Commitments in Antitrust*

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Abstract

We analyze the impact of the introduction of a commitments procedure in terms of efficiency and deterrence in antitrust contexts. At the European level, this procedure consist in offering an immunity of fine to the firm in return for commitments that meet the competition concerns expressed to her. We first show that commitments are not proposed by firms who benefit much from the practice, but are always proposed in cases where the firm could be deterred with the usual trial sanction: this procedure necessarily lowers the deterrent effect of the competition authorities' intervention. However, under asymmetric information, commitments may enhance the consumers' surplus: they allow for shortened proceedings and avoid trial type-II errors. In addition, we find that the correlation between the firm's gain from the practice and the consumers' harm determines the optimal frequency of use of the commitments procedure: monotonic correlations push to pure strategies from the competition authority, while a stochastic use may be optimal otherwise. Deriving some comparative statics, we finally show that the commitments procedure is not always an alternative to a lack of efficiency of the competition authority's intervention: trial's expected sanctions and commitments may be complementary tools.

Keywords: Commitments in antitrust; Plea bargaining; Consumer Surplus.

JEL Codes: K21, K42, L41

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1 Introduction

Enforcement of the competition law traditionally relies on one major instrument: the fine. Recent modernization of the legal framework of the European authorities involve negotiated procedures, among which leniency programs, direct settlements and the commitments procedure.

In collusion cases, leniency programs and direct settlements provide some incentives for a firm to reveal its participation and provide proofs concerning an alleged infringement, before or during an investigation.[1]

As compared to these procedures, the commitments procedure has been mostly used in cases of unilateral practices, and does not formally establish the guiltiness of the firm: no fine can be imposed. Moreover, it is focused on the future behavior of the firm more than on the cooperation in investigations.[2] Such an outcome is more than often used in front of the *US Department of Justice*, where *consent decrees* concern 70 to 80 % of antitrust cases.

Article 9 § 1 of Council Regulation 1/2003 disposes that:

> " *Where the Commission intends to adopt a decision requiring that an infringement be brought to an end and the undertakings concerned offer commitments to meet the concerns expressed to them by the Commission in its preliminary assessment, the Commission may by decision make those commitments binding on the undertakings.*"

The wording of this article leaves some discretion to the European Commission, and the case law plays an important role concerning the anticipations of firms. However, competition authorities are well aware of the need to announce their policy in advance, and generally use in addition public speeches or guidelines to define the commitments policy.[3] It may depend on observable variables such as the sector or the type of the practice. For example, abuse of dominant position and vertical restraints may be treated in different ways.

In this article, we assume that commitments are to put an end to the practice, so that they are indivisible in the sense of the article of Shavell (1993), and

[1] In leniency programs, only the first informant is rewarded by an immunity of the fine, while direct settlements are more like a plea bargaining procedure where several firms may be rewarded equally. On leniency programs, see for example Motta and Polo (2003), Auber, Kovacic and Rey (2006) and Harrington (2008). Essentially, they can make tacit collusion harder to sustain through an increase of the probability of sanctions: reductions of the fine may incite proof cooperation. The recent procedure of direct settlements has not yet been analyzed in the economic literature, but an example of bargaining with multiple defendants is found in Kobayashi (1992).

[2] We will only study unilateral practices. Examples of such cases are found in *German Football League* (COMP/37.214, decision of Jan., 19th of 2005), *Coca-Cola* (COMP/39.116, decision of Jun., 22nd of 2005), *Alrosa & De Beers* (COMP/E-2/38.381, decision of Feb., 22nd of 2006), *Repsol* (COMP/B-1/38.348, decision of Apr., 12th of 2006). However, there is no such limitation in the European dispositions. See for example: *Buma and Sabam* (COMP/37.749, decision of Aug., 17th of 2005), *Scandinavian Airline System and Australian Airlines* (COMP/39.152, decision of Sept., 22nd of 2005) and *DaimlerChrysler, Toyota, General Motors and Fiat* (COMP/39.140 to 143, communication IP/07/409 of Mar., 23rd 2007). For detailed legal analyzes see, for example, Furse (2004), Cook (2006), Wils (2006) and Vialfont (2007). For an economic analysis of leniency and commitments procedures in collusion cases, see Vialfont (2008).

[3] See for example the communication of the French Competition Authority, dated March 3rd of 2009, available on its Web site.

that the authority has the ability to credibly announce the probability of the commitments procedure by type of practice.[4]

We find that the commitments procedure has typically two opposite effects. On the one hand, consumers benefit of the avoidance of the trial and the associated costs and uncertainty. On the other hand, by closing a case with commitments, the competition authority gives up the fine, and inevitably looses some deterrent effect of its intervention.

The main purpose of this article is to analyze the tradeoff for the authority between these two effects in efficiency terms. We show that the commitments procedure may enhance the efficiency of the enforcement of the competition law, through the enhancement of the consumers' surplus: the firm always has the ability to choose the trial procedure, and efficiency derives from the consumers' gain if any.

This article is related to the literature on settlement and plea bargaining, where a defendant is given the option to plead guilty in exchange for a reduction of the penalty.[5] However, formal decisions and the commitments procedure also have some effects on the futur market equilibrium, respectively through injunctions and commitments. In addition, the ending of the practice might affect consumers and the firm by different amounts.[6]

In our model, the gain of the firm from the practice is its private information. The timing of the game makes it close to the screening model of Bebchuk (1984) with a continuum of types. Indeed, even though the firm makes a commitments proposal, we will see that the ability of the authority to ask for indivisible commitments makes impossible a signaling game in the sense of Reinganum and Wilde (1986): the firm knows its private gain but can only propose the interruption of the practice for a given immunity of fine. For the authority, the fact that a firm proposes commitments rather than going to trial will only reveal a part of its information.

Landes (1971), Gould (1973), Posner (1973), and Shavell (1982) are among the early articles on this topic, where it is shown that avoiding trial costs motivates settlement. Here, we do not explicitly take trial costs into account in order to focus on other interesting effects of the commitments procedure. In particular, shortened proceedings with commitments are a gain for the authority as we will see.

A second justification of plea bargaining is provided by Grossman and Katz (1983) who first identified their insurance effect against judicial errors. Here, we assume that a firm that has not adopted a potentially anticompetitive practice is never prosecuted. However, even with risk-neutral parties, we will find some

[4]These are two policy announcements on which the authority commits. The second is discussed with the presentation of results.

[5]See Daughety and Reinganum (2005, 2008) and Spier (2007) for excellent surveys.

[6]In the European competition law, competition authorities are generally not supposed to grant direct compensations to consumers: the fine is a transfer that does not enhance the consumers' surplus by itself and is paid back to the public revenue department. Injunctions and commitments are closer to compensation schemes, but only refer to the future behavior of the firm by restoring the competitive equilibrium. In the settlement literature, Polinsky and Che (1991) first analyzed the decoupled liability providing some optimal differentiated transfers between trial parties, in terms of crime deterrence and suits reduction. Daughety and Reinganum (2003) have provided such an analysis in asymmetrical information. For an article measuring the compliance effect of settlement with asymmetrical information, see Chu and Chien (2007), where the probability of damages does not depend on degree of precaution taken by the offender.

value to the insurance effect of commitments against "type-II errors", depending on the properties of the consumers' surplus.

Finally, the question of the effect of negotiations on deterrence is a critical question in plea bargaining analysis with a budget constrained authority. In asymmetric information models, the compliance incentives of settlements and their effects on welfare are analyzed by Reinganum (1993), Miceli (1996) and Franzoni (1999).[7] This literature mainly shows that the reduction of sanctions needed in order to incite negotiations reduces deterrence. In our model, the anticompetitive value of a practice is only characterized in a formal decision. However, we also find that the introduction of the commitments procedure induces more types of firm to adopt a practice that harms consumers: a firm that could be deterred with the trial intervention is always part of those that are interested in a commitments proposal. As compared to this literature, we consider damages to consumers that vary with the gain of the firm and consider that this link is not always monotonic.

We do consider a simple model where all these effects are at play in an antitrust context: a firm can engage in a practice that enhances its profit and harms consumers, but not necessarily in a one-to-one proportion. We show that, under asymmetric information, the correlation between the firm's gain and the consumers' harm determines the optimal frequency of use of the commitments procedure. When these amounts are positively linked, we find that the competition authority always use the commitments procedure. When, on the opposite, an increase of the firm's gain is due to some efficiency gains that are partially passed on to consumers, the authority only uses trial. When the correlation is non-monotonic, a stochastic use of this procedure may be optimal.

We finally show with comparative statics that the commitments procedure is not always an answer to a lack of efficiency of the intervention of the competition authority. Trial's expected sanctions and commitments may be complementary tools. This possible result gives some economic arguments in favor of what happened in Europe, where this procedure was introduced with an increase of the legal fine.

The paper continues as follows. In section 2 we present the model. Section 3 presents the different arbitrations of the firm. In section 4, we look for the authority's decision. Concluding remarks follow in section 5.

2 The Model

A firm considers engaging in a practice that increases its profits and reduces the consumers' surplus. We denote $\Delta \in [0, \overline{\Delta}]$ the incremental gain resulting from the practice, which follows a density $\phi(.)$ on the concerned sector. The reference situation is the one where the firm does not engage in the practice. We denote $S^*(\Delta)$ the consumers' surplus in the reference situation.

When the firm adopts the practice, consumers' surplus is reduced to $S \leqslant S^*(\Delta)$. We denote $h(\Delta) = [S^*(\Delta) - S]\phi(\Delta)$, the weighted harm to consumers, and assume that it is continuous and once differentiable. In addition, we do assume that $h(0) \geqslant 0$, so that a practice that does not imply any benefit to the firm may harm consumers. The correlation between what the firm gains and

[7] Polinsky and Rubinifeld (1988) first tackled the deterring consequences of a fine reduction in negotiations in a symmetric information game.

what consumers loose is not necessarily monotonic, due to some efficiency gains that may in part be passed on to consumers: for different values of Δ, efficiency gains and anticompetitive effects of a practice might interfere differently, so that $h(\Delta)$ might not necessarily be increasing.

We assume that the authority maximizes the consumers surplus, so that its first-best would be to deter any practice. In order to make an interest to implement a commitments procedure, we do assume that the fine is not high enough to imply this result. Moreover, we assume that the firm is never prosecuted when it does not adopt the practice.

The intervention of the authority is modeled as follows. If the firm engages in the practice, it might be detected, with a probability $\alpha \in (0,1)$, in a preliminary investigation. While detected, the practice is found anticompetitive in trial, with a probability $\beta \in (0,1)$, in which case the firm pays a fine F and receives an injunction to interrupt the practice. We assume that Δ cannot be credibly disclosed by the firm, and that it always remains its private information.[8] In addition, we assume that α and β are exogenous, knowing that during any stage the authority would like to set them as high as possible.

At the end of the preliminary investigation, the firm may propose commitments that meet the competition concerns, insuring an immunity of fine but also the immediate loss of Δ. The whole game is presented in figure 1.

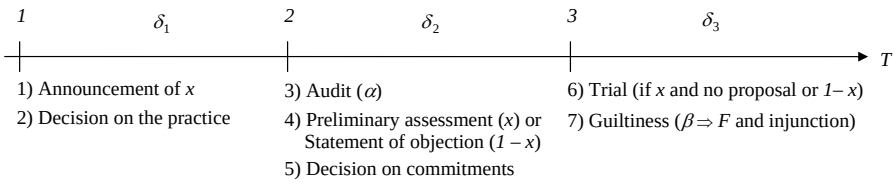

Figure 1: Timing of the game

At the first period of the game ($T = 1$), the competition authority chooses the frequency at which it will use the commitments procedure, denoted $x \in [0,1]$. Upon that announcement and the possible procedures, the firm decides whether or not it engages in the practice.

At the second period of the game ($T = 2$), the firm is audited with probability α. Then, the authority proposes to initiate the commitments procedure by sending the preliminary assessment, with probability x, or continues the investigation and sends the statement of objection that leads to a formal decision. If the firm proposes commitments that meet the competition concerns, the authority accepts them and immediately close the case.[9] If the firm does not propose any commitments or that the authority does not send the preliminary assessment, the investigation continues. If the firm is not audited, with probability $1 - \alpha$, it continues the practice.

[8] Shavell (1989) shows that if private information can be credibly revealed on a voluntary basis, no trial will occur in equilibrium when it is costly for the parties. This point is discussed in section 4.

[9] An additional step in $T = 2$ would be that offered commitments are only accepted with a probability x'. As will be discussed in footnote 10 and 12, what matters in this game is the *ex ante* probability of the commitments procedure announced by the authority.

At the third period ($T = 3$), there is no practice if and only if the firm was deterred in $T = 1$, commitments where proposed in $T = 2$, or the trial establishes guiltiness in $T = 3$, with probability β. Note that this last period involves no particular decision from the parties.

Each period is discounted with a factor $\delta_i > 0$, where $i = 1, 2, 3$, reflecting different lengths or importance of the three periods. At the sequel, and for simplification purpose, the values of the different strategies are always evaluated at $T = 1$.

3 Firm's Decisions

We solve the game backward, starting by defining if a firm, that is audited and has received a preliminary assessment in $T = 2$, decides to propose commitments.

At the beginning of the second period, if the firm decides to face trial, its expected gain, up to a discounting factor, is $\delta_2\Delta + \delta_3[(1-\beta)\Delta - \beta F]$: it continues the practice during the second period, and may not be found guilty in $T = 3$ with probability $1 - \beta$, but may be imposed an injunction and pay F. If the firm decides to propose commitments, its expected gain, up to the same discounting factor, is 0: it must stop the practice immediately and with certainty. Comparing these two outcomes gives the following result where we take indifference as a cause for a commitments proposal.

Lemma 1. *There exists a threshold Δ^r such that the firm offers commitments if and only if $\Delta \leqslant \Delta^r$.*

A firm for which $\Delta > \Delta^r$ always chooses the trial, while types $\Delta \leqslant \Delta^r$ propose commitments after a preliminary assessment. Indeed, trial implies a negative expected gain for the firm if and only if:

$$\Delta \leqslant \frac{\delta_3\beta F}{\delta_2 + \delta_3(1-\beta)} \equiv \Delta^r$$

For these types avoiding the trial fine is worth commitments. Intuitively, if the benefit from the practice is large enough, the firm prefers to face the trial expecting to avoid the injunction.[10]

Suppose first that only trial is possible, and let us define the expected gain of the firm under its different options in $T = 1$, where no practice means no extra gain. If the firm decides to engage in the practice, its expected gain is $(\delta_1 + \delta_2)\Delta + \delta_3\{(1-\alpha)\Delta + \alpha[(1-\beta)\Delta - \beta F]\}$. Here, the firm gains Δ in the period 1, and may not be audited. It immediately follows that types for which the latter gain is negative are deterred to adopt the practice, which is rewritten as follows:

$$\Delta \leqslant \frac{\delta_3\alpha\beta F}{\delta_1 + \delta_2 + \delta_3(1-\alpha\beta)} \equiv \Delta^0$$

[10] Even with an additional step in $T = 2$ where proposed commitments would be accepted with probability x', the same set of Δ-types would propose commitments. Indeed, the expected gain of a firm would be $(1-x')\{\delta_2\Delta + \delta_3[(1-\beta)\Delta - \beta F]\}$: if the authority accepts the proposed commitments, the firm interrupts the practice, and otherwise the firm faces the trial expected gain. The only determining element at this point is whether the trial expected gain is negative or positive.

Note that $\Delta^0 < \Delta^r$, given that $\alpha < 1$ and that Δ^0 also refers to the gain from the practice gain in $T = 1$.

In order to analyse a non trivial game, we make the following assumption concerning the deterrent effect of the trial intervention of the authority.[11]

Assumption 1. *We assume that all types of firm would not be deterred even if a preliminary investigation was certain ($\alpha = 1$).*

This assumption is equivalent to $\Delta^r < \overline{\Delta}$ or $F < \dfrac{\delta_2 + \delta_3(1-\beta)}{\delta_3 \beta}\overline{\Delta}$. Hence, Δ-types in $(\Delta^0, \Delta^r]$ are not deterred but have a negative expected gain in front of the authority: these types *regret* their decision once audited.

Suppose now that commitments are possible, and note that, under assumption 1, some types will never propose commitments. The authority sends a preliminary assessment with probability $x \geqslant 0$. If the firm decides to adopt the practice and to propose commitments once audited, its expected gain can be written $\delta_1\Delta + \delta_2\Delta(1-\alpha x) + \delta_3\{(1-\alpha)\Delta + \alpha(1-x)[(1-\beta)\Delta - \beta F]\}$. As compared to the evaluation of the trial in $T = 1$, the firm looses Δ in $T = 2$ if it is audited, but only pays the fine with the probability $1 - x$.

Although two opposite effects appear between an anticipated interruption and a reduced expected fine, the following lemma presents the result of the introduction of the commitments procedure on the initial decision of the firm in $T = 1$.

Lemma 2. *Any introduction of the commitments procedure increases the set of Δ-types that engage in the practice in $T = 1$.*

Lemma 2 comes straight from the fact that types that may be deterred with the only trial intervention are necessarily interested by a commitments proposal. Intuitively, the authority introduces a procedure that offers an immunity of fine, while trial always remains possible for the firm as opposed to a quickened and certain treatment of the case: negotiation cannot increase deterrence.

Indeed, for $x \geqslant 0$, Δ-types that decide not to engage in the practice are those for which:

$$\Delta \leqslant \frac{\delta_3\alpha\beta(1-x)F}{\delta_1 + \delta_2(1-\alpha x) + \delta_3[1-\alpha+\alpha(1-\beta)(1-x)]} \equiv \Delta^d(x)$$

Figure 2 illustrates the form of $\Delta^d(x) \leqslant \Delta^0$, which decreases with the *ex ante probability* of a commitments application x.[12]

Given that $\Delta^d(0) = \Delta^0$, when slightly increasing x from zero, the authority first looses the deterrence of Δ-types next to Δ^0. In addition, $\Delta^d(x) = 0$ for

[11] If Δ is common knowledge, the competition authority can decide an adjusted level of fine. In such a case, $F(\Delta) = \dfrac{\delta_1 + \delta_2 + \delta_3(1-\alpha\beta)}{\delta_3\alpha\beta F}\Delta$ is sufficient to deter each Δ-type. Under asymmetric information, F cannot be a function of Δ, but the authority can deter all Δ-types if and only if $F \geqslant \dfrac{\delta_1 + \delta_2 + \delta_3(1-\alpha\beta)}{\delta_3\alpha\beta F}\overline{\Delta}$. Given that in both information structures complete deterrence constitutes the first-best in terms of consumers' surplus, we do analyze a game where some types cannot be deterred while using only the trial as a tool of intervention. This is true, for example, if the fine is legally bounded.

[12] If this probability of commitments is reduced to xx', with possible rejections of proposed commitments by the authority even after a preliminary assessment, more types decide not to engage in the practice in $T = 1$. However, results hold given that in our framework x can be chosen by the authority in the set $[0, 1]$.

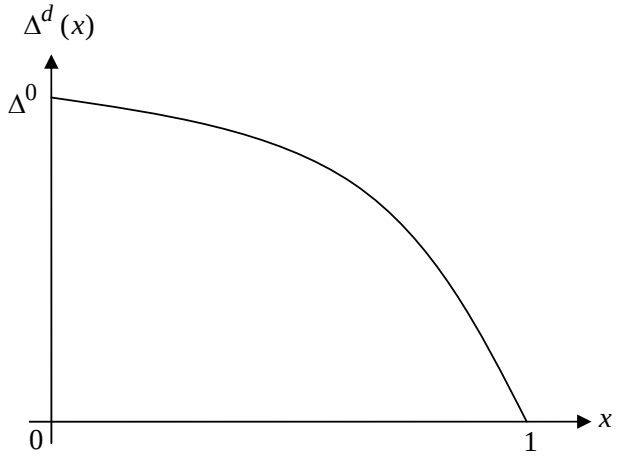

Figure 2: Ex ante probability of commitments and deterrence

$x = 1$: when the authority always uses the commitments procedure, all types that could be deterred adopt a "*wait-and-see strategy*", given that they never pay any fine and that an audit is not certain.[13]

Figure 3 summarizes previous results when the authority announces an x in $[0, 1]$.

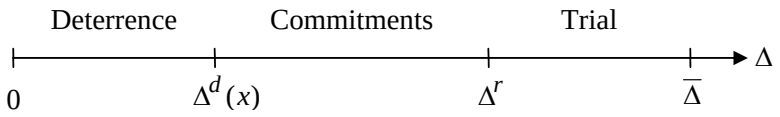

Figure 3: Choices of types of firm for $x \geqslant 0$

The smallest types ($\Delta \leqslant \Delta^d(x)$) decide not to adopt the practice when $x < 1$, while intermediary types ($\Delta \in (\Delta^d(x), \Delta^r]$) adopt it but regret their decision once audited. The latter therefore propose commitments after a preliminary assessment, while the largest types ($\Delta > \Delta^r$) choose trial expecting for a discharge.

In order to derive some comparative statics on these thresholds, we first regroup the different parameters of the model in function of their effect on the efficiency of the initial intervention of the authority.

When δ_1 and δ_2 increase, it is possible to say respectively that the audit and trial technologies are less efficient. Indeed, these two parameters reflect the lengths or importance of the period between, on the one hand, the beginning of the game and the moment where an audit is possible, and, on the other hand, between the beginning of the audit and the trial.

[13]The term "wait-and-see" in an antitrust context refers to Fenn and Veljanovski (1988) where the authority uses either sanction or monitoring. Here, for $x = 1$, any firm waits for a possible audit, and knows that if its practice is detected it will simply have to stop it.

On the opposite, when the audit probability α, the conviction probability β or the fine F increase, the threat of trial increases. Moreover, δ_3 represents the importance of the period at stake in the decision of the authority.

Let us now derive some comparative statics, summarized in table 1. They provide some intuitions concerning the actual probability of a commitments proposal.

Variable	δ_1	δ_2	δ_3	α	β	F	x
Δ^0	-	-	+	+	+	+	n/a
Δ^r	n/a	-	+	n/a	+	+	n/a
$\Delta^d(x)$	-	-	+	+	+	+	-
$\Delta^r - \Delta^0$	+	-	?	-	+	+	n/a
$\Delta^r - \Delta^d(x)$	+	-	?	-	+	+	+

Table 1: Effects of the audit and trial technologies on the choice of types

We find that $\Delta^d(x)$ decreases with the length of the period before a possible audit and the proceedings duration, but increases with the element of the expected fine. Very intuitively, more Δ-types are deterred when they can be sanctioned quickly and certainly.

Apart from δ_1 and α, that are irrelevant in the definition of the trial expected sanction in $T = 2$, Δ^r varies the same way as $\Delta^d(x)$.

Globally, and for a given x, we find that the probability of a commitments proposal decreases ($\Delta^r - \Delta^d(x)$ decreases) when the audit technology becomes more efficient (δ_1 decreases and/or α increases), while a more efficient trial technology pushes more Δ-types to propose commitments (δ_2 decreases, β increases and/or F increases).

Finally, by definition, an increase of x makes more probable a commitments proposition. We also find that it increases indirectly this probability by lowering the deterrence threshold ($\Delta^r - \Delta^d(x)$ increases).

In the following section, we present the decision of the authority on x when it anticipates the above results.

4 The Competition Authority's Decision

Let us first present the consumers' surplus associated to the different decisions of the firm.

For the deterred Δ-types ($\Delta \leqslant \Delta^d(x)$), the consumers' surplus is given by:

$$cs^d(\Delta) = (\delta_1 + \delta_2 + \delta_3)S^*(\Delta)$$

For these types, the consumers' surplus is simply the actualized value of $S^*(\Delta)$, so that $cs^d(\Delta)$ does not depend on x. However, the set of deterred types is a function of x, through the value of $\Delta^d(x)$.

For the Δ-types that engage in the practice and propose commitments ($\Delta \in (\Delta^d(x), \Delta^r]$), the consumers' surplus is given by:

$$cs^c(\Delta) = \delta_1 S + (1-\alpha)(\delta_2+\delta_3)S + \alpha\left\{x(\delta_2+\delta_3)S^*(\Delta) + (1-x)\left[\delta_2 S + \delta_3(\beta S^*(\Delta) + (1-\beta)S)\right]\right\}$$

Here, the firm adopts the practice during the first period, so that the observed consumers' surplus in $T = 1$ is S. If the firm is not audited, with probability $1-\alpha$, it continues the practice during the two last periods. While audited, it receives a preliminary assessment with a probability x and offers commitments that implies $S^*(\Delta)$ during the two last periods. With probability $1-x$, it continues the practice until trial that only implies $S^*(\Delta)$ under a guilty decision.

Finally, for the Δ-types that engage in the practice and decide to go to trial ($\Delta > \Delta^r$), the consumers' surplus is given by:

$$cs^t(\Delta) = (\delta_1+\delta_2)S + \delta_3\left\{(1-\alpha)S + \alpha[\beta S^*(\Delta) + (1-\beta)S]\right\}$$

The firm never proposes commitments so that $S^*(\Delta)$ can only be obtained in $T = 3$, with an ex ante probability $\alpha\beta$. Note that by definition, $x = 0$ implies that $cs^c(\Delta) = cs^t(\Delta)$.

Let us first describe the optimal commitments' policy when the authority knows Δ.

Proposition 1. *Under symmetric information on Δ, the competition authority never uses commitments if $\Delta \leqslant \Delta^0$, and always does otherwise.*

The authority sets $x^* = 0$ for $\Delta \leqslant \Delta^0$, and $x^* = 1$ otherwise. Indeed, for $\Delta \leqslant \Delta^d(x)$, the trial's expected fine implies the deterrence of the practice, with $\Delta^d(x)$ decreasing with x, so that it should never use commitments for these types: $cs^c - cs^d = -[S^*(\Delta) - S]\{\delta_1 + \delta_2(1-\alpha x) + \delta_3[1-\alpha(x+(1-x)\beta)]\} < 0$. Deterrence means no harm to consumers, while the commitments procedure implies a possible interruption during the audit.

On the complementary set of Δ-types, commitments lead to an immediate interruption of the practice from $T = 2$, and insures against type-II errors: $cs^c - cs^t = [S^*(\Delta) - S]\,\alpha x\,[\delta_2 + \delta_3(1-\beta)] > 0$. Note that for $\Delta > \Delta^r$, the value of x has no effect on the consumers' surplus given that no commitments are proposed.

However, the optimal policy presented in proposition 1 is not incentive compatible under asymmetric information on Δ. Here, a firm benefits from an informational rent if and only if $\Delta \in (\Delta^d(x), \Delta^0]$: such a firm would decide to mimic larger types, while revealing it would face a systematic refusal from the authority for deterrence reason. This comes from the fact that firms with $\Delta \in (\Delta^0, \Delta^r]$ would reveal it, leading to a certain acceptance from the competition authority. Therefore, the asymmetric information leads to a partial anti-selection process.[14]

[14] If Δ can be credibly revealed, an immediate equilibrium is $x^* = 1$ when it is shown that $\Delta > \Delta^0$, and $x^* = 0$ otherwise. As compared to Shavell (1989), there still would be some trial for types $\Delta > \Delta^r$. As used by the US Department of Justice, partial commitments could incite these larger types to propose some commitments, implying the associated quickening and insurance effects. In the European competition law, commitments are supposed to be complete, and trials arise for practices that are very beneficial to the firm.

The objective of the competition authority is to maximize the weighted consumers' surplus that can be written as follows:

$$CS(x) = \int_0^{\Delta^d(x)} cs^d(\Delta)\phi(\Delta)d\Delta + \int_{\Delta^d(x)}^{\Delta^r} cs^c(\Delta)\phi(\Delta)d\Delta + \int_{\Delta^r}^{\overline{\Delta}} cs^t(\Delta)\phi(\Delta)d\Delta$$

The derivative of $CS(x)$ w.r.t. x is given by:

$$CS'(x) = \alpha[\delta_2 + \delta_3(1-\beta)] \int_{\Delta^d(x)}^{\Delta^r} h(\Delta)d\Delta$$

$$+ \left[\delta_1 + \delta_2(1-\alpha x) + \delta_3(1-\alpha+(1-\beta)(1-x))\right] h(\Delta^d(x))\frac{\partial \Delta^d(x)}{\partial x}$$

The first element is positive and represents the marginal gain of increasing x through the quickening and insurance effects of commitments: $h(\Delta)$ is completely "repaired". The second element is negative given that $\partial\Delta^d(x)/\partial x$ is negative, and represents the marginal loss of increasing x, implying less deterrence. $CS'(x)$ is immediately rewritten as follows:

$$CS'(x) = \alpha\left[\delta_2 + \delta_3(1-\beta)\right] \int_{\Delta^d(x)}^{\Delta^r} \left[h(\Delta) - h(\Delta^d(x))\right] d\Delta$$

In addition, $CS''(x)$ is of the sign of $h'(\Delta^d(x))$:

$$CS''(x) = -\alpha\left[\delta_2 + \delta_3(1-\beta)\right] h'(\Delta^d(x))(\Delta^r - \Delta^d(x))\frac{\partial \Delta^d(x)}{\partial x}$$

Hence, the convexity of $CS(.)$ w.r.t. x directly depends on the way $h(\Delta^d(x))$ varies with x.

At the sequel, we provide some conditions under which there is a corner solution with $x^* = 0$ or $x^* = 1$, respectively when offering commitments is never or always possible. We also show that sometimes the solution is interior ($0 < x^* < 1$): the authority sends a preliminary assessment stochastically.

Let us first provide a sufficient condition under which some introduction of the commitments procedure enhances the consumers' surplus.

Proposition 2. *A sufficient condition under which the commitments procedure enhances the consumers' surplus is that the mean value of $h(.)$ on $[\Delta^0, \Delta^r]$ is larger than $h(\Delta^0)$.*

Indeed, $\int_{\Delta^0}^{\Delta^r} \left[h(\Delta) - h(\Delta^0)\right] d\Delta > 0$ implies that $CS'(0) > 0$, so that $x^* > 0$. Intuitively, slightly raising x from zero implies a deterrence loss of few types, but benefits consumers for all $\Delta \in (\Delta^0, \Delta^r]$. Hence, the authority introduces this procedure when the mean value of $h(.)$ for this latter Δ-types is larger than the weighted harm associated to those whose deterrence is immediately lost.[15]

The following proposition present the optimal decision of the authority when $h(.)$ is monotonic on $[0, \Delta^r]$.

[15] This sufficient condition is verified if $\phi(\Delta)$ is uniform (respectively $S^*(\Delta)$ constant) and $S^*(\Delta)$ (resp. $\phi(\Delta)$) increases on $[\Delta^0, \Delta^r]$.

Proposition 3. *A monotonicity of $h(.)$ implies a pure strategy of the authority:*

1. *If $h(.)$ is increasing on $[0, \Delta^r]$, $x^* = 1$.*
2. *If $h(.)$ is decreasing on $[0, \Delta^r]$, $x^* = 0$.*

Intuitions are given with $\phi(.)$ uniform. If the firm's gain is positively correlated with the consumer's harm, deterrence loss is always dominated by the quickening and insurance effects of the commitments procedure: $x^* = 1$. Here, Δ is directly associated to anticompetitive effects, so that consumers loose as much as Δ increases. Hence, consumers are better off avoiding discharge and obtaining quick interruption of these cases, given that deterrence concerns minor ones.

On the opposite, when an increase of Δ is due for example to some efficiency gains that partially past on to consumers, $x^* = 0$. Here, trial deters most harmful practices, so that the authority never uses commitments.[16]

However, $h(.)$ is not necessarily monotonic in Δ on the set $[0, \Delta^r]$. We present hereafter different optimal strategies of the authority when the weighted consumers' harm has a unique interior extremum.

Proposition 4. *If $h(.)$ is concave and has an interior maximum on $[0, \Delta^r]$, the optimum for the authority is to set $x^* = 0$ or $x^* = 1$.*

This case is illustrated in figure 4.a), with the corresponding expected consumers' surplus in figure 4.b).

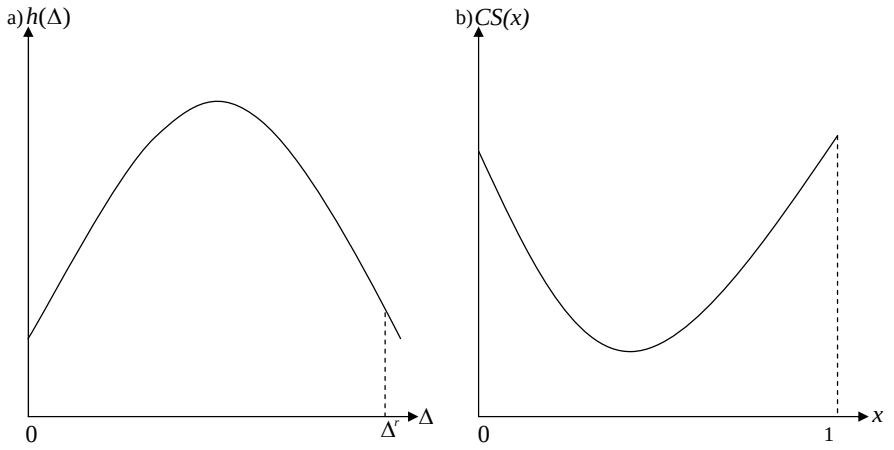

Figure 4: Inverted U-shaped weighted harm and consumers' surplus

When the weighted consumers' harm is the largest for intermediary Δ-types, that engage in the practice even for small values of x, the arbitration is about whether to include them in the commitments procedure or to always choose trial: deterrence of the smallest types is not the main objective. Here, the loss of deterrence first concerns the most serious cases and only certain quickening and

[16] If $S^*(\Delta)$ is a constant, when types in a given sector follow an increasing or decreasing distribution function, the competition authority optimally announces $x^* = 1$ or $x^* = 0$.

insurance effects of commitments can offset this loss. If they are not sufficient, the authority should only use trial decisions.

The authority decides between these two local optima with respect to the sign of $CS(1) - CS(0)$ that can be written as follows:

$$CS(1) - CS(0) = -\left[\delta_1 + (\delta_2 + \delta_3)(1-\alpha)\right] \int_0^{\Delta^0} h(\Delta) d\Delta + \alpha \left[\delta_2 + \delta_3(1-\beta)\right] \int_{\Delta^0}^{\Delta^r} h(\Delta) d\Delta$$

The first element is negative, given that the authority may adopt a strategy that would lead to incite all initially deterred types to engage in the practice in $T = 1$, possibly with no audit in $T = 2$. However, for larger types, the quickened and certain interruption of the practice, from $T = 2$ in case of an audit, pushes the authority to choose $x^* = 1$.

In this setting, comparative statics give no clear result concerning the interest of the two opposite strategies. In particular, trial and commitments can be seen as complements or substitutes, depending on the value of parameters.

However, when $h(.)$ increases on $[0, h(\Delta^0)]$, it is shown in appendix that a longer period before a possible audit (δ_1 increases) makes $x^* = 1$ more likely. Indeed, in that case, a "beneficial" commitments proposal is more probable: as presented in table 1, $\Delta^r - \Delta^0$ increases.

If, in addition, the mean value of $h(.)$ on $[0, h(\Delta^r)]$ is larger than $h(\Delta^r)$, longer proceedings (δ_2 increases) make $x^* = 1$ more probable. Here, even though the effective use of commitments is less frequent, the initial set of deterred types is reduced implying the latter result.

Finally, for small positive values of F, we find that $CS(1) > CS(0)$, and that the derivative of $CS(1) - CS(0)$ w.r.t. F is negative if and only if $h(\Delta^0) > h(\Delta^r)$.

However, under these three conditions, the audit and conviction probabilities might not lead to such a substitute result: the derivative of $CS(1) - CS(0)$ w.r.t. α and β might be positive.

The presented signs of the derivatives of $CS(1) - CS(0)$ are more likely when Δ^0 is the maximum of $h(.)$. Hence, when intermediary harms are more likely, trial and commitments may be substitutes, which means that this negotiated procedure should be introduced to compensate a lack of efficiency of the authority.

Proposition 5. *If $h(.)$ is convex and has a unique interior minimum on $[0, \Delta^r]$, x^* is interior.*

This case is illustrated in figure 5.a), with the corresponding expected consumers' surplus in figure 5.b).

Here, the competition authority uses a mixed strategy concerning the sending of the preliminary assessment, in order not to reduce in excess the deterrence of most harmful practices. However, some use of the commitments procedure is optimal given that large Δ-types also means large damages.[17]

[17] If $S^*(\Delta)$ is a constant, when types in a given sector are concentrated in the smallest and largest Δ, the competition authority optimally announces an interior x^*.

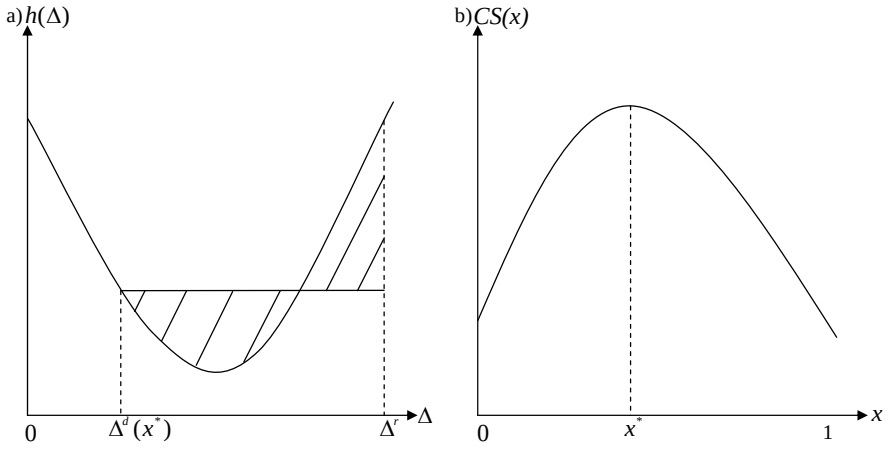

Figure 5: U-shaped weighted harm and consumers' surplus

As shown in figure 5.a), x^* equalizes $h(\Delta^d(x^*))$ to the mean value of $h(.)$ on $[\Delta^d(x^*), \Delta^r]$:

$$\int_{\Delta^d(x^*)}^{\Delta^r} \left[h(\Delta) - h(\Delta^d(x^*))\right] d\Delta = 0$$

With a U-shaped weighted harm on the set of types that would propose commitments, we find now that the later the authority performs an audit (high δ_1) and the less it is probable (low α), the less it has interest to use commitments: audit and commitments are complements.

In addition, the optimal frequency of preliminary assessment increases when investigations are performed faster (δ_2 decreases) and with an higher expected fine (β and/or F increases).

Hence, with this latter shape of $h(.)$, a theoretical argument can be given in favor of the European introduction of the commitments procedure coupled with an increase of the legal bounds of sanctions.

However, taking firms' arbitrations into account between deterrence, trial and commitments, we have shown that it is not always the case: it can be that the commitments procedure should never be introduced when the initial intervention of the authority is efficient enough, even out of the complete deterrence situation.

5 Conclusion

In this paper we analyze the impact of the introduction of a commitments procedure in terms of procedural efficiency and deterrence. At the European level, this procedure consist in offering an immunity of fine to the firm in return for commitments that meet the competition concerns expressed to her. In any case, the firm has the trial as the outside option.

For that purpose we develop a simple model in which the firm decides whether to adopt a practice that harm consumers and, once audited, to choose

the trial or the commitments procedure. Starting from a small gain with the practice, we find that the firm chooses not to adopt it, then to engage in the practice but to propose commitments, and finally, for largest gains, to always choose the trial option expecting for discharge. In this setting, the set of types that propose commitments decreases with the audit technology and increases with the threat of the trial.

The introduction of such a procedure has three effects on the consumers' surplus. First, allowing for shortened proceedings, it permits some cases to be handled quickly in order to restore an higher consumers' surplus (the quickening effect). Second, while the illegal nature of an applied practice is only established in trial decisions, the competition authority may obtain some behavioral remedies where a discharge in trial is possible (the insurance effect). Finally, under asymmetric information, given that commitments imply an immunity of fine, the authority also incite some types of firm to engage in the practice while they would have not initially (loss of deterrence).

We then provide a sufficient condition under which the authority should always make some use of the commitments procedure. Indeed, when the authority introduces this procedure in few cases, it only looses the deterrence of few types of firm but obtains the the quickening and insurance effects in more cases. The interest of commitments is then subject to the fact that firms engaging now in the practice do not harm consumers too strongly.

We also show that, when the harm to consumers increases with the gain of the firm, commitments are always accepted but that trial remains an active procedure given that commitments are indivisible. If the harm to consumers decreases with the gain of the firm, with efficiency gains for example, only the trial is active. Finally, with non monotonic relations, a stochastic use of commitments may be optimal.

Finally, it appears that the commitments procedure is not always an alternative to a lack of efficiency of the intervention of competition authorities. Indeed, we have found that a weak threat in trial can reduce the interest of commitments, even though an immunity is obtained in exchange for an interruption of the practice.

An interesting research perspective is related to the case where the firm still has to pay a certain amount of fine while committing or that partial commitments may be negotiated. This is sometimes the case in consent decrees decisions of the US Department of Justice. In that sense, it would be interesting to compare the European and American approach of commitments in antitrust. However, we also think to the no-contest procedure of the French competition law where substantial commitments are asked to obtain a partial reduction of the fine. These cases are let for future research.

6 Appendix

6.1 Comparative Statics of Proposition 4

We have:

$$CS(1) - CS(0) = -\left[\delta_1 + (\delta_2 + \delta_3)(1-\alpha)\right] \int_0^{\Delta^0} h(\Delta) d\Delta$$

$$+\alpha\left[\delta_2+\delta_3(1-\beta))\right]\int_{\Delta^0}^{\Delta^r}h(\Delta)d\Delta$$

Hence, the derivatives of $CS(1)-CS(0)$ w.r.t. the different parameters can be written as follows.

Concerning δ_1, we find the following expression:

$$\frac{\partial[CS(1)-CS(0)]}{\partial\delta_1}=\int_0^{\Delta^0}[h(\Delta^0)-h(\Delta)]d\Delta$$

where a sufficient condition for this derivative to be negative is that $h(\Delta)$ is increasing on $[0,\Delta^0]$. In that case, the longer the period before a possible audit, the more the authority is likely to choose $x^*=1$. Note that the fact that $h(\Delta)$ increases on $[0,\Delta^0]$ means that the authority prefers the deterrence of the associated largest Δ-types.

In addition, one can find the following link between $CS(1)-CS(0)$ and δ_2:

$$\frac{\partial[CS(1)-CS(0)]}{\partial\delta_2}=\int_0^{\Delta^0}[h(\Delta^0)-h(\Delta)]d\Delta+\int_{\Delta^0}^{\Delta^r}[h(\Delta)-h(\Delta^r)]d\Delta$$

where a sufficient condition for this derivative to be positive is that $h(\Delta^0)$ is the maximum of $h(\Delta)$ on $[0,\Delta^r]$.

Under the assumption that $h(\Delta^0)>h(\Delta^r)$, we find that an increase of the fine F decreases $CS(1)-CS(0)$:

$$\frac{\partial[CS(1)-CS(0)]}{\partial F}=\alpha\beta\delta_3[h(\Delta^r)-h(\Delta^0)]$$

Hence, for these three parameters, when $h(\Delta^0)$ is the maximum of $h(\Delta)$ on $[0,\Delta^r]$, it is possible to say that trial and commitments are substitutes.

However, even under this condition, audit and conviction probabilities may induce a complementarity result.

Indeed, the derivative of $CS(1)-CS(0)$ w.r.t. α is positive if and only if:

$$(\delta_1+\delta_2+\delta_3)\Delta^0h(\Delta^0)+\delta_3\alpha\beta\int_{\Delta^0}^{\Delta^r}h(\Delta)d\Delta<(\delta_2+\delta_3)\alpha\int_0^{\Delta^r}h(\Delta)d\Delta$$

The derivative of $CS(1)-CS(0)$ w.r.t. α is positive if and only if:

$$(\delta_1+\delta_2+\delta_3)\Delta^0h(\Delta^0)+\delta_3\alpha\beta\int_{\Delta^0}^{\Delta^r}h(\Delta)d\Delta<(\delta_2+\delta_3)\alpha\Delta^rh(\Delta)d\Delta$$

6.2 Comparative Statics of Proposition 5

We know that the optimal probability, x^*, is such that $h(\Delta^d(x))$ is equal to the mean value of $h(.)$ on $[\Delta^d(x),\Delta^r]$, that is:

$$\int_{\Delta^d(x)}^{\Delta^r}\left[h(\Delta)-h(\Delta^d(x))\right]d\Delta=0$$

To define the derivatives of x^* w.r.t. the different parameters, it is useful to define the partial derivative of $\Psi(\delta_1, \delta_2, \delta_3, \alpha, \beta, F, x^*)$ w.r.t. x^*, where $\Psi(.)$ is defined as follows:

$$\Psi(\delta_1, \delta_2, \delta_3, \alpha, \beta, F, x^*) = H(\Delta^r) - H(\Delta^d(x^*)) - h(\Delta^d(x^*))(\Delta^r - \Delta^d(x^*)) = 0$$

Hence, we have:

$$\Psi'_x(\delta_1, \delta_2, \delta_3, \alpha, \beta, F, x^*) = -\frac{\partial \Delta^d(x^*)}{\partial x^*} h'(\Delta^d(x^*))(\Delta^r - \Delta^d(x^*))$$

which is strictly negative given that $\partial \Delta^d(x^*)/\partial x^* < 0$, and that $h'(\Delta^d(x^*)) < 0$.

It immediately follows that x^* will vary with parameters i, for $i \neq x^*$, as $\Psi(.)$ varies with i, given that:

$$\frac{\partial x^*}{\partial i} = -\frac{\Psi'_x(\delta_1, \delta_2, \delta_3, \alpha, \beta, F, x^*)}{\partial \Psi'_i(\delta_1, \delta_2, \delta_3, \alpha, \beta, F, x^*)}$$

With the following derivatives, it is possible to say that trial and commitments are complementary tools, in the sense that more efficient investigation and prosecution impliy an higher probability of a preliminary assessment.

Indeed, for parameters $a \in \{\delta_1, \alpha\}$ that are used in the definition of $\Delta^d(x^*)$, we find that:

$$\Psi'_a(\delta_1, \delta_2, \delta_3, \alpha, \beta, F, x^*) = -\frac{\partial \Delta^d(x^*)}{\partial a} h'(\Delta^d(x^*))(\Delta^r - \Delta^d(x^*))$$

Hence, when δ_1 increases, we find that x^* decreases, given that $\partial \Delta^d(x^*)/\partial \delta_1 < 0$. On the opposite, a higher α makes more probable the use of the commitments procedure.

For parameters $b \in \{\delta_2, \delta_3, \beta, F\}$ that are used in the definition of Δ^r and $\Delta^d(x^*)$, we find that:

$$\Psi'_b(\delta_1, \delta_2, \delta_3, \alpha, \beta, F, x^*) = \frac{\partial \Delta^r}{\partial b}[h(\Delta^r) - h(\Delta^d(x^*))] - \frac{\partial \Delta^d(x^*)}{\partial b} h'(\Delta^d(x^*))(\Delta^r - \Delta^d(x^*))$$

By definition of $\Delta^d(x^*)$, such that $h(\Delta^d(x^*)) < h(\Delta^r)$, it appears that an increase of δ_2 decreases x^*, while δ_3, β, and F increase that probability.

7 References

Aubert C., Rey P., Kovacic W. (2006), "The Impact of Leniency and Whistleblowing Programs on cartels", International Journal of Industrial Organization, 6 pp. 1241-1266.

Bebchuk L. (1984), "Litigation and Settlement Under Imperfect Information", RAND Journal of Economics, 15 pp. 404-415.

Chu C. and Chien H. (2007), "Asymmetric Information, Pretrial Negotiation and Optimal Decoupling", International Review of Law and Economics, 27 pp. 312-329.

Cook C. (2006), "Commitment Decisions: The Law and Practice under Article 9", World Competition 29 pp. 209-228.

Daughety A. and Reinganum J. (2003), "Found Money? Split-award Statu-tes and settlement of punitive damages cases", American Law and Economics Review, 5 pp. 134-164.

Daughety A. and Reinganum J. (2005), "Economic Theories of Settlement Bargaining", Annual Review of Law and Social Science, 1 pp. 35-59.

Daughety A. and Reinganum J. (2008), "Settlements", forthcoming in the Encyclopedia of Law and Economics (2nd Ed.), Vol. 10: Procedural Law and Economics, Ed. by C. Sanchirico, to be published by Edward Elgar.

Fenn P. and Veljanovski C. (1988), "A Positive Economic Theory of Regulatory Enforcement", The Economic Journal, 393 pp. 1055-1070.

Furse M. (2004), "The Decision to Commit: Some Pointers from the US", European Competition Law Review, 1 pp. 5-10.

Franzoni L. (1999), "Negotiated Enforcement and Credible Deterrence", The Economic Journal, 109 pp. 509-535.

Gould J. (1973), "The Economics of Legal Conflicts", Journal of Legal Studies, 2 pp. 279-300.

Grossman G. and Katz M. (1983), "Plea Bargaining and Social Welfare", American Economic Review, 73 pp. 749-757.

Harrington J. (2008), "Optimal Corporate Leniency Programs", The Journal of Industrial Economics, 56 pp. 215-246.

Kobayashi B. (1992), "Deterrence with Multiple Defendants: An Explication for "Unfair" Plea Bargaining", The RAND Journal of Economics, 23 pp 507-517.

Landes W. (1971), "An Economic Analysis of the Courts", Journal of Law and Economics, 14 pp. 61-108.

Miceli T. (1996) "Plea Bargaining and Deterrence: An Institutional Approach", European Journal of Law and Economics, 3 pp. 249-264.

Motta M. and Polo M. (2003), "Leniency Programs and Cartel Prosecution", International Journal of Industrial Organization, 21 pp. 347-379.

Posner R. (1973), "An economic approach to legal procedure and judicial administration", Journal of Legal Studies, 2 pp. 399-458.

Polinsky M. and Che Y. (1991), "Decoupling liability: Optimal incentives for care and litigation", RAND Journal of Economics, 22 pp. 562-570.

Polinsky M. and Rubinfeld D. (1988), "The deterrent effects of settlements and trials", International Review of Law and Economics, 8 pp. 109-116.

Reinganum J. (1993), "The Law Enforcement Process and Criminal Choice", International Review of Law and Economics, 13 pp. 115-134.

Reinganum J. and Wilde L. (1986), "Settlement, litigation, and the allocation of litigation costs", RAND Journal of Economics, 17 pp. 557-566.

Shavell S. (1982), "Suit, settlement and trial: a theoretical analysis under alternative methods for the allocation of legal costs", Journal of Legal Studies, 11 pp. 55-81.

Shavell S. (1989), "The sharing of information prior to settlement or litigation", RAND Journal of Economics, 20 pp. 183-95.

Shavell S. (1993), "Suit versus Settlement When Parties Seek Nonmonetary Judgments", Journal of Legal Studies, 22 pp. 1-13.

Spier K. (1997), "A Note on the Divergence between the Private and the Social Motive to Settle under a Negligence Rule", Journal of Legal Studies, 2 pp. 399-458.

Spier K. (2007), "Litigation", In Handbook of Law and Economics, Ed. Polinsky and Shavell, 1 forthcoming, Elsevier.

Vialfont A. (2007), "Le droit de la concurrence et les procédures négociées", Revue Internationale de Droit Economique, 2 pp. 157-184.

Vialfont A. (2008), "Leniency and Commitments in Antitrust", mimeo, Laboratoire d'Economie Industrielle.

Wils W. (2006), "Settlements of EU Antitrust Investigations: Commitment Decisions under Article 9 of Regulation No. 1/2003", world Competition 29 pp. 345-366.