Violations of Antitrust Provisions: The Optimal Level of Fines for Achieving Deterrence

Alberto Heimler & Kirtikumar Mehta*

While the general principle that fines for antitrust violations be set at deterrent levels is well established in prevailing Guidelines on Fines, how these principles are to be interpreted in specific cases is not even considered, or at most only non-operational indications are provided. This article attempts to fill this gap by elaborating some guidance on how deterrence could be achieved for specific categories of violations, by taking into account very simple parameters of demand and supply responses to price signals. In the first place, we argue that a measure of 'ex ante' extra profits provides the conceptually correct starting point and we suggest how this may be calculated. Second, general principles of determination of fines can and should be applied in distinct ways to cartel and to abuse of dominance violations, taking into account the different probability of detecting these violations. Furthermore, the determination of the deterrent level of fines would benefit both enforcement and compliance if appropriate account is taken of the interplay between fines, leniency, and private litigation. A simulation approach is developed in the article to provide competition authorities with ranges of percentages of fines that may become useful in practical applications.

In the past decades, the debate on substantive antitrust in the European Union (EU) was concentrated on two main issues: the standards of harm and how best to achieve deterrence. As for the standard of harm, economic analysis and the effects-based approach are now generally accepted. The divergence between the United States and the EU authorities may arise in specific cases, but the general approach is more or less common, as can be seen by the recommendations and reports of the International Competition Network (ICN). On deterrence however, although leniency is well established on both sides of the Atlantic, the approach is still different. In the United States, deterrence is mainly achieved with criminal sanctions and private enforcement, while in the EU stand-alone private enforcement is practically absent (with the exception of interim measures in abuse cases) and pecuniary sanctions are the only instrument for achieving deterrence

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1 See <www.internationalcompetitionnetwork.org>.


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(with the exception of the few jurisdictions that have introduced criminal sanctions).

This article contributes to the debate on deterrence by suggesting the way to establish the optimal level of fines. On a first reading, the issue seems not to be of much relevance since the ICN Cartel Working Group concluded its Report to the Kyoto Annual Conference (as if the issue would be self-evident) that all competition authorities should ensure that fines are set at a level to deter infringing conduct. While much work has been done in the area of fines for competition law infringement, what have been lacking are attempts to identify recommended practices on how fines should be calculated in specific cases. Antitrust laws only identify the maximum statutory level of fines, usually equal to 10% of global turnover, and even the interpreting guidelines fail to identify what should be the fine associated with the different antitrust violations and how to calculate it.

The European Commission has issued a number of guidelines on sanctions and so did the Association of the European Competition Authorities (ECA). In particular, the best practice guidelines agreed to in 2008 by ECA enumerate a coherent set of principles to achieve deterrence. However, both the European Commission Guidelines and the ECA Principles on fines are criticized for failing to identify the fines that competition authorities should actually impose.

Building on the ECA Principles (which are very similar to those adopted by the European Commission in its Guidelines), this article suggests a range of deterrent fines to be applied to the different violations of competition law. In section 1, we look at each of the main principles proposed by ECA and comment on some problems of practical implementation that have the consequence that the resulting fines may diverge from the deterrent levels. In section 2, we consider alternative practical ways to implement the theoretical principles of setting fines so as to be convergent with the pursued objective of deterrence, distinguishing a cartel violation and an abuse of dominance violation and introducing explicitly follow-on private enforcement actions.

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4 See, for example, A. Andreageli et al., ‘Enforcement by the Commission: The Decisional and Enforcement Structure in Antitrust Cases and the Commission’s Fining System’, draft report presented at the Fifth Annual Conference of the Global Competition Law Centre (June 2009); F Jenny, ‘Optimal Antitrust Enforcement: From Theory to Policy Options’, in The Reform of EC Competition Law, ed. I Lianos & I Kokoris (Kluwer law International, 2010).
1 ECA PRINCIPLES FOR SETTING FINES

The ECA outlines four principles that should be the core of an approach to fines for competition infringements. These relate to setting fines at a deterrent level subject to a maximum ceiling, that the level of fines should depend on the gravity of the infringement, and finally that the basic level of the fine should be adjusted to take into account aggravation and mitigation factors so that the fines set are not the result of an arithmetical formula ignoring the specificity of the case.

The first principle, according to ECA, is that 'pecuniary sanctions imposed on undertakings which infringe substantive antitrust provisions should effectively sanction and deter the offender from repeating an infringement, as well as deterring any other potential offenders'. Furthermore, 'in order to achieve an adequate level of deterrence, the level of fines should exceed any potential gains that may be expected from the infringement'. In other words, the ECA best practices endorse the economic theory of sanctions: Fines should be higher than the expected gain from the violation. More formally, see, for example, Wils\textsuperscript{5} but, more generally, Becker,\textsuperscript{6} expected sanctions should be at least equal to expected illegal profits (where profits stand for any illegal gain that results from the antitrust violation):

\[ \rho S \geq \text{extra profits}, \quad (1) \]

where \( \rho \) is the probability of being caught, \( S \) is the level of the fine, and extra profits are the expected illegal gains. This formulation implicitly assumes a static analysis, in other words that the fines are paid in the period of infringement. However, we will have more on this later.

Equation 1 can easily be solved for \( S \), the deterrent level of the fine, which should be at least equal to the expected illegally earned profits divided by the probability of being caught. If a cartel is expected to lead to a profit increase of 10% of affected revenue and there is a 10% probability of being caught, the sanction should at least be equal to the affected revenue (ten times the expected profits).

Equation 1 suggests that for a fine to serve a deterrent function it should be related to the \textit{ex ante extra profits} originating from the violation and not to the extra profits actually gained that may be higher or lower than those expected at


decision-making time for many different reasons, often independent of the investigated behaviour.

However, how are these expected gains calculated if the reference to actual profits is not an appropriate benchmark? Should they be calculated case by case in relation to specific circumstances? According to ECA, the analysis should not entail ‘a duty for competition authorities to establish or to quantify expected gains deriving from the investigated infringement’, because it would be practically impossible to do so unless specific evidence is provided from the investigation, which is considered a highly unlikely outcome.

The problem is that expected profits are not observed, so what is it exactly that antitrust authorities are to do according to ECA? In practice, since expected gains cannot be computed in each individual case, competition authorities should find some criteria by which to identify the level of ex ante extra profits associated with categories of anticompetitive practices. This should not lead to fully predictable fines; otherwise, they might lose their deterrent function and become endogenous in the decision-making process of firms. Indeed, according to the ECA Principles, ‘transparency and a certain degree of predictability should be ensured, with a view to increasing the effectiveness of the fining policy pursued by competition authorities’, for example, by publishing fines guidelines or providing similar transparency enhancing information.

Second, fines in Europe have a maximum limit set by the law, usually 10% of global turnover of the undertaking, that is, the ultimate parent company, which represents the maximum statutory fine. According to the ECA Principles, legislative bodies should establish the maximum statutory fine ‘at a level, which is high enough to enable the competition authority or the competent court to impose a sanction capable to deter the unlawful conduct’. This commendable statement is, however, not very informative since it does not add or qualify in any way the deterrent level. If the deterrent level of fine is below the statutory cap, the statutory cap is irrelevant; if, on the other hand, the deterrent level of the fine is above the statutory cap, then the fine would be set at the statutory cap and the fine would not be deterrent. Indeed, while caps based on global turnover are easy to introduce in the legislations, they are not ultimately final, since the considerations on bankruptcy would still be taken into account on a case-by-case basis according to the general principles of administrative law. It would be much better to set a cap based on affected sales (and not on global turnover) and, hence, impacting directly on the variable relevant for deterrence. However, in most jurisdictions, the statutory cap is already established in the law. As a result, we will not suggest that the system be changed (even if we believe that it should and the statutory cap be
eliminated), since what really matters is whether the fine is set at the deterrent level, and in most circumstances, this deterrent level is likely to be below the statutory cap as defined.

Third, actual fines, bound by the statutory cap, are in most jurisdictions determined according to ‘the seriousness of the infringement and its duration’. An appropriate basis for the calculation of fines would then be the value of sales to which the infringement relates (which includes its duration) and the sanction would be a percentage of the value of sales to which the infringement relates, reflecting its seriousness.

According to the ECA Principles, seriousness is related to ‘the ability of that type of conduct to affect competition and ultimately consumers, as well as its significance in the economic context where it occurred’. However, the ECA Principles do not go very far in the identification of the actual factors to consider when establishing whether a violation is serious. The ECA Principles refer to ‘a) the combined market share of the undertakings concerned; b) the extent to which the infringement has been implemented’. Assuming that the fine may go up as high as 30% of annual affected sales multiplied by duration in years of the infringing conduct as suggested, for example, by the EC Fining Guidelines, the factors identified by ECA seem to be quite inadequate for choosing the right percentage. Indeed, for any given market share of the undertakings concerned, the ECA Principles suggest that the amount of the fine be related to implementation only, irrespective of the seriousness of the violation. The indication provided does not therefore in itself go far enough to determine the percentage chosen from the relatively broad interval ranging between 0% and 30%.

Fourth, ECA best practices also address the question of the adjustment factor for aggravating and attenuating circumstances and reductions for leniency and/or cooperation in the course of the investigation. Here, the list of elements to be considered is complete, although there are no indications of the amounts involved.

Key aggravation factors are: recidivism, leading or organizing role, and obstruction of investigation. In all these cases, the ECA Principles suggest particular rigor when the offender retaliated ‘against other undertakings to police the infringement’. As for recidivism, an increase in the level of fine is necessary ‘since such undertakings were not effectively discouraged from infringing competition law by the fines already imposed upon them, and thereby show a propensity to infringe competition law’. However, for all these circumstances, the ECA Principles do not provide any indication on the range of increases that may become necessary.
The same can be said for key attenuating circumstances. These are: minor role, cooperation, and state compulsion. As regards minor role, this can be relevant in the case of cartels, when according to ECA ‘competition authorities may reduce the fine applicable to undertakings, which played a substantially limited role’ or treat more leniently firms that ‘departed significantly and openly from the proposed course of action and its participation in the infringement is genuinely peripheral’. In the case of cooperation with the investigation, the reduction is contained by reductions of fines under the leniency provisions, and to ensure its maximum value, the reduction is applied at the end of fines calculation. Undertakings whose fines are capped by the maximum statutory limit are guaranteed a leniency reduction on the capped amount.

2 SOME ALTERNATIVE APPROACHES TO PRACTICAL IMPLEMENTATION

The principles outlined above comprehensively address in theory the major objectives to be sought in order to achieve a deterrent fines policy but do not address the problems of practical implementation. The first significant obstacle is the need to have a relevant measure of ‘ex ante extra profits’. It is argued above that it is not possible for an investigation by the competition authority to measure this directly since at best that would be a measure of actual extra profits. One obvious approach would be to obtain an estimate of ex ante extra profits from a consideration of the expected profitability condition derivable from the perspective of an infringer of competition law.

There are, in effect, two situations deserving of consideration: that of a cartel infringement and that of an abuse of dominance infringement.

2.1 CARTEL INFRINGEMENT

In the case of a cartel, each participant coordinates its conduct with the others in regard to the parameter of competition in order to jointly maximize profits. In the classic case of a market sharing cartel of similarly sized undertakings in a homogenous market, expected extra profits in relation to the sales of the cartel,
assuming all participants agree to a price increase, effective immediately, and that they all respect the agreement, would be given by

$$\text{extra profit/sales} = (1 - \mathcal{E}L) \frac{\Delta p}{p} - \mathcal{E} \left( \frac{\Delta p}{p} \right)^2,$$  \hspace{1cm} (2)

where $\mathcal{E}$ is the market demand price elasticity; $L$ is the Lerner market power index defined as $L = \frac{p - \mathcal{E}}{p}$, that is, the margin (price less marginal cost) over price, calculated before the price increase; and $\frac{\Delta p}{p}$ is the cartel price increase.

This expression for expected extra profits for the cartel and for each representative cartelist reveals that:

- expected extra profits in relation to sales tend to be smaller than the agreed cartel overcharge;
- where the market demand elasticity is high, the expected extra profits in relation to cartel sales can be expected to be small, even negative;
- and less obviously, where the market power index is high, for example, in a tight oligopoly, the expected extra profits originating from the cartel in relation to sales can be expected to be low since, at most, profits reach the monopoly level.

2.2 IMPLICATIONS FOR PERCENTAGE RANGE FOR CARTEL FINES ON UNDERTAKING’S ANNUAL TURNOVER AND CRITERIA FOR DETERMINING SERIOUSNESS OF INFRINGEMENT

As a consequence, in the light of previous paragraph, for the case of cartel infringement a reasonable measure for expected extra profits in relation to each

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7 The equation extra profit/sales = \frac{\Delta \text{profit}}{\Delta \text{sales}} = \frac{\mathcal{E}(1 - L)}{1 + (1 - \mathcal{E})} \frac{\Delta p}{p} - \mathcal{E} \left( \frac{\Delta p}{p} \right)^2 can be derived from

$$\frac{\Delta \text{profit}}{\Delta \text{sales}} = \frac{(p - \mathcal{E}) \Delta q + \Delta p \mathcal{E} + \Delta p}{p q}$$

by substituting for $\Delta q$ from the definition of elasticity

$$\Delta q = \frac{\Delta p}{q}$$

and then multiplying the result by $\frac{\Delta \text{sales}}{\Delta \text{sales}} = \frac{p q}{(p + \Delta p)(q + \Delta q)}$. $L$ is Lerner index evaluated at pre-cartel prices. An alternative but similar derivation is to be found in M.-L. Allain et al., ‘The Determination of Optimal Fines in Cartel Cases: The Myth of Underdeterrence’, <www.cirano.qc.ca/pdf/publication/2011s-34.pdf>, 2011, 10.
party’s turnover is calculable and can be used, given an assumed detection rate, to set a band for the percentage of turnover to be fined. The elements for determining seriousness could be articulated somewhat more than those identified by ECA. In particular, the infringement is more serious: (a) the higher the market share of the cartel; (b) for any given market share of the cartel, the lower is the degree of concentration (as measured, for example, by the Herfindahl-Hirschman Index) of the firms participating in the cartel; (c) the less substitutable is the product/service; and (d) the greater the likely impact (overcharge) of the cartel. A further element worthy of note that could be taken in account is the degree of implementation of the cartel decisions by all participants and whether the cartel is highly organized or not.

Granted that our model is a very simple representation of reality, elements (a)–(d) provide a more correct weighting for seriousness and, hence, for proportionality of the deterrent level of fines. They incidentally provide an underpinning for some of the elements already developed in the ECA Guidelines.

Quantifying some of these elements requires authorities to be informed about specific market parameters and, hence, may be rejected as non-operational. It should not be. Indeed, cartel investigations are quite capable of yielding the necessary information at a qualitative level, thus not needlessly burdening the authority or limiting its discretion.

The range for expected extra profits can be derived as follows: assuming (a) 15% permanent increase in prices as a result of the cartel; (b) demand price elasticities between 0.5 and 1.2; and (c) Lerner index values between 0.3 and 0.8, then the range of extra profits as a percentage of affected sales lies within the band 1%–12.2% (see Table 1).

The following justifications underpin the assumptions on the key parameters of Equation 2. As regards the assumed price increase imposed by the cartel, Connor finds a median overcharge by cartels of all types in the period 1991–2004 of 24%. A review and analysis on the same data set by Boyer and Kotchoni suggests, however, a mean bias-corrected overcharge estimate of 13.8% for all cartels in the data set. A 15% overcharge is, therefore, quite a reasonable hypothesis at the upper end of the overcharge scale observed to date.

We assume a range for (absolute) market demand elasticities between 0.5 and 1.2, which is a range that would encourage the participants to coordinate their conduct and aim at joint profit maximization: If prevailing market demand is

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elastic, then cheating would undermine any cartel that is formed, and if much less inelastic, then market coverage of the cartel is likely to be much reduced.

<table>
<thead>
<tr>
<th>Elasticities</th>
<th>Value of the Lerner Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>0.8</td>
</tr>
<tr>
<td>0.5</td>
<td>10.9%</td>
</tr>
<tr>
<td>0.8</td>
<td>9.49%</td>
</tr>
<tr>
<td>1.2</td>
<td>7.31%</td>
</tr>
</tbody>
</table>

Table 1 Expected Extra Profits over Sales in the Case of Cartels
(Assuming a 15% Overcharge)

The only remaining element to incorporate in the analysis concerns the value that can be assigned to the probability of detection.

First of all, what \( \rho S = \text{extra profits} \) (Equation 1) implies is that the sanction is imposed in the same year/period when the extra profits are gained. The reality is different. The cartel can be discovered also years later, even after it has ceased to exist. In other words, a firm decides whether to participate in a cartel year after year according to the deterrence effect of a fine that can be levied also \( n \) years after the extra profits have been gained. However, as Harrington\(^{10}\) suggests, the quality of the available proofs significantly decays in time, and as a result, the expected penalty declines year after year by a factor \( b \). Considering these dynamic elements of the fining policy, Equation 1 becomes

\[
\rho S + \rho (1 - \rho)b \delta S + \rho (1 - \rho)^2 b^2 \delta^2 S + \ldots + \rho (1 - \rho)^n b^n \delta^n S = \text{extra profits},
\]

where \( \delta \) is an appropriate discount factor and extra profits are the extra profits expected from the cartel in one year. Solving for \( S \),

\[
S = \text{extra profits}[1 - (1 - \rho)b \delta]/\rho.
\]

All this implies that, with \( b \) equal to 0.95, a probability of detection of 10%, and a discount factor of 5% (i.e., \( \delta = 0.95 \)), the fine has to exceed the expected extra profits by a factor of 1.86. Should the probability of detection be higher, the factor by which the fine should be higher than expected extra profits is reduced.

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\(^{10}\) Harrington, ‘Comment on “Antitrust Sanctions”, Competition Policy International 6, no. 2 (Autumn 2010).
However, what should be our best estimate for the detection rate? While detection rates are essentially unobservable, a paper by Combe et al.\textsuperscript{11} based on EU cartel prohibition decisions adopted during the pre-leniency period, that is, before mid-1990s, estimated a detection rate of 13%. Since this paper looks only at EU cases, ignoring cases prosecuted by national authorities as well as basing its sample on actual prosecutions rather than cartels detected but not prosecuted due to lack of evidence, it can be concluded that this is an underestimate of the implicit detection rate. Furthermore, the period of analysis predates EU’s Leniency Programme; hence, the underestimate is likely to be significant. A study based on US DOJ’s cartel enforcement\textsuperscript{12} estimates that an effective leniency programme can increase cartel detection rate by over 60% and reduces cartel formation by 59%. A probability of detection of 20% (and an augmentation factor of 1.38) is, therefore, a conservative estimate.

Table 2 provides the percentage ranges for the basic amount of fines as a proportion of turnover for likely values of the key market parameters. Taking into account likely values for relevant economic parameters influencing gravity, a fine range between 1.0% and 15.04% would be representative of deterrent levels for basic amounts of fines.

Table 2 Deterrent Sanction in the Case of Cartels

<table>
<thead>
<tr>
<th>Elasticities</th>
<th>Value of the Lerner Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>15.04%</td>
</tr>
<tr>
<td></td>
<td>13.12%</td>
</tr>
<tr>
<td></td>
<td>10.2%</td>
</tr>
<tr>
<td>0.5</td>
<td>13.09%</td>
</tr>
<tr>
<td></td>
<td>9.82%</td>
</tr>
<tr>
<td></td>
<td>4.9%</td>
</tr>
<tr>
<td>0.8</td>
<td>10.08%</td>
</tr>
<tr>
<td></td>
<td>4.83%</td>
</tr>
<tr>
<td></td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

In practice, the basic fine percentage is usually adjusted to take into account aggravation and mitigation factors applied to each cartel participant. Of these, possibly the most important aggravation circumstance is recidivism, and how this impacts on incentives for filing for leniency deserves some mention.


2.3 LENIENCY

Fining policy, especially for cartels, is particularly complex because it needs to consider the interplay with leniency. Where there exists a leniency programme for cartels, the best practice fines guidelines need to carefully ensure that the two instruments are mutually reinforcing rather than conflicting with the enforcement objectives. A low level of fines will simply not activate even well-designed leniency programmes. There is ample evidence for this statement and even leniency programmes that are well designed but simply allow for the possibility of very substantial reductions in fines for other applicants lose a lot in effectiveness. If fines are set at a deterrent level, filing for immunity is generally worthwhile – even if there is some risk of private damages action. To incentivize applications after immunity has been granted to the first applicant, it is necessary that reduction of fine applicants are also provided with fine reductions, albeit much lower than those granted to the first applicant. Hence, the reductions offered under a leniency programme to second, third, etc., applicants are as important as upfront immunity, albeit that they should be limited, never exceeding 50% of the fine.

The race to the authority once the investigation has started depends not only on the reductions but also on the fines’ percentages applied. Subsequent leniency applicants who substantiate and submit complementary evidence are crucially important to ensure that the prohibition decision withstands judicial review. Hence, fines exceeding the deterrent level may be favoured in order to stimulate immunity applications, but the likely impact on the overall incentives for reduction of fine applicants should be a very important consideration. All the more so when account is taken of aggravating circumstances such as recidivism. In this context, the percentage increase applied to a recidivist who happens to be second or third applicant should not be so high as to eliminate the benefit of applying for leniency. The increases for recidivism and the reductions of fines for leniency have to be self-reinforcing, not self-defeating, so as to avoid that applications to the competition authority for immunity and for reductions of fines, particularly by recidivists, show a decline over time.

2.4 ABUSE OF DOMINANCE

The case of abuse of dominance is different from cartels, at least with respect to exclusionary abuses. These are meant to exclude competitors from the market, and since (in EU law) they are put in place by a firm that is already dominant, the expected profits originating from the abuse have to be assumed to be equal to a part of the extra profits associated with dominance. In particular, expected extra profits in relation to sales may be assumed to arise from excluding entrants or
other small competitors from the contestable part of the dominant's market share. Furthermore, because of fixed costs, profits as a proportion of sales of a dominant firm are less than its margin over price (i.e., its Lerner index).

Some idea of the orders of magnitude of expected extra profits in relation to sales achieved by a dominant company can be obtained by examining the determinants of profits as a proportion of total revenue of a dominant firm facing a fringe of price taker competitors. This is the situation that most closely resembles that of an abuse of a dominant position: a dominant company trying to become more dominant and, at the limit, a monopolist by excluding existing and would-be competitors.

First of all, it is necessary to estimate the Lerner index. Then, in order to arrive at expected extra profits, it is necessary to estimate fixed costs.

The Lerner index depends on the following variables: directly on its market share and inversely on three other elements – the market demand elasticity, the supply elasticity of the fringe competitors, and their market share. Orders of magnitude of the Lerner index can be estimated by considering some reasonable values for the above parameters.

As for the market elasticity of demand, considering that it refers to a market that accommodates a dominant firm, the relevant range of market prices should be expected to intersect the market demand curve in its elastic part – assume an elasticity of around 1.5. As for the dominant company market share, alternative values are either 70%, 85%, or 95%, and supply elasticity of competitors may be supposed to be high when their market share is relatively high (3.0) and low (1.5) when it is small. What is of interest to determine is not the level of total profits as a share of the dominant firm’s total revenue but the increase in profits that the dominant firm seeks to achieve through its abuse. The changes in the Lerner index therefore provide an estimate of the extra profits expected from exclusionary abuse by the dominant firm.

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13 See L. Kaplow & C. Shapiro, 'Antitrust', in Handbook of Law and Economics, Ch. 15, vol. 2, ed. A. Mitchell Polinsky & S. Shavell (2007). Following from their analysis and letting the Lerner index $L$ of a dominant firm at its profit maximizing level be $L = \frac{p - \epsilon}{p} \frac{1}{\epsilon_F}$ where $\epsilon_F$ is the absolute value of demand elasticity facing the dominant firm and that can be expressed as $|\epsilon_F| = \left| \epsilon_D + (1 - S) \frac{\epsilon_S}{S} \right|$, where $S$ is the dominant firm’s market share and $\epsilon_D$ and $\epsilon_S$, respectively, are the absolute elasticity of market demand and the elasticity of supply of the remaining competitors.
Three benchmark hypotheses can, therefore, be identified: a dominant firm with a very high market share (95%) combined with low market share for the competitor (5%) with low supply elasticity (around 1.5) (A firm); a high market share for the dominant firm (85%) combined with medium market share for the competitor (15%) and significant supply elasticity (2.5) (B firm); and finally, a dominant firm with market share of 70%, a medium market position of competitor (30%), and significant supply elasticity (3.0) (C firm).

The expected extra profits as a proportion of revenue of the dominant firm can be calculated using these values. What matters in an exclusionary abuse is for the dominant company to be able to exclude competitors. This implies that if the strategy is successful, the firm may become a monopoly in case A, a type A firm in case it starts from being a B firm and a type B firm in case the dominant firm is of the C type. What matters is the change in the Lerner index (second column of Table 3).

<table>
<thead>
<tr>
<th>Lerner Index Change</th>
<th>Expected Extra Profit</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monopoly 67.0%</td>
<td>33.5%</td>
<td></td>
</tr>
<tr>
<td>Type A firm 60.0%</td>
<td>7.0%</td>
<td>30.0%</td>
</tr>
<tr>
<td>Type B firm 45.0%</td>
<td>15.0%</td>
<td>22.5%</td>
</tr>
<tr>
<td>Type C firm 29.0%</td>
<td>16.0%</td>
<td>14.50%</td>
</tr>
</tbody>
</table>

What is interesting in this hypothetical calculation is that the change in the Lerner index is higher the lower the degree of dominance, the reason being that a super-dominant firm does not have much to gain by eliminating the little competition that it faces. To the contrary, a dominant firm facing a stronger competitor has much to gain by excluding it from the market. All this implies that, contrary to what the ECA Principles suggest, that is, that the sanction should be higher the higher the market share of the violating firms, the sanction for an abuse of dominance, at least in principle, should be lower the higher the degree of dominance of the violating firm.

Considering that the Lerner index is higher than expected extra profits over revenue because of the existence of fixed costs, expected profits over revenue could be estimated to be approximately half of the Lerner index itself (third column of Table 3). The change in expected extra profits would also be divided by 2 (fourth column of Table 3). The hypothesis that fixed cost be in some proportion with the market share of the dominant firm seems reasonable,
considering that it suggests economies of scale as the main reason for dominance. The range of extra profits originating from an exclusionary abuse should, therefore, vary between 0 and 8% of total affected revenue, the higher end of the range corresponding to situations where fringe competitors have a high supply elasticity, implying that a greater proportion of the dominant firm’s market share is contestable.

Furthermore, since the purpose of the abuse is to exclude affected competitors, they are very likely to notice that they are being excluded. The probability of detection is, therefore, much higher than in the case of cartels and at least above 50% for situations where the dominant firm is a relatively small entity, above 70% for larger dominant firms, and virtually 100% for super-dominant large firms. Since sanctions would be necessary only when the violation is particularly severe, this would be the case only in situations where dominance is clearly established. For most cases therefore, it would arguably be appropriate to take detection probability as high as 70%.

Applying Equation 4 with a probability of detection of 70%, we would have to multiply the expected change in extra profits by a factor of 1.04.

<table>
<thead>
<tr>
<th>Type</th>
<th>Expected Change in Extra Profit</th>
<th>Deterrent Sanction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A firm</td>
<td>3.5%</td>
<td>3.6%</td>
</tr>
<tr>
<td>Type B firm</td>
<td>7.5%</td>
<td>7.8%</td>
</tr>
<tr>
<td>Type C firm</td>
<td>8.0%</td>
<td>8.3%</td>
</tr>
</tbody>
</table>

The range of sanctions in the case of abuse of dominance (see Table 4) would, therefore, be 3.5%–8.3%, much lower than in the case of cartels (see Table 5).

3 THE ROLE OF PRIVATE ENFORCEMENT

One of the missing elements of the ECA Principles is that they do not address the role of private enforcement in enhancing deterrence. In particular, if follow-on damage requests become more common in the EU, the level of fines needed to ensure deterrence will correspondingly be reduced. Indeed, especially for the most serious violations:

$$\rho(S + \rho^bD) = \text{extra profits},$$

where $D$ represents the damages granted to those that suffered from the antitrust violation and $\rho^b$ is the share of damage requests that will actually be granted by
the judge. $D$ can be assumed to be equal to the expected extra profits (plus the profits that customers could have made if prices would have been lower), and $\rho^*$, as already suggested, is the share of expected extra profits likely to be granted as damage by the judge or in private settlement.

As a result,

$$S = \frac{(\text{extra profits})}{\rho^*} - \rho^*(\text{extra profits}).$$

In other words, the possibility of private action implies that deterrence is achieved with a fine reduced by a factor equal to the expected extra profits multiplied by the percentage of expected profits probably accepted as settlement of a damage claim.

The probability of a follow-on action is increasing rapidly and it can be assumed to be equal to one. The share of expected extra profits to be granted as a damage claim can be assumed to be in the order of magnitude of 25%.14

<table>
<thead>
<tr>
<th>Elasticities</th>
<th>Value of the Lerner Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>12.26% 10.69% 8.31%</td>
</tr>
<tr>
<td>0.5</td>
<td>10.67%  8.01%  4.00%</td>
</tr>
<tr>
<td>0.8</td>
<td>8.19%   3.97%  &lt;1%</td>
</tr>
<tr>
<td>1.2</td>
<td>8.19%   3.97%  &lt;1%</td>
</tr>
</tbody>
</table>

Table 5 Detergent Sanctions in the Case of Cartels Adjusted for Private Enforcement

14 This order of magnitude is derivable from Connor’s estimates of global settlements in Staff Paper #03-12 (Department of Agricultural Economics, Purdue University, November 2003).
Table 6  Deterrent Sanctions in Abuse of Dominance Cases
Adjusted for Private Enforcement

<table>
<thead>
<tr>
<th></th>
<th>Optimal Sanction</th>
<th>Private Enforcement</th>
<th>Optimal Sanction++</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A firm</td>
<td>3.6%</td>
<td>3.5%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Type B firm</td>
<td>7.8%</td>
<td>7.5%</td>
<td>5.9%</td>
</tr>
<tr>
<td>Type C firm</td>
<td>8.3%</td>
<td>8.0%</td>
<td>6.3%</td>
</tr>
</tbody>
</table>

As a result of private enforcement, the fine for cartels should, therefore, be in the range of 4%–12.26% for likely values of relevant economic parameters, while that for abuse of dominance in the range of 2.7%–6.3%; the higher the fine, the greater the damages to competition as a result of the violation (see Table 6).

Following the ECA Principles, in order to identify the sanction to be applied both for cartel and abuse of dominance, the above percentages should be applied to the values of sales to which the infringement relates, multiplied by the number of years the infringements has lasted.

4  CONCLUSIONS

The 2008 ECA Principles on fines are very well articulated and identify a number of key issues. The first is that the fine should at least be equal in probability terms to expected profits, not actual profits. The second is that competition authority should not be obliged to precisely estimate them on a case-by-case basis but identify them in a general way. This article picks up from where the ECA Principles stop, adding and complementing them.

Indeed, the purpose of this article is to identify the deterrent level of fines for cartels and abuse of dominance, providing competition authorities with ranges of percentages that may become very useful in practical applications. In the case of cartels, the more effective the leniency programmes, the higher the probability of detection and the lower the economic deterrent level of the fine. In the case of abuse of dominance, where the practice is not secret, the probability of detection is, in any case, much higher, and the percentage of the fine should, therefore, be much lower. There is another reason why fines for abuse of dominance should be much lower and that is that dominant companies have a better ability to raise prices and have greater incentives to pass on the fine to consumers.

All laws suggest that the applicable percentage of sales affected by the infringement be based on the seriousness of the infringement; this ensures that the fine is set at the deterrent level. However, what should be the criteria determining
seriousness and how quantitatively should it be translated into the level of the fine? The criteria, suggested by ECA, that is, the extent by which the infringement is implemented, or how high the cumulative market share of the infringers is, are not conclusive because neither of these criteria fully takes into account the economic parameters of the market concerned. It is difficult then to maintain that the criteria are appropriate to achieve deterrence.

It is evident that to combine, in a consistent way, the distinct policy instruments – fines, leniency, and private damages – requires a rather precise modelling exercise than a simple carrot and stick story. Simulations of such a model could also provide a more robust way to define the maximum cap on fines.

The probability of a follow-on private enforcement action is increasing and could be presumed to be unity for the most serious violations. This implies that private enforcement needs to be considered in terms of the deterrent effect it provides. We have based our assessment on the hypothesis that a settlement on average would amount to a 25% recovery of illegally gained profits, a figure that is in line with existing evidence.

All this discussion suggests that while sanction policy principles have much merit, they should be much more predictable than they are today, identifying classes of sanctions according to the seriousness or ability of different violations to be damaging to consumers. In this way, the ex ante deterrent effect would be maintained and the greater predictability and above all transparency would contribute to increasing compliance.