable anymore. Moreover by referring to more competitive environments even the gain deriving from the organizational slack is taken into account[43].

On the other hand whenever the collusion has an international dimension, the availability of reliable benchmarks in the foreign markets can disappear and the reference to historical data may not be a good starting point. However even with regard to international cartels the studies on bilateral trade flows can provide some benchmarking elements to establish the competitive quantity without the cartel[44].

Once derived the percentage of the mark-up, by multiplying that result with the affected commerce the measure of the gross gain is established.

2.2. The duration

The temporal dimension naturally has great importance for the determination of the gain, since most of the times the temporal horizon of collusive agreement is indefinite or infinite[45], at least according to the intents of the participants. Indeed many cartel were supposed to lie on the market since decades before they were found and punished[46].

A first consideration to be done with regard to long term cartel is that the agreement has the tendency to become more instable. First of all the persistent existence of high profits in the cartelized market is likely to attract new entrants[47]; secondly the long term demand elasticity and the cross elasticities are likely to be much lower (in absolute terms) than the short term one; the lack of competitive pressure may result in increasing x-inefficiency, which makes easier the entry on the market for more dynamic firms; with the time going on, the probability that the enforcing agency will eventually catch the participants increases; finally technological developments or demand changes can seriously affect the static requirements necessary for the maintenance of the collusion.

As a result of this instability the gain deriving from the infringement is likely to decrease constantly and the natural collapse is a question of time. From a formal point of view both the expected profits and the probability adjusted discount factor will decrease and the probability of detection will increase, thus the threat of a given penalty acquires an higher deterrent effect.

Besides the theoretical issues, the flowing of the time arises several practical difficulties. First of all the calculation of the gain based on a simple

---

[43] Norwegian Competition Authority, *op. cit.,* (2001), par. 104, p. 21.

[44] Particularly important is the s.c. "gravity equation", which basically relates the import from one nation to another positively with the levels of national income, see J. L. Clarke and S. J. Evenett, *op. cit.,* (2003), p. 703.

[45] See L. Pepall – D. J. Richards – G. Norman, *op. cit.*, (2002) p. 369.

[46] As it was clear in the ICI-Solvay case, which was supposed to have its roots in a 1946 agreement.

[47] Even the most successful cartel of our times, the OPEC, had to face the increasing fringe competition of North Sea and Russian oil reserves. Another example is given by J. L. Clarke and S. J. Evenett, *op. cit.,* (2003), p. 700, with regard to the role of Chinese exporters in the fall down of the cartel on folic acid and B^1 and B^6 Vitamins.

multiplication of the annual gain times the duration of the collusion is not an accurate measure of the actual money pocketed by the participants, especially if the measure of reference will be the gain earned during the last year of existence of the cartel, since it is likely that it will provide an underestimation of the actual gain. In addition the gain earned in the former periods should be revaluated in actual terms. Finally the longer the collusive condition have been lying on the market, the scarcer the availability of information not affected by the collusive environment, especially if the structure itself of the industry has been influenced too by the cartel.

At the end the temporal dimension can be deemed to have two opposed effects: on one hand the cartel becomes elder and weaker, up to when it will pass away after having yielded bunches of money for the participants and serious losses for the society; this natural death can be just be accelerated by the enforcement system, if an ex ante deterrent effect wasn't achieved at the very beginning of the infringement. On the other hand the practical determination of the actual gain becomes tremendously complicate. A possible guideline however can be the unsuitability of the gain earned in the last periods as a starting point for the calculation, when the cartel lasted for long time, since the likelihood of an underestimation in such a case could be very high.

From a theoretical point of view the first best situation would arise when data on each year extra profits earned are available, thus it would be necessary just summing up and actualize them. However, even in this optimistic case, the effective ability to pay may represent a serious obstacle for the enforcement of such a fine: the gains pocketed long time ago are usually invested in assets that cannot be easily converted in cash flow at the moment of the imposition of the penalty. That consideration can provide a further argument for the imposition of criminal sanctions with regard to long lasting cartels, even following the classical beckerian approach on enforcement[48]: since the ability to pay is anyway the upper limit for the magnitude of the fine, the likelihood that the fine will be higher than the actual cash flow of the enterprise should lead to the application of personal sanction in order to keep the deterrent effect without bringing the firm to the bankruptcy. Even though the ability to pay could be measured through several proxies[49], the sale of the assets would have to take into account the costs that such an expropriative fine brings about[50].

2.3. The probability of detection

Once established the base fine, this amount has to be adjusted by the probability that such a penalty will be actually applied, according to the formula showed above. In fact both the detection and the conviction are uncertain events whose probability has to be taken into account for the adjustment of the nominal fine. However, since the collusive agreement is an act covered by the utmost

[48] See G. J. Werden and M. J. Simon, "Why price fixers should go to prison", *The Antitrust Bullettin*, (1987), p. 923-924.

[49] See C. Craycraft, J. L. Craycraft, J. C. Gallo, *op. cit.,* (1997), p. 171 and ff. .

[50] Once the fine overcomes the operating funds, the firm has to convert the stock in order to pay the fine; in that case the shareholders, the long and short term creditors can be affected depending on the magnitude of the fine. In the Craycraft et al. study only 42% of the firms would have been able to pay the optimal fine without fall in bankruptcy and only 26% be means of the highest measure of the operating funds, C. Craycraft, J. L. Craycraft, J. C. Gallo, *op. cit.,* (1997), p. 179.

secrecy which is concealed to the other operators of the market and given the informational asymmetry which affects the enforcing authority, the most difficult obstacle to punish the misbehaviour is represented by the necessity to detect the agreement, whereas the conviction once discovered the anticompetitive deal is much less uncertain, given the *per se* prohibition and the tough attitude of authorities and judges towards this kind of antitrust infringements. For that reason the two probabilities will be considered together under the same name (probability of detection), as positively related to the expenditure for the enforcement afforded by the government. While considering the imposition of criminal sanctions, however, a distinction between the two moments of the enforcement procedure would be useful: if the standard of proof is different depending on the type of penalty imposed (administrative or civil vis à vis a criminal one) , there will be two different deterrent effects with regard to the different penalties, because an higher standard of proof means a lower probability of conviction, even though the probability of detection is the same.

The most important investigative tools are the monitoring of the market dynamics, the dawn raids and the leniency programs, whose paramount importance will be highlighted below. The first instrument is complementary to the others, since it allows an ample survey of many markets; once some collusive elements are inferred, a deeper investigation looking for hard evidences will be required, and that could lead to some firms joining the leniency programs.

The figures on the actual probability of detection differ, since they are all based on uncertain estimates, given the fact that there is no proof on the overall number of infringements, whose the ones detected are just a fraction. Some statistical estimates made by Bryant and Eckard[51] pointed out a probability between 0.13 and 0.17 of getting caught, based on the assumption that the life of caught cartels is the same of uncaught ones, while others would propose a lower probability of about 0.10[52], based on the fact that notwithstanding the treble damages, the criminal penalties, the costs of the trial and of the cartel, collusive agreements keep on being dealt by firms.

It has to be highlighted that this probability of detection is a variable depending on the expenditure born by the government, even if a precise empirical study on that relationship has not been drawn. A concave relationship could be supposed to exist between expenditure and probability of detection, since a more than proportional increase in expenditure is needed as long as the probability of detection increase[53].

This assumption seems to be realistic since the most flagrant violation of the antitrust law can be detected even through a careful monitoring of price movements[54], while more secret agreements need the utilization of more invasive and expensive investigative tools, like dawn raids and leniency programs.

On the other side, a negative relationship characterizes the relationship between the probability of detection and the magnitude of fines, because the nominal fine will be lower the higher the probability that it will be applied, in order to achieve a given expected fine.

---

[51] P. G. Bryant – E. W. Eckard, "Price fixing: the probability of getting caught", 73 *The Review Of Economics And Statistics* (1991), p. 536.

[52] G. J. Werden and M. J. Simon, *op. cit.,* (1987), p. 626.

[53] For the idea of diminishing returns from the antitrust enforcement see first of all K. G. Elzinga and W. Breit, *op. cit.,* (1976) p. 11.

[54] "…the probability of detection is sensitive to an individual firm's price…" see J .E . Harrington, "Some implication of antitrust laws for cartel pricing", 79 *Economic Letters* (2003), p. 382

There are other effects deriving from a given level of enforcement efforts, that can be summarized:

- higher probability of detection can reduce the likelihood of judicial mistakes and the relative costs[55];
- the monitoring efforts can reduce the effectiveness of the internal punishment mechanism in case of deviation from the agreement, since immediate retaliation by means of price wars will let the cartel be discovered[56];
- an higher probability of detection can lower more than proportionally the expected utility of the cartel's extra profits in risk adverse individuals;
- some learning benefits can be yielded from a setting where offenders are detected more often thanks to increased investigative efforts[57]
- an higher probability of detection, besides increasing the amount of the expected fine, will lower the probability adjusted discount factor , thus making less attractive the future cartel profits vis à vis the opportunity of deviating.

Despite the advantages deriving from an increased investigative activity, there are increasing costs to be born in order to seriously detect collusion, even because hard evidences (i.e. proof at least of communication to maintain collusion) are required in order to have conviction, not being desirable that the illegal behaviour were inferred exclusively by means of market data, given the flaws of pure econometric techniques[58]. Because of these costs and because of the limits that the maximum statutory fine has to respect, is likely that full *ex ante* deterrence is not desirable, given the huge investigative costs that an invasive and complete deterrent system would yield. There will thus be a certain level of collusive activity, under which the enforcing agency won't investigate, because it would be too expensive compared to the social benefits secured[59].

Since a full deterrence solely by means of high fines (within the statutory limits) and accordingly high probability of detection through investigation is likely not to be achieved, the most recent developments in the detection techniques try to exploit the instability feature of the cartel by means of leniency programs, in order to implement at least a second best solution.

2.3.1 Leniency programs

The leniency programs are schemes according to which the enforcing agency guarantees some lenient treatment for the firms that come forward and furnish hints and evidences on ongoing cartels. Actually by awarding the cheaters, this approach aims at destabilizing the cartel agreement and making profitable deviating from the collusive path.

---

[55] See B. H Kobayashi and J. R. Lott jun., "Low probability – high penalty enforcement strategies and the efficient operation of the plea-bargaining system", 12 *International Review Of Law And Economics*, (1992), p. 76.

[56] J .E . Harrington, *op. cit.* , (2003), p. 381

[57] O. Ben-Shahar, "Playing without a rulebook: optimal enforcement when individuals learn the penalty only by committing the crime", 17 *International Review Of Law And Economics*, (1997), p. 409 and ff. .

[58] See M. Motta, *Competition Policy – Theory And Practice,* (2003), p. 189.

[59] See S. Souam, "Optimal antitrust policy with different regimes of fines", in 19 *International Journal Of Industrial Organization*, (2001), p. 2.

In fact without the possibility of leniency programs, the enforcing efforts not achieving the full deterrence could lead to a rather paradoxical result, the strengthening the collusive agreement[60]! The explanation is straightforward: if the detection is costly for the colluding firms, the cartel is able to increase the price closer to the pure monopoly one than without the threat of fines; indeed, if one of the firm will deviate, that price movement will be more evident and it could lead to the detection and punishment by the authority, thus making the deviation no profitable anymore. Moreover, if the limitation period for the infringement is long, the deviation will be made more costly even once the agreement is not in place anymore, since an immediate price movement could attract the investigation for the past and still punishable anticompetitive conduct[61].

However, if leniency programs are put on place, the deviation strategy becomes again a profitable one, whenever together with the deviation the firm will apply for the leniency, even if that makes cheating a strategy sustainable only for one period, the last one of existence of the cartel. Accordingly, a long limitation period for the infringement, rather than preventing from deviation, will not have negative influence on the decision on reporting[62].

Some scholars[63] have distinguished two opposite effects of leniency programs: on one hand they lower the *ex ante* deterrence, since the expected fine will be lower given the fine reduction; on the other they increase the *ex post* desistence, since the deviation and revealing strategy will lead the cartel to collapse and not to be rebuild in the future, given the loss of confidence among the participants. Thus if *ex ante* full deterrence is already achieved, the leniency program should not be used, whereas it is an important instrument in a second best setting.

Finally, from a processual point of view, the collaboration of the participants can provide decisive hard evidences that would have been otherwise very costly to collect, thus raising the probability of conviction.

Once established the importance of leniency programs, if full *ex ante* deterrence cannot be achieved without them, the basic features of an efficient scheme have to be sketched.

First of all the reduction of fine following the application has to be "large enough"[64], either because without collaborating there is an high probability of detection or because of the magnitude of fine or both. Moreover the higher the award for the deviation, the more likely the fear of application for the leniency and the higher the cartel profits have to be in order to overcome the profit deriving from cheating, thus the higher the likelihood that such an extreme cartel can be detected. On that point there are different elements that can help the efficient functioning of the cartel[65]:

---

[60] This argument is put forward by P. Cyrenne, "On Antitrust Enforcement and the Deterrence of Collusive Behaviour", 14 *Review Of Industrial Organization*, (1999), p. 265.

[61] J. Hinloopen, "Cartel Stability with Time-dependent Detection Probabilities", *Tinbergen Institute Discussion Papers 104/1*, (2003a), p. 16.

[62] J. Hinloopen, "Leniency programs in antitrust law", 151 *De Economist*, (2003b), p. 431.

[63] M. Motta – M. Polo, "Leniency programs and cartel prosecution", 21 *International Journal Of Indutrial Organization*, (2003), p. 347 and ff. .

[64] The formalization of such a feature is done in J. Hinloopen, *op. cit.,* (2003b), p. 419 and ff. for the model.

[65] See J. Hinloopen, *op. cit.,* (2003b), p. 415 and ff. and S. D. Hammond, *Detecting And Deterring Cartel Activity Through An Effective Leniency Program,* Paper presented before the International Workshop on Cartels, 20-22 November 2000, Brighton, available at http://www.usdoj.gov\atr.

- the increasing size of fines, based on the gross gain from the cartel, is likely to influence the corporate decision whether applying for the leniency or not;
- the threat of personal fines and, above all[66], of the imprisonment can provide a further incentive on the individual decision to shrink from the corporate instructions, thus leaving out of control of the firm the possibility that the employees will apply for the leniency;
- the enforcing agency has to build a strong enforcement record, in order to make credible the threat of detection even in case of no collaboration. In that case an ever increasing detection probability enhances the effectiveness of the system[67], both by means of the time going on, which makes easier the detection, or through an increase of investigation expenditure;
- the reduction in case of collaboration has to be substantial, eventually the total immunity from punishment, in a measure that makes the $E^{s} > E^{c}$. With regard to personal sanctions, the enforcing agency has to be able to grant the immunity even for them;

Secondly, the award has to be let available only for the first applicant, provoking the s.c. race to the courthouse[68]. The first and more obvious reason for such a limitation is given by the fact that otherwise the effect of reduction of the expected fine would outweigh the increase in probability of detection, with a negative overall influence on the deterrent effect[69]. Besides that, the "first takes all" approach will introduce an element of "…tension and mistrust among the cartel members…"[70], given by the fact that the payoff for the first to defect is augmented, thus even if the first best equilibrium would still lead to stick to the cartel, in case that someone defects, every member wants to be the first. That feature can have interesting outcome whenever firm of different sizes or with different costs structure join a cartel: as far as there is asymmetric information about each other payoffs among the participants, each member is exposed to the risk that someone else will defect, no matter the magnitude of its own payoff; that setting could lead every participant to apply for the leniency as soon as an insignificant change will occur in the market. For a similar reason the admissibility to the program even if an investigation has started should be an important feature of the system[71]: being all the other conditions constant, if an investigation is not carried on, the members won't have a bigger incentive to defect than at the beginning of the collusion, whereas the event of an investigation, by changing the probability of detection of the firms, will suddenly lead to the race to the courthouse. The same reasoning would apply if other market conditions will change, in that case being the efficacy of the leniency enhanced. Moreover, in order to amplify this effect, some enforcing authorities (most notably the US Antitrust Division of the DOJ) have adopted an "Amnesty

[66] Because personal monetary sanction could loose the deterrent effect on the individuals if the firm will indemnify the manager fined, see Wils W. P. J. , *op. cit.,* (2003a), p. 220.
[67] J. Hinloopen, *op. cit.,* (2003b), p. 418
[68] S. D. Hammond, *op.cit.,* (2000), p. 5. A formal proof of the first-takes-all requirements of any Leneny program can be found in G. Spagnolo, *op. cit.*, p.17.
[69] About the opposite effects of leniency programs, see M. Motta – M. Polo, *op. cit.,* (2003), p. 347 and ff., however in the model provided in the article the basic setting admits the concession of the leniency for each firm collaborating.
[70] S. D. Hammond, *op. cit.,* (2000), p. 5
[71] See M. Motta – M. Polo, *op. cit.,* (2003), p. 373.

plus" approach[72] with regard to multiple cartels. According to such an approach, a firm under investigation for a cartel, even without being admitted to the leniency program for that infringement, by providing information on another cartel it joined, can be eligible for a full amnesty for the second infringement *plus* for a reduction of the penalty to be imposed for the first infringement[73]. In that way, even an investigation going on a different market can be seen as an element able to influence the current anticompetitive deal, whenever the same firm joins both the cartels.

Third general characteristic of the system is the need for transparency, both on the hypothetic punishment once detected, on the conditions to be fulfilled to be eligible for the program and on the award granted in case of admission to the leniency. Indeed, since the firm has to carry out an *ex ante* evaluation whether applying or not before doing that, it has to be sure at the utmost level what payoff each decision will yield. For that reason the lowest degree of discretion has to be left to the agency in order to concede the benefit and accordingly the criteria have to be clearly set out in advance and they have to be binding for the authority. Otherwise the uncertainty of the admission and the possibility to attract the attention of the authority to certain markets without getting the award would prevent the firms from joining the program.

As it has been pointed out throughout the section, the leniency program is essential in modern antitrust enforcement. Its necessity derives directly from the difficulties to achieve a full *ex ante* deterrence, given the legal, budgetary and economic constraints; these problems are solved by leveraging on the intrinsic instability of the collusive agreement. But in order to be efficient it cannot be seen just like an investigative tool, rather it is an element itself of the enforcement system. Such a strict interrelation between probability of detection, magnitude of fines and effectiveness of leniency program brings about the need for coordination among them, since each element has an impact on the others. Moreover a careful assessment of the effects of private damages and personal sanctions on the leniency system has to be carried out, even if it is not within the scope of this paper.

Seen within a complete system, the leniency program has led to amazing results in the fight against the hard core cartel, whereas whenever it has been introduced without an unitary strategy, the outcome has been totally different, like the 1996 EC Notice on leniency.

2.3. Conclusive remarks

At the end of the discussion about the optimal fine, a definitive formula is not proposed, rather some general guidelines can be derived, in order to recognize the effects that some policy decisions can yield. Indeed, the application of a short-cut formula would be appropriate, and useful, only in case that some

---

[72] See for the details S. D. Hammond, "When calculating the costs and benefits of applying for corporate amnesty how do you put a price tag on an individual's freedom?", speech at the fifteen annual of the National Institute on White Collar Crimes, March 8 2001, available at http://www.usdoj.gov\atr.
, (2001).

[73] Actually this new feature could be deemed to follow the "courageous leniency programs" path as described in G. Spagnolo, *op. cit.,* (2003), pp. 16 and ff. . Indeed the reduction for the first infringement, whose requirements for leniency wouldn't be fulfilled otherwise, could be seen as a positive rewards for the application for the second infringement.

critical information were available. However, the information asymmetry is the most evident feature that characterize the regulator-firm relationship, even in the field of enforcement.

The basing point is that antitrust penalties have to achieve the optimal amount of deterrent effect, whose marginal costs doesn't overcome the marginal benefits[74] of an effective antitrust enforcement; that means that often total *ex ante* deterrence is not optimal, if it brings about more costs than benefits. In order to achieve that optimality, the basic framework on penalties should be a quantitative one, rather than qualitative. In other words, the quantity of the penalty has to be linked to the measure of the effect that the infringement provoked, rather than on the quality of the action undertaken. Of course due account has to be given to the problem of the attempted infringement, even if it has not yielded any tangible effect, since it provoked anyway a threat of harm to the society. That is taken into account by means of minimum floor for the penalties.

First of all, the coherence of the entire sanctioning system is of paramount importance, since all the elements are closely interrelated, and the change of one parameter is likely to have effect on all the setting. For that reason matters like the private damages and the standing to claim them, the international or domestic feature of the infringement, the type and quantity of investigative tool, the availability of criminal sanctions are to be taken into account when the question on the optimal fine is addressed.

Secondly, the transparency of the criteria applied in the determination of the sanction, and their publicity, are fundamental, in order to strengthen the deterrent effect on the rational criminal's cost-benefit analysis. The surprise-effect is not a valuable good, rather uncertainty leads just to underweight the real amount of the fine at the crucial moment of the cost-benefit analysis about engaging on the cartel or applying for the leniency.

Therefore, the gross gain principle should be the basic point, even if measured by means of proxies; indeed an inquiry on the affected commerce is a reasonable burden to be asked to the enforcing agency, at least to have a measure of the overall effect of the cartel and of the role played by each participant. On the contrary, the determination of the mark-up, but above all a precise determination of the probability of conviction, are much more questionable, and the agency will be inevitably forced to use gross estimates. The starting point remains however the quantitative link between sanction and effects produced, because otherwise the achievement of the deterrent effect will be a matter of chance, rather than the aim of the enforcing system, and many losses will be suffered meanwhile

Finally the importance of the consistency of the leniency program with the other element of the system is crucial, since the possibility of the amnesty targets at the heart the major flaws of the collusive agreement, the instability given by the self interest of the members. At the end, even the invisible hand needs to be guided by someone else, sometimes!.

[74] The existence of benefits deriving from partial *ex ante* deterrence has been empirically measured with regard of probably the biggest cartel of recent history, the Vitamins one: countries with higher antitrust enforcement expenditure have suffered lower losses, which fully justify the expenses done, see J. L. Clarke and S. J. Evenett, *op. cit.,* (2003) pp. 689 and. ff.

3. THE ACTUAL EC FINING POLICY

The application of the optimal framework in practice has not been plain, given the lack of all the relevant data. For instance most of the time the statutory provisions concerning the fining power of antitrust agencies don't establish a precise amount or a definitive methodology[75] to decide the amount of the fine, rather they provide the types of sanctioning instruments and the upper ceiling of the sanctions allowed. Either the courts or the administrative agencies have been left with an unbounded discretionary power to establish the fine within the statutory limits, and for long time the exercise of such a power has not been constrained by *ex ante* explicit criteria. During the last decades, however, the deterrent objective has been more and more pushed forward as the prominent task of the enforcement[76], rather that the pursuance of the s.c. co-operative strategy[77]. In order to accomplish to such an objective, explicit fining criteria have been drawn, such that a cost-benefit analysis can be carried out by the potential "criminal", before that he will engage in the illegal activity. Hence, together with the statutory rule, the sanctioning guidelines expliciting the fining criteria applied by the enforcing agent are an essential part of the sanctioning system. Finally the role of the leniency programs and the indications of the jurisprudence are reviewed, with the final aim to ascertain points of contacts or divergences of the actual policy *vis à vis* the theoretical setting sketched in the previous chapters.

Before the analysis of the actual European policy, however, a brief summary of the US setting will be given, in order to emphasise similarities or differences between the two systems.

3.1. The US experience

The most striking difference between the European sanctioning system and the US one is the availability in the latter of criminal sanctions, particularly targeted to individuals. However even the guidelines on the determination of the monetary sanction, the massive recourse to private damages claims and the leniency system show some differences with the European experience.

The basic ceilings of sanctions are set by the Sherman Act, as it follows[78]:

---

[75] There are some legal systems that provide a methodology for the assessment of the fine, based on the effects of the infringement, like Germany, New Zealand and Switzerland (three times the advantage) or the USA (two times the gain or the loss). However these measures are always alternative to a maximum ceiling.

[76] The clear understanding of the importance of the deterrent task is, for instance, deemed to be the key of all the recent developments of the British sanctioning system in Barry J. Roger, "The Competition Act and the Enterprise Act reforms: Sanctions and deterrence in UK Competition law" in G. Dannecker – O. Jansen, *Competition Law Sanctioning In The European Union – The EU-law influence on the National Law systems of sanctions in the European Area,* (2004), p. 101. A brief but complete chronological path of development of the US sanctioning policy related to the different consideration of the role of the fines is in S. Calkins, "Corporate compliance and the antitrust agencies' bimodal penalties", 60 *Law And Contemporary Problems*, (1997), p. 130 and ff. .

[77] The distinction between the deterrent or rule-oriented enforcement strategy and the cooperative strategy is drawn down by J. T. Scholz, "Co-operation, deterrence and the ecology of regulatory enforcement", 18 *Law And Society Review* (1984), p. 179 and ff. .

[78] These measures are likely to change if a bill introduced by the Congress the 29th september 2003 will become law, see J. S. Magney – R. C. Anderson, "Recent developments in criminal enforcement of US Antitrust laws", 27 *World Comeptition*, (2004), pp. 102-103. In such a case

- corporate fines: up to 10 millions $ or twice the gain of the violator or the loss of the victim;
- individual sanctions: up to 350.000 $ of fine and up to three years of imprisonment.

Within these limits, however, the judge doesn't have complete discretion; on the contrary the Sentencing Commission Guidelines govern the application of sanctions for crimes that arise under federal jurisdiction, according to the offence behaviour and the offender characteristics[79]. First of all, only horizontal collusion is to be prosecuted in a criminal context[80]. In order to establish the basic amount of the fine with regard to the type of offence, the Guidelines provide two alternative methods: the general one (currently used for all the crimes) is based on the determination of the offense level within a general scale (from 43, the most serious crimes, to 1, the least serious ones), with the antitrust offences deemed to have a basic scale of 10; such a level can be increased up to 18 depending on various circumstances and anyway up to 11 a jail sentence of at least half of the statutory maximum has to be imposed; finally, the Guidelines provide a range of fines for each offense level. However, for antitrust matters, the alternative and specific method[81] is almost always used, based on the gain or the loss caused by the infringement: the basic amount is keyed on the volume of commerce, since the basic fine is set at 20% of the defendant's volume of commerce in the market involved (the affected market). It could be concluded that the determination of the fine is admitted both on qualitative or quantitative grounds, with a strong preference to the latter method in the practical application. However the quantitative method doesn't rely directly on the assessment of the actual gain or damage, since it would be too difficult, but only on a proxy, a quota of the affected commerce[82].

Once determined the offence level basic fine, that is adjusted according to the offender characteristic; after such a culpability assessment, the final fine can range from a minimum of 75%[83] to a maximum of 400% of the basic fine, thus from 15% to 80% of the affected commerce. Of course the judge has some degree of flexibility, especially in case of plea bargaining, in order to shape further the fine with regard to the specific case.

Within the public enforcement context, it has to be highlighted that the US first introduced an effective leniency program and keeps on implementing it, for instance with the "amnesty-plus" feature explained above and the extension of the amnesty to individual sanctions, both personal and pecuniary. The future importance of this last development can be fully understood just by referring to the fact that the *Vitamins* cartels, the biggest ever convicted, was detected even thanks to the previous investigations on the *Citric acid* cartel, where the Hoffman La Roche, the ring leader in the *Vitamins* case, was found guilty.

---

the new maxima will be 100 millions $ for corporate fines, 1 million for individual fines and 10 years of imprisonment.

[79] See United States Sentencing Commission, Guidelines Manual, §2R1.1 (Nov. 2003). For a complete description of the application of the US Sentencing Guidelines see M. O. Wise, "The system of sanctions and enforcement co-operation in US antitrust law", in G. Dannecker – O. Jansen, *op. cit.,* (2004), pp. 200 and ff.

[80] USSG §2R1.1, comment. (backg'd.), p. 277.

[81] USSG §2R1.1 (d) 1, p. 275.

[82] See M. O. Wise, *op. cit.*, (2004), p. 203.

[83] USSG §2R1.1 (d) 2, p. 275. Only for antitrust offences a minimum fine is provided by the Guidelines.

In addition to the public enforcement, the US system provides strong incentives for private suits, since it allows the plaintiff to recover treble damages plus the legal fees in case of victory, class actions are available and the results of the public proceeding can be used as *prima facie*[84] evidence of guiltiness. Furthermore, private suits can be brought by public officials too, as the FTC with the disgorgement action and the single states attorney general in their *parens patriae* role; for the latter, moreover, it is always possible seeking remedies according to their state competition law.

At the end the overall consequences of the infringement arisen under the US jurisdiction are remarkable, especially if compared with the EC ones for the same cartel. In the worldwide *Vitamins* cartel the amount of fines and private damages to be paid in the US was of roughly 2 billions USD *vis à vis* the 855 millions of Euros to be paid to the Commission in the European case, without taking into account the imprisonment of nine executives. Moreover, the Rhone-Poulenc, which first sought for the leniency, was totally exempted from the payment of the fine and from criminal personal charges.

The presence of multiple enforcers has caused some critics, especially on the inefficiencies of the private damages[85], the possible loss of control on the amount of fines[86], the risk of undermining the "silver bullet" of enforcement strategy, i.e. the leniency program[87], since the DOJ is not able to guarantee immunity from private damages. Finally the presence of criminal sanctions requires an heavy burden of proof ("behind a reasonable doubts"), such that the conviction costs are likely to be higher compared to a pure administrative proceeding[88].

On the other side, thanks to the presence of several consequences following the infringement and several instruments sanctioning it, some DOJ officials claim the achievement of total deterrence objective[89]. Besides that the utilization of a quantitative method in determining the fine is an useful tool to achieve the right amount of deterrence[90]. Moreover, with regard to the efficiency of leniency programs, the presence of private damages is balanced by the provision of personal penalties in such a way that even if the corporation doesn't have enough incentive to report the cartel because of the uncertain consequences of

---

[84] Clayton Act §5(a), 15 U.S.C. §16(a).

[85] See for instance K. G. Elzinga and W Breit, *op. cit.,* (1976) p. 63 and ff. .

[86] "…As a result of so many enforcers, punishment has taken on a greater significance. What has changed is not just that total punishment has increased, but that it has increased in an unpredictable, erratic, and somewhat random fashion, leaving some types of violations subject to a stunning multiple set of fines and damages far in excess of treble damages, and other types of violations subject to virtually no criminal or civil liability whatsoever…" S. W. Waller, "Private law, punishment, and disgorgement: the incoherence of punishment in antitrust", 78 *Chicago-Kent Law Review* (2003), pp. 220-221.

[87] M. O. Wise, "The system of sanctions and enforcement co-operation in US antitrust law", in G. Dannecker – O. Jansen, *Competition Law Sanctioning In The European Union – The EU-law influence on the National Law systems of sanctions in the European Area,*, (2004), p. 207 and P. C. Zane, "The price fixer's dilemma: applying game theory to the decision of whether to plead guilty to antitrust crimes", *The Antitrust Bullettin*, (2003),p. 1 and ff.

[88] A similar effect has been found in the shift from misdemeanour to felony, with an increased burden of proof required which increases the incentive for defensive efforts of the defendant and finally to plead not guilty, see E. A. Snyder, "The effect of higher criminal penalties on antitrust enforcement", 33 *Journal Of Law And Economics*, (1990), p. 455.

[89] See the remarks at the Conference on Competition Policy in the Global Trading System: Perspectives from Japan, the United States, and the European Union of S. M. Chemtob, "Antitrust deterrence in Unites States and Japan", (2000), p. 9 available at http://www.usdoj.gov\atr

[90] OECD, *op. cit.,* (2002), p. 77.

the private claims, the individual employee does. In any case, the increased measure of fines due to the utilization of quantitative method of determination of the fine provides a strong incentive to report the infringement. On that latter point moreover, it has to be noted that the recent abovementioned bill aimed at modifying the actual sanctioning system of the Sherman act would provide a reduction of the available damages from the treble to the single measure in case of admission to a leniency program[91]. The private claim thus would loose its punitive feature and only the compensative function would remain.

3.2. The EC sanctioning system

3.2.1. The Reg. 1/2003

The Commission's sanctioning power in case of intentional or negligent infringement of art. 81 and 82 of the Treaty is provided for at the art. 23 of the reg. 1/2003, particularly at the paragraphs 2 and 3 with regard to the sanctions following the detection and conviction for an infringement. Moreover the new decentralized system leaves the single national authorities the possibility to pursue the infringements of the treaty with their own sanctioning instruments[92]. In the near future, thus, it will be possible the imposition of criminal sanctions for infringement of the Treaty where the national competition laws provide this kind of instruments. However, with regard to hard core cartel abuses, it is likely that they will keep on being at the top of the priority list of the Commission's competition agenda, thus the reference sanctioning system will still be the European one.

The most relevant provisions of the article concern the upper ceiling of the fine (paragraph 2) and the basic criteria to be followed in the imposition (paragraph 3). Moreover at the paragraph 5 of the same article it is explicitly stated that such a payment shall not be considered of criminal nature.

The upper ceiling is fixed with reference to the overall worldwide turnover of the undertaking convicted, since it cannot exceed the 10% of such a measure. Such amount is completely untied to the kind or the effects of the infringement sanctioned, rather it is linked only to the size of the undertaking; indeed the referring turnover is the worldwide one, regarding all the activities of the undertaking, not only the turnover resulting from the affected market[93]. Thus the only function of the provision is the determination of the limit above which the size of the fine is deemed to be dangerous for the existence itself of the undertaking and, hence, not proportional[94], without any binding provision on the utilization of the turnover as a proxy for the determination of the actual fine.

Conversely, at the following paragraph, the two main criteria to be followed in the determination of the amount are vaguely mentioned, being the gravity and the duration of the infringement. Indeed the new regulation doesn't do anything else that repeating the basic features of the previous system of the Commission, as explicated in the "Guidelines on the method of setting fines imposed pursuant

---

[91] see J. S. Magney – R. C. Anderson, *op. cit.,* (2004), p. 103, footnote 10.

[92] See art. 5 Council Regulation (EC) No 1/2003 of 16 December 2002 on the implementation of the rules on competition laid down in Articles 81 and 82 of the Treaty OJ L 001 , 04/01/2003 P. 0001 – 0025.

[93] See Court of Justice in Joined Cases 100-103/80 *Musique diffusion française and Others* v *Commission* [1983] ECR 1825, paragraph 119

[94] See Court of First Instance in Case T-224/200 *Archer Daniels Midland Company v Commission* [2003] paragraph 200 available at http://www.europa.eu.int/eur-lex.

to Article 15 (2) of Regulation No 17", already published in 1998 under the previous regime. Anyway it is explicit the link between the effect of the infringement and the fine to be imposed, in order to achieve the deterrent objective[95].

Within these two statutory boundaries, the Commission is left with ample discretionary power, which is nevertheless *ex ante* regulated by the Commission itself through the abovementioned Guidelines. Moreover, the judicial review on the determination of the fine is unlimited[96], hence the courts can incisively control and redress the Commission's policy on that point.

Moreover, the new regulation contains some changes on other points that, even if are not specifically to be dealt in this paper, could influence the probability of detection, hence the deterrent effect of the sanction imposed. First of all the investigative powers of the Commission are broadened, given that the officials can take statements from the employees during the inspection (art. 19) and even premises different than the firm's ones can be subjected to inspections (art. 21). In addition, there could be a positive impact on the resources available for the investigation, following an increased activity of the national authorities due to the decentralization, and a larger quantity of information available if the cooperation will work as supposed.

3.2.2. The 1998 Commission Guidelines[97]

Before the issue of these Guidelines, the Commission didn't adopt an unique approach, since the criteria followed were not predetermined, but explained in the decision case by case. Indeed two major approaches can be found in the most recent pre-guidelines case law[98]:

Finally the Commission Guidelines represent an attempt to summarize the two previous methods, since the fine is set directly for each undertaking but with reference to the gravity of the infraction. However the gravity is not linked to a quantitative measure of the effect of the infringement, as the US Sentencing Guidelines do through the affected commerce, rather a qualitative criterion is claimed to be the most important.

Indeed, about the determination of the basic fine, two steps are provided according to the two criteria of gravity and duration of the infringement. According to the gravity, the infringements are divided in three categories, minor (range of fines from 1000 up to 1000000 euros), serious (from 1 up to 20 millions euros) and very serious (over 20 millions euros). The gravity has to be assessed according to the nature of the infraction, the actual impact on the market, if measurable, and the size of the geographic relevant market. Moreover the Guidelines provides a list of infractions for each category of infringement, with the hard-core agreement belonging to the very serious one. The second step

---

[95] See the 29th preamble of the new reg. 1/2003.
[96] Art. 31 reg. 1/2003.
[97] OJ 1998 C 9/3.
[98] Such a distinction is drawn by E. David, "La dètermination du montant des amendes sanctionnant les infractions complexes: règime commun ou regime particulier ?", 36 *Revue Trimestrelle De Droit Europeen*, (2000), pp. 517-523. According to the "descendant" method, an overall determination of the fine according to the gravity of the infraction is set, thus such a fine is shared among the undertakings (PVC case); on the contrary, following the "ascendant" method, the fine is determined for each undertaking according to a percentage of the turnover on the affected market, percentage determined with regard to the gravity of the infringement and to the behaviour of the firm (Soda Ash and Cartonboard cases).

involves a percentage increase on the basis of the duration, up to 50% for infringement lasting no more than 5 years or up to 10% increase per year for infringements lasting more than 5 years.

Once set the basic fine, attenuating and aggravating circumstances can be taken into account, whose effect on the fine is not predetermined, since it leaves some freedom of evaluation. Another divergences with the US experience is find on that point, since in the Sentencing Guidelines the number of aggravating and attenuating circumstances and their effects on the multiplier of the basic amount is predetermined[99]. On the contrary the circumstances listed in the Commission Guidelines are not exhaustive and reproduce the past jurisprudence on the matter[100]. In particular the behaviour of the undertaking is taken into account, in order to accomplish with the punitive aim of the sanction, on the basis of a retributive setting.

Due account should be taken, once the above calculations have been made, of certain objective factors such as a specific economic context, any economic or financial benefit derived by the offenders, the specific characteristics of the undertakings in question and their real ability to pay in a specific social context, hence the fines should be adjusted accordingly.

Last step of the calculation is the application of the percentage reduction provided for in the 2002 Leniency Notice.

3.2.3. The 2002 Notice on immunity from fines and reduction of fines in cartel cases[101]

The 2002 Notice replaces the former Notice on leniency issued in 1996, following the substantial successes of the 1993 revision of the US leniency program, already operating since 1979. Notwithstanding the considerable number of decisions following each application for the program[102], the previous system had some flaws, especially if compared with the US one. Indeed, many application for the EC program followed a previous application for the US one, provoked by the increased exchange of information between the two shores of the Atlantic and a more aggressive attitude of the US in prosecuting international cartels. It could be said that the European leniency system benefited of the positive externalities of the American efforts in enforcing the antitrust rules.

The major flaws reported[103] with the previous system gravitate around the lack of certainty about the *an* and the *quantum* of the reduction and the possibility to concede full immunity only for application handed before the opening of an investigation. On the former point, the old Notice required the supply of "decisive evidences" on the existence of the cartel, being the appreciation on the decisivity matter of the Commission's discretion; moreover even if eligible for the highest class of reduction, such a class didn't provide automatic full immunity as

---

[99] See USSG § 8C2.5 and 8C2.6 .

[100] E. David, *op. cit.,* (2000), p. 522.

[101] OJ 2002 C 45/2.

[102] 80 companies joined the program from 1996 till 2002, and 16 out of 18 decisions on cartels followed a leniency application, see F. Arbault – F. Peirò, "The Commission's new notice on immunity and reduction of fines in cartel cases: building on success", *Competition Policy Newsletter*, (2002), p. 15. On that grounds the EC officials claim the program as a remarkable success.

[103] A comparision between the two systems were carried out by S. D. Hammond, *op. cit.,* (2000) , available at http://www.usdoj.gov\atr. see even F. Arbault – F. Peirò, *op. cit.,* (2002), pp. 17-18.

in the US amnesty program, but a range between 75 and 100% reduction; finally, the exclusion from the program involved all the possible ring-leaders, while in the US system only one, the main instigator, can not be found eligible. On the latter point, if an investigation had already been started, the possible reduction drops to 75-50% fine reduction.

The new notice admits two major sections, immunity and reduction of the fine. To be eligible for the immunity two alternative tests are admitted: either *"submit[ting] evidence which in the Commission's view may enable it to adopt a decision to carry out an investigation procedure"*[104] or *"submit[ting] evidence which in the Commission's view may enable it to find an infringement of Article 81 EC"*[105] in the case that an investigation has already been opened. Only the first undertaking can be eligible for the immunity, which is conditionally granted in writing, provided that the firm keeps on cooperating during the proceeding.

About the reduction, the substantive test requires the submission to the Commission of evidences having *"significant added value"*[106]. There are three bands of reduction available in that case: between 30 and 50% in case of the first applicant, between 20 and 30% for the second, up to 20% for the furthers.

Thus the new Notice tries to correct some of the limits of the previous system, with the writing guarantee of the immunity (without the need of a discretionary evaluation on the evidences presented in the 8(a) test) and the possibility to apply for the immunity after the beginning of the investigation.

3.2.4. Two cases

3.2.4.a. The *Lysine* case[107]

The case involving the condemn for the worldwide major firms producing lysine, a food additive, was an important breakthrough on the Commission's policy on fines, since it entailed one of the first applications of the Guidelines on the determination of the fines and the relative comments of the jurisprudence, shedding some light on some important aspects of the new policy.

It has to be said that the infringement was first found and convicted in the US in 1996 and, pursuant agreements between the firms and the DOJ, the following sanctions were imposed: ADM 70 millions USD, Kyowa Hakko Kogyo and Ajinomoto Co. Inc. 10 millions USD, Cheil 1,25 millions USD and Sewon Corporation Ltd 328000 USD. Moreover three executives of ADM were sentenced to serve jail terms. In addition to that, private claims were filed in the US for a total amount of 147,8 millions USD. Compared to the estimates of the affected commerce (about 78 millions USD), the overall financial consequences from the infringement amounted to 189% of that proxy[108], without counting the personal consequences.

According to the EC Guidelines, the Commission considered the cartel a very serious infringement, with fines above 20 millions of euros; indeed, in order to differentiate the amount among the participants, the relative magnitude of the

---

[104] S.c. 8(a) test.
[105] S.c. 8(b) test.
[106] S. C. SAV-test at the point 21 of the Notice. However the Notice doesn't explain the concept of value added.
[107] Court of First Instance in Case T-224/200 *Archer Daniels Midland Company v Commission* [2003] available at http://www.europa.eu.int/eur-lex.
[108] See OECD, *op. cit.,* (2002), p. 97.

basic fines was set with reference to the total turnover figures of the members; thus 30 millions for ADM and Ajinomoto and 15 for Kyowa Hakko Kogyo, Cheil and Sewon (paragraph 305 of the Decision). Such an amount was adjusted according to the duration, with an increase of 30% for ADM and of 40% for the others. A further increase due to aggravating circumstances was justified for ADM and Ajinomoto for their leading role, whereas a diminution of 20% of Sewon's fine was justified for its passive role and a general 10% decrease on the ground that all the firms put to an end the infringement as soon as detected. Finally, according to the 1996 Leniency Notice, reductions of 50% for Ajinomoto, of 30% for Kyowa Hakko Koygo and Cheil and of 10% for ADM were accorded for their cooperation during the investigations. The final fines, thus, result as the following ones: 47300000 euros for ADM, 27300000 for Ajinomoto, 13200000 for Kyowa Hakko Koygo, 12200000 for Cheil and 8900000 for Sewon.

According to the Court of First Instance, while the total turnover gives the size of the firm and its economic power, the turnover on the relevant market gives a proxy of the seriousness of the infringement, even though in any case these figures cannot have a "disproportionate…significance"[109] compared to the other elements. Moreover, in reviewing the Commission's determination of the gravity of the infringement on the basis of the actual impact of the cartel, "…it is particularly important that the Court examine the Commission's assessment of the cartel's effect on prices..", with "reference [to] the competition that would normally exist if there were no infringement" [110]. Thus, in the judgement of the effect, no relevance has to be given to the "…actual conduct which an undertaking claims to have adopted…" but only to the effects[111]. But probably the most important principle expressed by the Court is the need that "…a fine must be proportionate to the level of sales of the product which is the subject of the infringement."[112] Moreover, in complexes infringements involving many firms, a weighting criterion has to be found, in order to assess the real impact of each undertaking in the cartel[113]. Such a criterion cannot be found in the total turnover figure, since it "…is an imprecise guide."[114]; indeed rather than the size of the firm, expressed by the total turnover, is the scale of the infringement, expressed by the share of the affected commerce held by each undertaking, that has to be used to asses the specific weight of each firm on the infringement[115].

3.2.4.b. The *Adriatica di Navigazione* case[116]

The case involves the cartel among the ferry-boat operators operating the passengers and roll-over/roll-off services for TIRs on the route Ancona-Igoumenitsa-Patrasso (North route) and only the roll-over/roll-off services for TIRs on the route Bari/Brindisi-Patrasso (South route); hence two different infringements are found relative to each route. The particularity with the abovementioned Italian company was that, notwithstanding it operated only on

[109] *Ibidem,* par. 59 of the sentence.
[110] *Ibidem,* par 148and 150 of the sentence. The concept is further explained at par. 151
[111] *Ibidem,* par. 160.
[112] *Ibidem,* par. 175.
[113] *Ibidem,* par. 186.
[114] *Ibidem,* par. 193.
[115] *Ibidem,* par. 196. On that point the Court, even if corrected the Commission, didn't emend the final result of the assessment. The statement, however, is particularly important.
[116] Court of First Instance case CFI T-61/99 *Adriatica di Navigazione SpA vs. Commission,* [2003]. available at http://www.europa.eu.int/eur-lex

the Bari/Brindisi-Patrasso route, and mainly on the passengers services[117], in the final decision on the fines there is no distinction between the two different relevant markets represented by the two main routes, since a precise determination of the relevant market is almost absent in the motivation of the decision[118]. It follows that the fine is set regardless to the position of the abovementioned company in the two different relevant markets affected by the cartel[119]. Indeed, in weighting the fines among the different ferry operators, the Commission referred to the total turnover, rather than the turnover relative to each of the two markets affected. The Court of First Instance censured such an evaluation carried out by the Commission[120] and reduced the fine from 0.98 to 0.245 millions of euros, by referring to the turnover imputed to the south route, roughly 25% of the total turnover considered previously by the Commission.

Even in that case, like in the *Lysine* one, the Court stressed the importance of the definition of the relevant market, i.e. of the affected commerce, in the determination of the fine. In particular, in both the cases, the reference to the turnover of affected commerce, and the relative shares held by the alleged firm, are crucial for the weighting process of the fines among the participants, since a proportional link is needed between the fine and the effect of the participation. Such a link, according to the Court, is better represented by the position on the relevant market rather than by the absolute size of the firm, represented by the total turnover.

3.3. Some comments on the consistency of the actual policy with the theoretical framework

In the process of determination of the fine the economic analysis has progressively gained importance, and its instruments can be used to judge the actual policy fines, since the deterrent object has been finally recognized, if not the only, the prominent aim of the antitrust sanctioning power. Indeed, without such an essential presumption, speaking about cost-benefit analysis would have been useless. However it has still to be ascertained the consistency of the actual EC fining policy with the deterrent goal.

The turnover has been the most used figure which the calculation of the fine relied on, until the introduction of the Guidelines. Indeed a distinction has to be made between the reference to the turnover contained in art. 23 of the reg.1/2003 and the turnover on the affected commerce. The former entails the overall worldwide turnover, thus it has no relationship with the infringement; the percentage of 10% is just the statutory maximum based on the economic size of the firms, hence a fine overcoming the limit it supposed not to be proportionate to the infringement, because it could endanger the financial stability of the firm.

---

[117] Only 5% of the total turnover of the abovementioned firm was due to the affected market contested in the decision.

[118] Whereas in the decision two different infringements, one for the south route and the other for the north one, are claimed, in the part regarding the fine no difference can be found.

[119] Indeed the Commission itself, once proved the collusion on the two routes, admits that an accurate definition of the relevant market was not necessary, par. 19. Moreover, in setting the fine, the Commission referred to the total turnover of the firms in the 1993, regardless to the turnover on the affected markets, par. 174. That resulted on a fine for Adriatica of 0.98 millions of euros, equal to the 54% of the turnover of the firm on the route affected.

[120] Par. 196-197 and 211. reduced from 0.98 to 0.245 millions of euros, by referring to the turnover imputed to the south route, about 25% of the total turnover considered previously by the Commission.

It could be questionable whether such a measure is currently the correct one to assess the proportionality of the fine as far as the size of the firm doesn't say much on its profitability[121], hence on the ability to pay the fine; moreover, such a measure has a very weak link with the infringement, thus with the harm that it can have provoked. However, if the statutory limit provides an *a priori* assessment of the proportionality of the fine, the *a posteriori* assessment can still be relevant, according to the Commission's Guidelines, when the final fine has to be adjusted to the specific case[122]. However the lack of deterrent effect sometimes claimed[123] should maybe push towards an higher ceiling or a maximum related to the infringement, like the harm provoked.

The turnover of the affected commerce and the gain principle[124] used to be the relevant figure on the assessment of the fine, but the current Guidelines abandoned such a policy, with the aim to achieve an higher deterrent effect[125]. The Guidelines indeed pursues a qualitative approach on the assessment of the fine, since the range of fines provided in "…will make it possible to apply differential treatment to undertakings according to the nature of the infringement committed."[126] Even if the impact of the behaviour can have some relevance, if and only if measurable[127] (without a specific obligation to measure it), the Guidelines are quite specific in listing the types of infringements that can be included in each of the three categories provided for, even if they are not exhaustive. As already seen, each category involves a specific range of fine, according to an approach defined "forfaitaire"[128]: honestly it seems very difficult to accept such a method as bringing about "un objective de dissuasion accrue" based on the fact that "l'approche forfaitaire a un effect psychologique fort"[129]; rather than a "freudianian" approach, only a clear and transparent policy can be deemed to be consistent with the cost-benefit analysis lying behind the deterrent objective[130]. The reference to the nature of the infringement, rather than clearly to the impact, makes the achievement of the deterrent effect a matter of chance for several reasons. First of all, depending on the size of the company, the flat fines rates provided in the Guidelines could be excessive or not deterrent. Moreover, in the case of cartel, a clear range is not established, since the fine has to be

---

[121] On the numerous instruments to assess the ability to pay see . Craycraft, J. L. Craycraft, J. C. Gallo, *op. cit.,* (1997), p. 171 and ff. .

[122] In the general comments of the abovementioned Notice, at the point 5(b) it is expressly admitted that account should be taken on some objective factors, among these the ability to pay of the firm. However such adjustments are left to the discretion of the Commission.

[123] See for instance W. P. J Wils,., *op. cit.,* (2003a) pp. 37-44 with regard to the European case and in general J. S. Thompson – D. L. Kaserman, "After the fall: Stock price movements and the deterrent effect of antitrust enforcement", 19 *Review Of Industrial Organization*, (2001), p. 329 and ff. where the lack of deterrence is deemed to be proved in the likely recidivism showed by the fast rebound of stock prices of the detected undertakings.

[124] See Commission, *XXI Rapport de la Commission sur la politique de la concurrence*, (1991), p. 120.

[125] F. Arbault, "La politique de la Commission en matière d'amendes antitrust: récents développements, perspectives d'avenir", *Competition Policy Newsletter*, (2003), p.2.

[126] Guidelines on the method of setting fines imposed pursuant to Article 15 (2) of Regulation No 17 and Article 65 (5) of the ECSC Treaty, Section 1.A, sixth indent.

[127] Guidelines, Section 1.A first indent.

[128] See F. Arbault, *op. cit.,* (2003), p. 3.

[129] See F. Arbault, *op. cit.,* (2003), p. 3.

[130] See for instance M. Van Oers – M.J. Van der Meulen, *op. cit.,* (2003), p. 30. The Dutch Competition Authority indeed refused to base its Guidelines on the European ones on the base of the flaws highlighted below.

higher than 20 millions, but for the rest the Commission is left quite free to calculate the amount of the fine. The difference with the quantitative approach commonly used in the US experience is clear, as the clear reference to the affected commerce made by the Sentencing Guidelines can show.

Besides that, another shortcoming is the way in which the factor duration is taken into account, since a 10% increase per year of the basic fine doesn't reflect the fact that the gains after the first year could be doubled, while the overall fine is augmented only of 10%; there is a sort of incentives to continue the infringement, rather than giving up[131]. Finally, without reference to the actual economic impact due to the participation of each firm, it is difficult to differentiate the fine among the participants of the complex infraction: the reference to the absolute size of the firm is misleading, since it has not direct link with the role in the infringement.

The difficulties encountered by the Commission are quite evident even in the case law. In the abovementioned *Adriatica* case, notwithstanding the fact that the infringement was clearly a cartel affecting the trade between Member States, thus a very serious one, the Commission qualified it only as a serious one[132], since the infringements affected a limited part of the common market; indeed the strict application of the Guidelines would have brought about excessive fines compared with the dimension of the firms involved, thus the Commission needed to overrule the qualitative criteria that itself puts.. On the contrary in other cases, involving bigger firms, in order to achieve the deterrent effect, the Commission has been forced to apply a "multiplier" to increase the basic fine resulting from the Guidelines[133]. Again, however, that affects these transparency and certainty that the Guidelines themselves try to achieve

But where the flaws of the lack of a quantitative approach based on the affected commerce are more evident to the European judges is in the weighting process of the fines among the participants: without a definition of the affected (relevant) market, the Commission has been forced to rely only on the overall size of the undertakings, with a misleading reference to the overall turnover[134]. The Luxembourg judges have censured such an approach in both the abovementioned decisions, highlighting the importance of the definition of the relevant market (thus the relative turnover and the shares of each firm) even in cartel cases, in order to assess of the gravity of the infringement and the relative impact of each firm. Moreover the definition of the affected market for fining purposes implies an *ex post* analysis, which is supposed to impose a lower investigative burden than in the other cases where it is requested.

Even if the application of the theoretical framework is not possible because of the lack of all the relevant information, a quantitative approach based on the affected commerce, like in the US and, now, in the Netherlands[135], would enhance the transparency and predictability of the entire system, together with a stronger deterrence effect for the biggest and most profitable cartels. By means of

---

[131] See Van Oers – M.J Van der Meulen, *op. cit.,* (2003), p. 31.

[132] Decision of the Commission 9 December 1998, *Greek ferries*, OJEC 1999 L 109 p. 24, par. 150.

[133] See Decision of the Commission 16 September 1998, *Trans-Atlantic conference agreement*, OJEC 1999, L 95/1, table 12 and F. Arbault, *op. cit.,* (2003), p. 4.

[134] Such a difficulty was apparent in both the cases reported, the *Adriatica* and the *Lysine* ones.

[135] The new Dutch fining Guidelines uses as a starting point a percentage (10%) of the "turnover involved", that a has to be multiplied according to some factors depending on the kind of the infringement: the quantitative approach is mixed with a qualitative one, see Van Oers – M.J Van der Meulen, *op. cit.,* (2003), p. 33 and ff. .

a clear link with the effect of the infringement, the quantitative approach better targets the deterrent goal, as a comparison between the EU and US experiences shows in the worldwide *Graphite electrodes* case: even if the estimates on the affected market are similar (more than two billions of Euros in the EU, 2 billions USD in the US), the EU fine reflects only 11% of the affected market, while the US one more than the double, 24%[136], without taking into account the jail sentence for two executives. According to the quantitative criterion, thus, the resulting fine should be a substantial part of the affected commerce, if not a multiple in case of long lasting cartels.

Given the interconnection of the elements of the sanctioning system, a greater deterrence and transparency would enhance the effectiveness of the leniency programs too. On that point the structural revisions contained in the 2002 Notice represent a step forward, since now it admits the possibility to join the program even after the investigation, thus when the incentive to cheat is stronger and the cartel more unstable. The same effect could results from the decision of lowering the discretionary power of the Commission in conceding the immunity. However, in order to catch up the level of instability necessary to achieve the full effectiveness of the system, the general level of sanctions should be increased, as the US experience could show. Indeed most of the widest, and profitable, cartels of recent history[137], which could not be deterred by the sole EC level of fines, where detected and punished in the EC even thanks to the external effects[138] of the US leniency program, which can be deemed still to have a greater effectiveness even because of the higher level and wider range of sanctions.

In general the EC sanctioning system is gradually moving towards a more economic approach, especially with regard to the deterrent role of the fines and the features of the leniency program, even though some steps have been sometimes misleading. Particularly the general method underlying the Guidelines, based on a qualitative approach, and the mis-utilization of the wrong turnover figure (the total worldwide one) have been in contrast with the guidelines provided for by the economic insights.

CONCLUSIONS

At the beginning of the paper it has been highlighted as the dramatic increase in the amount of fines during the last years is a decisive turn towards a deterrence oriented enforcing system, both in the EC and the US. Since the hard-core cartels are inevitably harmful for the society, deterring from committing them by means of harsh sanctions is a desirable objective.

The economic analysis can help in the achievement of the deterrent objective, since by means of the economic analysis the several effects of the features of an enforcement system, the costs incurred in the enforcing activity, the effectiveness of some instruments can be better understood and a more efficient and effective system can be drawn. However the earliest beckerian solution has to be reviewed. Indeed, the proportionality of the punishment principle is an important legal principle to take into account in the analysis: on the extent that the sanction

[136] See OECD, *op. cit.,* (2002), pp. 96-98. Even if the total consequences in the US include the private claims too, that doesn't change the result on the higher deterrent effect of a quantitative method, since the measure of the damages is even more clearly linked to the effect of the infringement than the fines, given that the treble damages rule requires a precise assessment of the harm.

[137] Like the *Lysine*, the *Vitamins* or the *Art auction* cases could show.

[138] Made possible by the increased exchange of information between the two sides of the Atlantic.

overcomes the harm provoked by the offender, adjusted for the probability of detection due to the concealing efforts of the offender, that brings about a cost for the society, besides the offender itself; such an argument is important in the case of the s.c. exemplary punishment, where the tough sanctions conceal weak enforcement efforts and a careless assessment of the gain deriving from the infringement .

The huge fines imposed in cartel cases, however, should not imply the adoption of a strategy based on the exemplary punishment, rather they should be justified on the basis of the extent of the gain earned by the participants of the cartel and of the best utilization of the investigative tools available to the enforcing agents, according to the basic formula by which the nominal fine has to be equal to the net gain divided by the probability of detection. Indeed the pursuance of an "exemplary punishment" strategy is prevented by the imposition of statutory ceilings to the sanctions applicable, hence the investigative efforts cannot be reduced to a minimum that would lead to a optimal deterrent fine exceeding that ceilings.

The determination of the gain, thus, become a fundamental step in the assessment of the efficient fine, i.e. the one which brings the highest deterrent effect with the lowest costs.

The first element to determine the gain is the extent of the market affected by the illicit, i.e. the affected commerce. Moreover, in the case of complex infringements like cartels, which involve several participants by definition, the determination of the share of the affected commerce held by each participants can provide a reliable criterion for the weighting process of the fines among the cartelists. actually the overall economic size is not a suitable criterion, since it clearly clashes against the proportionality criterion, as it can be derived from the two decision of the Court of First Instance analyzed above. The utilization of the affected commerce is already common in the US, according to a quantitative approach lying behind the Sentencing Guidelines' alternative method specifically provided for antitrust offences.

Much less easy to determine is the other element to assess the gain, i.e. the mark-up imposed on the consumers by the cartel; the Norwegian report proposes a benchmarking method, but undoubtedly it doesn't guarantee very precise estimates. However, given that a very high mark-up makes the detection of the cartel easier and the cartel itself more unstable, the measure of the increase in price cannot exceed some limits, that econometric studies could help to determine. An interval between 5-15% of the affected commerce probably would be adequate in most of the cases.

Even if the measure of the gain was precisely assessed, the main obstacle in the determination of the optimal fine would still be the assessment of the perceived probability of detection[139], which results very difficult to determine. Some estimates made sometimes ago vary between 0.16 and 0.10, with the need to accordingly multiply the gain figure about six or ten times, and they would lead to a disproportionate sanction, hence to the impossibility to have *ex ante* deterrence. However these estimates don't take into account the exploitation

[139] The further problem of the "perceived" measure of that variables derives from the fact that the cost benefit analysis is carried out by the offender, thus its perception of the probability is to be taken into account and that complicate further the assessment, even because the costs of collecting the right information on the assessment have to be included, see N. Garoupa, *op. cit.,* p. 183 and ff. .

during the last years of the leniency programs, probably the most powerful investigative tool in the detecting activity of cartels.

Indeed if an effective leniency program is put in practice, it has been shown as the deterrent effect of a given fine is greatly enhanced. On that point the US experience has been leading for long time, thanks to the coordination between higher fines due to a more economic oriented approach, an incisive use of personal sanctions and a wide and international-oriented investigation activity. However even the 2002 Leniency Notice of the Commission represents a positive step, even though it has to be integrated with a more accurate analysis of the effect of the infringement in the determination of the fine.

Unfortunately, the lack of precise data doesn't allow the strict application in the real world of the theoretical framework, but it can anyway provides the direction of the path to be followed in order to have an efficient sanctioning system. The main concept to be followed should be the quantitative approach in the determination of the fine, based on the effect of the cartel, i.e. the gain, since it is the incentive that pushes to the commission of the illicit. Whereas the US Sentencing Guidelines give the option towards a quantitative approach by means of the reference to the affected commerce, on the contrary the actual EC system as expressed in the 1998 Guidelines lies on a qualitative approach, based on the nature of the infringement; even if some quantitative measures can be taken into account (sometimes the wrong ones, like the overall turnover instead of the one in the affected market, and anyway there is no obligation to do that), they will be just used to correct the basic fine already determined on qualitative grounds. Sometimes such an approach leads to inconsistent results, like in the *Adriatica* case, and the Commission is forced to adjust its method, by applying a different (and lower) category than the standard one or multiplying the basic fine. However, in doing so, the entire system loses transparency and predictability, thus part of its deterrent effect.

These are the challenges that the new Commission will have to face in the war against the cartels, leaving aside the temptation towards an "(un)exemplary" punishment approach, based on abstract categories without links to the real effect of the infringement. That will make moving backward the enforcement of around three centuries.

LIST OF REFERENCES

Bibliography

F. Arbault and F. Peirò, "The Commission's new notice on immunity and reduction of fines in cartel cases: building on success", *Competition Policy Newsletter*, (2002), p. 15.

F. Arbault, "La politique de la Commission en matière d'amendes antitrust: récents développements, perspectives d'avenir", *Competition Policy Newsletter*, (2003), p.15.

L. A. Bebchuk and L. Kaplow, "Optimal sanctions when individual are imperfectly informed about the probability of apprehension", 21 *Journal Of Legal Studies* (1992), p. 365.

G. S. Becker, "Crime and punishment: an economic approach", 76 *Journal Of Political Economy* (1968), pp. 169.

O. Ben-Shahar, "Playing without a rulebook: optimal enforcement when individuals learn the penalty only by committing the crime", 17 *International Review Of Law And Economics*, (1997), p. 409.

S. Bishop and M. Walker, *The economics of EC Competition Law,* (1999)

Bouckaert, Boudewijn and De Geest, Gerrit (eds.), *Encyclopedia of Law and Economics, Volume V. The Economics of Crime and Litigation* ,(2000), available at http://encyclo.findlaw.com .

P. G. Bryant and E. W. Eckard, "Price fixing: the probability of getting caught", 73 *The Review Of Economics And Statistics* (1991), p. 531.

S. Calkins, "Corporate compliance and the antitrust agencies' bimodal penalties", 60 *Law And Contemporary Problems*, (1997) , pp. 127.

S. M. Chemtob, "Antitrust deterrence in Unites States and Japan", (2000), p. 9 available at http://www.usdoj.gov\atr

J. L. Clarke and S. J. Evenett, "The deterrent effect of national antitrust laws: evidence from the international vitamins cartel", 48 *Antitrust Bulletin* (2003), p. 689.

Commission, *XXI Rapport de la Commission sur la politique de la concurrence*, (1991)

C. Craycraft, J. L. Craycraft, J. C. Gallo, "Antitrust sanctions and a firm's ability to pay", 12 *Review Of Industrial Organization*, (1997), p. 171.

P. Cyrenne, "On Antitrust Enforcement and the Deterrence of Collusive Behaviour", 14 *Review Of Industrial Organization*, (1999), p. 257.

G. Dannecker and O. Jansen, *Competition Law Sanctioning In The European Union – The EU-law influence on the National Law systems of sanctions in the European Area,* (2004)

E. David, "La dètermination du montant des amendes sanctionnant les infractions complexes: règime commun ou regime particulier ?", 36 *Revue Triméstrelle de Droit Européen*, (2000), pp. 511.

K. G. Elzinga and W Breit, *The Antitrust Penalties: A Study Of Law And Economics*, (1976)

S. Evenett *et al.*, "International cartel enforcement: lessons from the 90's", (2002), available at www.econ.worldbank.org

N. Garoupa, "Optimal law enforcement with dissemination of enforcement", 7 *European Journal Of Law And Economics*, (1999), p. 183.

S. D. Hammond, *Detecting And Deterring Cartel Activity Through An Effective Leniency Program,* Paper presented before the International Workshop on Cartels, 20-22 November 2000, Brighton, available at http://www.usdoj.gov\atr.

S. D. Hammond, "When calculating the costs and benefits of applying for corporate amnesty how do you put a price tag on an individual's freedom?", speech at the fifteen annual of the National Institute on White Collar Crimes, March 8 2001, available at http://www.usdoj.gov\atr.

J .E . Harrington, "Some implication of antitrust laws for cartel pricing", 79 *Economic Letters* (2003), p. 377.

J. Hinloopen, "Cartel Stability with Time-dependent Detection Probabilities", *Tinbergen Institute Discussion Papers 104/1*, (2003a).

J. Hinloopen, "Leniency programs in antitrust law", 151 *De Economist*, (2003b), p. 415.

K. H. Hylton, *Antitrust Law – Economic Theory And The Common Law Evolution*, (2003).

A. Jones – B. Sufrin, *Ec Comeptition Law*, (2001).

B. H. Kobayashi and J. R. Lott jun., "Low probability – high penalty enforcement strategies and the efficient operation of the plea-bargaining system", 12 *International Review Of Law And Economics*, (1992), p. 69.

S. G. Lanning, "The costs of maintaining a cartel", 36 *The Journal Of Industrial Economics*, (1987), p. 157

J. S. Magney – R. C. Anderson, "Recent developments in criminal enforcement of US Antitrust laws", 27 *World Comeptition*, (2004), pp. 101.

M. Motta, *Competition Policy – Theory And Practice,* (2003)

M. Motta – M. Polo, "Leniency programs and cartel prosecution", 21 *International Journal Of Indutrial Organization*, (2003), p. 347.

New Zealand Ministry of Commerce, *Penalties, remedies and court processes under the commerce act 1986,* (1998)

OECD, *Fighting hard core cartels – harm, effective sanctions and leniency programs,* (2002), available at http://www.oecd.org .

OECD, *Hard core cartels – recent progress and challenges ahead,* (2003), available at http://www.oecd.org

W. H. Page, "Optimal antitrust penalties and competitors' injury", 88 *Michigan Law Review*, (1990), p. 2151.

L Pepall – D. J. Richards – G. Norman, *Industrial organization: contemporary theory and practice,* (2002).

A. M. Polinsky and S. Shavell, "Should the liability be based on the harm to the victim or the gain to the injurer?", 10 *The Journal Of Law, Economics & Organization* (1994), p. 427.

A. M. Polinsky and S. Shavell, "Public enforcement of law", in Bouckaert, Boudewijn and De Geest, Gerrit (eds.), *Encyclopedia of Law and Economics, Volume V. The Economics of Crime and Litigation* ,(2000), available at http://encyclo.findlaw.com, p. 307.

B. J. Rodger, "The Competition Act and the Enterprise Act reforms: Sanctions and deterrence in UK Competition law" in G. Dannecker – O. Jansen, *Competition Law Sanctioning In The European Union – The EU-law influence on the National Law systems of sanctions in the European Area,* (2004), p. 101.

J. T. Scholz, "Co-operation, deterrence and the ecology of regulatory enforcement", 18 *Law And Society Review* (1984), p. 179.

F. R. Shoneveld, "Cartel sanctions and international competition policy: cross-borders cooperation and appropriate forums for cooperation", 26 *World Competition*, (2003) p. 433.

E. A. Snyder, "The effect of higher criminal penalties on antitrust enforcement", 33 *Journal Of Law And Economics*, (1990), p. 439.

S. Souam, "Optimal antitrust policy with different regimes of fines", in 19 *International Journal Of Industrial Organization*, (2001) p. 1.

G. Spagnolo, "DIVIDE ET IMPERA, Optimal deterrence mechanisms against cartels and organized crimes, (2003), *Econometric Society 2004 North American Winter Meetings / Econometric Society*. available at http://repec.org/esNAWM04/up.24618.1049197921.pdf

G. J. Stigler, "The optimum enforcement of laws", 78 *Journal Of Political Economy* 1970 p. 526.

J. S. Thompson – D. L. Kaserman, "After the fall: Stock price movements and the deterrent effect of antitrust enforcement", 19 *Review Of Industrial Organization*, (2001), p. 329.

G. Tullock, *Rent Seeking*, (1993).

R. van den Bergh, P. Camesasca, *European Competition Law And Economics,* (2001).

M. Van Oers – B. Van der Meulen, "The Netherlands Competition Authority and its Policy on Fines and Leniency", 26 *World Competition* (2003), p. 25

S. W. Waller, "Private law, punishment, and disgorgement: the incoherence of punishment in antitrust", 78 *Chicago-Kent Law Review* (2003), pp. 207.

G. J. Werden and M. J. Simon, "Why price fixers should go to prison", *The Antitrust Bullettin*, (1987), p. 917.

W. P. J. Wils, , *The optimal enforcement of EC antitrust law – Essays in law and economics* (2003a)

W. P. J Wils., "Should private enforcement be encouraged in Europe ?", in 26 *World Competition*, (2003b) p. 473.

M. O. Wise, "The system of sanctions and enforcement co-operation in US antitrust law", in G. Dannecker – O. Jansen, *Competition Law Sanctioning In The European Union – The EU-law influence on the National Law systems of sanctions in the European Area,* (2004), p. 195.

P. C. Zane, "The price fixer's dilemma: applying game theory to the decision of whether to plead guilty to antitrust crimes", *The Antitrust Bullettin*, (2003), p. 1.

E. Zimring and G. J.Hawkins, *Deterrence and the legal threat in crime control*, (1973)

Cases

Court of Justice in Joined Cases 100-103/80 *Musique diffusion française and Others* v *Commission* [1983] ECR 1825.

Decision of the Commission 16 September 1998, *Trans-Atlantic conference agreement*, OJEC 1999, L 95/1.

Decision of the Commission 9 December 1998, *Greek ferries*, OJEC 1999 L 109 .

Court of First Instance in Case T-224/200 *Archer Daniels Midland Company v Commission* [2003] paragraph 200 available at http://www.europa.eu.int/eur-lex.

Court of First Instance case CFI T-61/99 *Adriatica di Navigazione SpA vs. Commission,* [2003]. available at http://www.europa.eu.int/eur-lex.