

Chapter 15

Deterrence in Competition Law*

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Abstract

This chapter provides a comprehensive discussion of the deterrence properties of a competition policy regime. On the basis of the economic theory of law enforcement, we identify several factors that are likely to affect its degree

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of deterrence: (1) sanctions and damages; (2) financial and human resources; (3) powers during the investigation; (4) quality of the law; (5) independence; and (6) separation of power. We then discuss how to measure deterrence. We review the literature that use surveys to solicit direct information on changes in the behavior of firms due to the threats posed by the enforcement of antitrust rules, and the literature based on the analysis of hard data. Finally, we argue that the most challenging task both theoretically and empirically is how to distinguish between “good” and “bad” deterrence.

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1. Introduction

Deterrence is a central theme in the theory and the practice of law enforcement; the enforcement of competition law is no exception. Laws are enacted in order to influence behavior such that socially undesirable conduct is not undertaken. A law enforcement system that “taxes” agents for undertaking unlawful behaviors, but is not able to prevent them, represents a waste of resources from an economic point of view as law enforcement is costly. It requires resources to monitor agents’ behaviors, to detect infringements, to prove violations, and to inflict punishments. These resources might be devoted to other aims. Moreover, the sanction imposed on apprehended wrongdoers is, at best, a mere transfer that does not improve social welfare. If these costly activities and transfers do not modify the rate at which agents undertake harmful actions — i.e., do not deter other infringements — society does not directly benefit from them.¹

These statements are not new. They date back to the insights of 18th century thinkers like Montesquieu, Beccaria, and Bentham. A large literature, developed from these first contributions, analyses how to obtain optimal deterrence in the enforcement of the law, as well as a literature that

¹There are indirect social benefits of law enforcement that may accrue even without deterrence, including restitution to victims (were possible) and re-establishment of justice (important because citizens have preferences for justice), but these are unlikely to justify the large economic costs involved in the public enforcement of the law. Moreover, Bageri *et al.* (forthcoming) show that non-detering antitrust sanctions can distort economic activity and increase the deadweight loss from anticompetitive behaviors, even in the absence of mistakes in the relevant decisions.

1 specifically focuses on deterrence in the implementation of competition
 2 law. This literature deals with the use of criminal sanctions,² the optimal
 3 level of fines,³ the contribution of private litigation and damage suits to
 4 the achievement of the public goals pursued by competition law,⁴ the
 5 implications for deterrence of leniency policies,⁵ and the optimal design of
 6 merger policy.⁶

7 This chapter provides an overview of the key determinants of deterrence
 8 in the realm of competition law and its enforcement. The aim is to
 9 systematize the existing contributions on the deterrence properties of a
 10 competition policy regime in order to provide a general overview of the
 11 literature highlighting its key results and the areas that could benefit from
 12 further research and analysis. Section 2 briefly discusses the economic
 13 theory of optimal deterrence and of its determinants, distinguishing between
 14 general deterrence and specific deterrence, as well as identifying the cases
 15 in which the enforcement activity generates over-deterrence. Section 3
 16 examines how these general findings apply to competition law and policy.
 17 It argues that deterrence is affected by three main factors: (a) the level
 18 of the loss incurred by those that infringe the law and are detected and
 19 convicted; (b) the (perceived) probability of being detected and convicted;
 20 and (c) the (perceived) probability of being wrongly convicted or acquitted.
 21 The same section analyses which institutional and enforcement features of
 22 a competition policy regime affect these three factors. Section 4 deals with
 23 the problem of how to measure deterrence. Section 5 presents our main
 24 conclusions.

²See Landes (1983), Werden and Simon (1987), Gallo *et al.* (1994), Kobayashi (1994), Wils (2006a), and Spagnolo (2006).

³See Buccirossi and Spagnolo (2007), Connor (2005), Craycraft *et al.* (1997), Geradin and Henry (2006), and Wils (2006b).

⁴Wils (2003).

⁵See Motta and Polo (2003), Aubert *et al.* (2006), Spagnolo (2004), Spagnolo (2008), and Harrington (2008).

⁶See Sørsgard (2009), Seldeslachts *et al.* (2009), and Duso *et al.* (2013). Although Nocke and Whinston (2010, 2013) do not directly talk about deterrence, their framework explicitly takes into account that current merger policy decisions affect the profitability and type of potential future mergers in a dynamic setting.

2. The Notion of Deterrence

2.1. General and specific deterrence

Deterrence of unlawful behavior may take different forms.⁷ The most relevant ones are: *general deterrence* and *specific deterrence*.

General deterrence, also referred to as *ex-ante* deterrence, consists in preventing agents from undertaking illegal behaviors by threatening violators with sufficiently heavy sanctions. The optimal level of general deterrence, from an economic point of view, is achieved when only those conducts that cause a harm to society that is larger than the net gain that accrues to the wrongdoers, are prevented. If the enforcement costs are zero and there is perfect and symmetric information, this level of deterrence can be obtained by setting the actual sanction, S , and the perceived probability of being detected and convicted, a , at a level such that the expected sanction, S^*a , equals social harm, H :

$$S^*a = H. \quad (1)$$

This simple rule, also known as Becker's rule,⁸ implies that for all those conducts that are socially inefficient — in that the wrongdoer's gain (G) is lower than the social harm — the expected sanction is greater than the gain (i.e., $S^*a > G$). Therefore, the level of the expected sanction is such that potential wrongdoers are discouraged from undertaking these conducts, as their expected payoff would be negative. On the contrary, all the socially efficient conducts, for which the wrongdoer's gain is larger than the social harm, will be undertaken, as the expected sanction is lower than the gain (i.e., $S^*a \leq G$). In a nutshell, Becker's rule sets the sanction so that it induces the offenders to internalize the social costs of their actions, and in a world with no enforcement costs and perfect information it ensures *ex-ante* deterrence of *all* socially inefficient acts.

Another important form of deterrence is *specific* deterrence, sometimes called *desistance*. This form of deterrence takes place *ex-post*, i.e., after

⁷For an in-depth criminological discussion of the different forms of deterrence for various types of unlawful behaviors, see Bernard *et al.* (2001). For a review of the basic theory of deterrence, see Shavell (2003). For an extensive discussion of deterrence in the context of competition policy, see Buccirossi and Spagnolo (2007) and Davies and Osmosi (2012).

⁸The design of the optimal sanction is one of the key results of Becker (1968) seminal paper.

1 an unlawful behavior has taken place and been discovered by the law
 2 enforcement agency. This form of deterrence works through a change in
 3 the information held by the agents. For example, if agents do not have
 4 perfect knowledge of the probability of being detected and convicted, i.e.,
 5 a in (1), being caught and punished provides them with new information to
 6 update their expectations.⁹ The very experience of being sanctioned may
 7 also have the effect of deterring further wrongdoing through the so-called
 8 *punishment-induced deterrence*, which represents a behavioral increase in
 9 the salience of the expected sanction.¹⁰

10 General deterrence is typically the primary objective of law enforce-
 11 ment, as it can be achieved for a very large number of potential infringe-
 12 ments without the need for these to be detected by law enforcers. This
 13 allows saving on a number of costs: the costs of the budgets of the courts
 14 and agencies involved in the investigation and prosecution of the alleged
 15 illegal behavior, the cost of the distortionary taxation required to finance
 16 these budgets, the private costs of litigation, and the social and private
 17 costs of imposing sanctions on the convicted parties. In addition, general
 18 deterrence avoids the damages that each illegal action would have caused,
 19 had it not been prevented. Hence, the most important part of the activity of a
 20 law enforcement agency, whose aim is to maximize social welfare, should
 21 consist in deterring violations, rather than in identifying and punishing
 22 wrongdoers. In an ideal world, this activity should be sufficient to control
 23 all misconducts, making desistance unnecessary.

24 2.2. Over-deterrence

25 The optimal level of *ex-ante* deterrence should not only ensure the
 26 prevention of all illegal and socially inefficient actions, but it should
 27 also avoid stopping agents from undertaking actions that improve social

⁹Specific deterrence can also operate through a change in the costs and/or benefits of committing an additional crime, when the legal system contemplates increased sanctions for repeat offenders, incapacitation (by imprisonment or disqualification), and special monitoring of convicted wrongdoers; see Stigler (1970), Rubinstein (1979), Polinsky and Rubinfeld (1991), Chu *et al.* (2000), and Emons (2007).

¹⁰This punishment-induced deterrence effect has been quantified recently in a field experiment on videotape rental by Fishman and Pope (2006).

welfare. In other words, *ex-ante* deterrence, to be at its optimal level, should never become *over-deterrence*. Over-deterrence takes place when the expected sanction is too high, thus stopping agents from choosing courses of action whose gain is actually higher than the harm they cause to society (i.e., $a^*S > H$). Over-deterrence can occur either when the sanction has been set at too high a level,¹¹ or when the enforcement effort, which determines the level of the probability of being caught and convicted, is excessive.¹²

2.3. *Deterrence in a more complex world*

Becker's rule guarantees the optimal level of *ex-ante* deterrence, but only in a world of perfect information and with no enforcement costs. Over the years, this rule has been refined by a series of contributions that have considered what happens if one relaxes these conditions. In their encompassing survey of the economic literature on the enforcement of law, Polinsky and Shavell (2000) suggest that sanctions should be set so as not to deter all inefficient conducts since the investigation of alleged crimes and the imposition of sanctions has a cost. Sanctions should be set only up to the point at which the harm caused to society by these conducts is larger than the gain that accrues to the wrongdoer plus the value of the resources saved by not enforcing the law.

If one considers that information is difficult and costly to obtain and, thus, that law enforcement agencies may make mistakes when investigating potential crimes, the probability of these errors should be considered when setting the optimal level of the sanction. Indeed, the enforcement agency's errors increase the incidence of unlawful behaviors for two reasons.¹³ First, and most obviously, if agents are aware that the agency may acquit wrongdoers (i.e., it commits a type I error), the perceived and

¹¹In the case of anticompetitive behaviors, this can happen as the loss an agent incurs is actually given by the sum of "sanctions" imposed by different bodies, which do not coordinate their decisions (e.g., the fines imposed by the competition authority and the private damages awarded by the court).

¹²With regard to the EU, over-deterrence does not seem to be a problem since legal actions for private damages are still rare and the fines imposed on misbehaving firms appear to be too low, see Waelbroeck *et al.* (2004), Veljanovski (2007) and Schinkel (2007).

¹³See Shavell (2003); Polinsky and Shavell (2000); Buccirossi *et al.* (2006b).

1 actual probability of being punished when behaving unlawfully diminishes,
 2 leading to lower expected sanctions. Second, if agents are aware that they
 3 risk to be unjustly sanctioned despite having complied with the law (i.e.,
 4 if type II errors happen), the gain from illegal actions increases relative
 5 to legal ones, reducing the deterrence effects of sanctions. Hence, if the
 6 enforcement agencies make mistakes, optimal sanctions should be higher
 7 than the Beckerian level.

8 If ε_I and ε_{II} respectively indicate the probability that the enforcement
 9 agency incurs in type I and type II errors, the optimal sanction should then
 10 satisfy the following adjusted Becker's rule:

$$S^*a(1 - \varepsilon_I - \varepsilon_{II}) = H.$$

11 Clearly, if the enforcement agency makes too many mistakes, it is instead
 12 optimal to not enforce the law at all (when $1 - \varepsilon_I - \varepsilon_{II} < 0$). Since
 13 information is costly and difficult to obtain, agents may also commit errors
 14 in assessing the level of the sanction they could incur when undertaking a
 15 specific behavior.

16 Errors can also be committed by the agents when trying to forecast
 17 the effects of their actions and, thus, the reaction of the enforcement
 18 agency. This is especially true when behaviors have complex economic
 19 effects, as assessing whether they are actually illegal may be difficult both
 20 for the enforcement agency and for the agents undertaking them. The
 21 complexity of the evaluation of the effects imply that a firm may be deterred
 22 from undertaking a perfectly competitive behavior under the mistaken
 23 assumption that it is illegal or because it could be perceived as illegal,
 24 in which case general deterrence generates a reduction in social welfare.
 25 Similarly, a firm may undertake an anticompetitive behavior because it
 26 believes that it is not in breach of the law. If such errors are possible,
 27 general deterrence becomes less effective and *ex-post* intervention becomes
 28 necessary.

29 This line of reasoning suggests a competition policy regime needs
 30 to rely on a mixture of *ex-ante* and *ex-post* deterrence.¹⁴ The relative

¹⁴See Duso *et al.* (2007) and Buccirosi *et al.* (2006a). However, the recent theoretical analysis by Sørgaard (2009) suggests that taking into account the likely deterrence effects of merger control should lead to a rather different interpretation of the results of studies

1 magnitude of the two should depend on the type of illegal behavior. For
 2 example, in the case of cartels, it is hard for companies to make mistakes
 3 when evaluating the possible effects of such a practice.

4 **2.4. Deterrence of anticompetitive behaviors:** 5 ***firms rather than individuals***

6 Since Becker's contribution, competition law enforcement and optimal
 7 deterrence of anticompetitive behaviors have become specific research
 8 subjects, which have gone well beyond adapting the results obtained by
 9 the economic theory of the public enforcement of law.

10 One reason behind the development of a specific literature on enforce-
 11 ment of competition law is that the design of the system that ensures optimal
 12 deterrence is complicated by the fact that the potential violators are both
 13 individuals and firms.¹⁵ Hence, there are a number of additional factors that
 14 have to be taken into account in such cases. For example, fines — against
 15 firms and individual employees — can be relatively less effective than the
 16 imprisonment of managers, because firms are protected by limited liability
 17 and they can easily indemnify managers by paying their fines when they
 18 acted in the interest of the firm.¹⁶ On the other hand, in setting the optimal
 19 sanction against corporations, one should consider that firms can also be
 20 sanctioned by the market and may be required to pay private damages
 21 (in some cases, treble damages).¹⁷ In addition, anticompetitive behaviors
 22 may not stem from calculated profit-seeking decisions at firm level, but may
 23 result from the presence of a principal–agent problem between shareholders

on the *ex-post* evaluation of merger control decisions. If competition policy is effective, it deters *ex-ante* the clearly anticompetitive mergers, leaving those that are more difficult to evaluate and for which errors are more likely to the scrutiny of competition authorities. This is the expected effect for an effective merger control policy, which deters all clearly anticompetitive mergers and focuses its investigations on difficult cases. Recently, analyses of deterrence in merger control have also been attempted. See for instance Seldeslachts *et al.* (2009), Clougherty and Seldeslachts (2013), and Duso *et al.* (2013).

¹⁵This is actually true for all corporate crimes.

¹⁶See Beckenstein and Gabel (1982); Kobayashi (2002); Spagnolo (2000; 2005).

¹⁷For an overview of these principal agent issues for cartel deterrence, see Buccirossi and Spagnolo (2008). And for an illuminating formal treatment of the issue see Aubert *et al.* (2006).

1 and managers, as well as between managers and their subordinates.¹⁸
 2 Firms try to prevent these occurrences through compliance systems and
 3 changes in decision-making practices. Yet, these activities have a cost
 4 that should be taken into account when determining the optimal level of
 5 deterrence.¹⁹

6 It should also be considered that very high fines may jeopardize a
 7 firm's financial stability, in which case, they may run against the ultimate
 8 goal of competition law: welfare maximization. This consideration is
 9 often mentioned in policy debates, as there is a common perception that
 10 future competition should increase with the enforcement effort, and that
 11 the number of active competitors might be a proxy for the degree of
 12 competition. This perception may render very high fines not credible, as
 13 agencies and judges may choose not to apply (or to reduce) them when
 14 they can seriously jeopardize the existence of a firm. This lack of credibility
 15 could in turn reduce their deterrence effect.²⁰ The argument on bankruptcy
 16 further affecting — i.e., on the top of the impact of the anticompetitive
 17 behavior — the level of competition in the market and the policy it appears
 18 to foster has, however, severe limitations. As discussed by Buccirossi and

¹⁸Buccirossi and Spagnolo (2008) argue that if firms become liable for sufficiently high fines, directors should be induced to choose, within their compliance efforts, those executive contracts that deter management from undertaking illegal actions, even if these increase profit. However, as noted in Harrington (2006), in most cartel cases prosecuted in Europe, the illegal agreement was decided at the top management level and that almost no CEO has been fired after their firm was convicted for price fixing. This suggests that in Europe, corporate governance systems are not yet designed to dissuade top management from undertaking anticompetitive behaviors. A likely reason for this is that fines and other sanctions have been too low in Europe, making anticompetitive agreement a profitable undertaking for both agents/managers and principals/shareholders.

¹⁹Kobayashi (2002) claims that if sanctioning tools were further strengthened in the US, where actual fines are high and treble damages can be imposed on misbehaving firms, the result could be higher prices for consumers and a decrease in social welfare. The reason is that, even if large *ex-ante* penalties can increase *ex-ante* deterrence, they also induce corporations to incur higher precaution and avoidance costs up to a point where they become excessive relative to social gain they bring about, i.e., they can induce over-enforcement.

²⁰Craycraft *et al.* (1997) find evidence that courts act according to the idea that bankruptcy should be avoided and reduce fines when a firm's ability to pay appears low. They also find that, in the majority of the US cases they analyzed, firms were imposed fines that were only a fraction of the optimal cartel-deterring Beckerian ones, even though these could have afforded to pay them from their normal cash flow.

1 Spagnolo (2007), there are a number of qualifications needed when arguing
2 for caps on antitrust fines that ensure the financial survival of firms. For
3 example, if this concern causes fines to be set at too low a level to have a
4 deterrence effect, it may be more costly to society than the risk of driving
5 a few convicted firms bankrupt with higher fines.

6 Moreover, competition law exists to deter anticompetitive behaviors in
7 all industries. If, for instance, high “optimal” fines lead to the bankruptcy
8 of some convicted firms in an industry, this may temporarily decrease
9 the number of firms in that particular industry but it may also increase
10 competition in other industries through the *ex-ante* general deterrence effect
11 generated by these fines.

12 In addition, if bankruptcy procedures are efficient, the impact of the
13 financial failure of some convicted firms on competition may be small
14 or even positive. Since the firms driven bankrupt by a fine should be
15 economically sound, they might be sold to new owners who can use the
16 same assets to enter the market and increase again the degree of competition.

17 Most importantly, linking fines to the firms’ ability to pay — so as
18 to always avoid bankruptcy, as is apparently done by US courts, entails
19 a double risk. It can generate distorted incentives for compliance for
20 wrongdoers who only differ in their financial situation. Moreover, it might
21 induce firms to issue more debt to reduce their (apparent) ability to pay and,
22 thereby, the level of the expected fines.²¹ Such a policy would add to the
23 social costs of reducing deterrence by limiting the level of the sanctions for
24 competition law violations and by inducing firms to adopt an inefficient
25 financial structure. With the introduction of new competition policy
26 instruments such as leniency programs and rewards for whistleblowers,
27 the issue of firms’ limited ability to pay may however lose bite. Buccirossi
28 and Spagnolo (2007) show through a set of simulations that in the presence
29 of well-designed and consistently/parsimoniously administered leniency
30 and whistleblower reward programs, the deterrence effect of fines increases
31 substantially: too generously administered programs of this kind will clearly
32 reduce deterrence and welfare, though they may make the work of a
33 competition authority much easier.

²¹This seems to have already happened in the US with taxi companies trying to limit their liability toward victims of car accidents (e.g., Che and Spier, 2006).

3. The Determinants of Deterrence in Competition Law

Section 2 highlights a key point: both “good” deterrence and “bad” deterrence (i.e., over-deterrence) exist. Good deterrence prevents firms from adopting conduct that, by impairing competition, reduces welfare; while bad deterrence, or over-deterrence, prevents firms from behavior that, by enhancing competition, improves social welfare. A competition policy regime is more effective the higher its level of good deterrence and the lower its level of bad deterrence.

As shown by the previous analysis, both good and bad deterrence depends on three general features of the competition legislation and its enforcement:²²

1. the level of the loss that firms and their managers expect to suffer if they are convicted (rightly or wrongfully);
2. the perceived probability of wrongdoers being detected and convicted; and
3. the perceived probability of being wrongly convicted.

It is now important to understand which features of a competition policy regime (i.e., which policy variables) influence the level of deterrence, by affecting these factors. In what follows, we identify and discuss the six sets of policy variables that we believe affect the three key elements of deterrence just listed, which are:

1. The level of the loss incurred as a consequence of the competition law infringements;
2. the human and financial resources employed for detecting violations by the Competition Authority (CA) (or the court);
3. the powers to investigate held by the CA (or the court);
4. the quality of the law;
5. the level of independence of the CA (and of the court); and
6. the degree of separation between the investigator and the prosecutor.

²²There are other factors that may be relevant, of course, including the degree of uncertainty on the level of the sanctions and, in the case of cartels, the risk of being betrayed by participant rather than discovered by the CA. However, we have chosen to restrict our focus to those we believe to be the main factors, which are the ones outlined above.

3.1. Features that affects the expected level of the loss: sanction policy, damages, settlements, and market reaction

The factors that influence the level of the loss that a firm expects to incur if it is found guilty of violating the competition law are: the sanction policy followed by the CA (or the court), the existence and extent of private litigation and, hence, of private damages; and the reactions of the market.

The feature of a competition law regime that has the most evident impact on the level of the loss is the sanction policy. The sanction levied by a CA and/or a court (e.g., fine or imprisonment) for a breach of competition law has a clear and direct impact on the loss suffered by a convicted firm and its executives. Hence, the level and the nature of the sanctions that can be imposed on the firms guilty of breaching competition law and on their managers considerably affect the behaviors these undertake.

In a world with imperfect information, the expectations on the level and nature of the sanctions, and not just what these actually are, play also an important role. These expectations depend on the practice of the CA (or the court) and on degree of transparency of the sanction policy. The availability of clear and detailed guidelines on how sanctions are set, as well as of previous reasoned decisions can have a strong influence on these expectations.

The loss a firm incurs when it is found guilty of a competition law violation also includes the damage repayments to the affected parties it expects to have to pay. These depend on the extent to which private litigation is possible, on the conditions under which litigation can be started as well as on the limit to the amount and type of damages that can be requested.²³ The possibility to settle the case — both with respect to an investigation of the CA (or the court) or to a private damage action — can also influence the expected loss.²⁴

²³For example, in some countries, no class action from consumers and/or small firms is possible, or an action for damages can only be started when the CA has ascertained the existence of a competition law violations. Similarly, in some countries, treble damages are awarded or the passing on defense is not allowed. All these features of the private litigation regime considerably affect the amount of damages a firm can be expected to pay.

²⁴In some countries rather than settle with the CA, the latter can accept commitments and close the investigation.

1 A final element of this loss is the reduction in equity value or in market
2 share that the firm may expect to suffer. The latter comprises the loss of
3 customers who are unwilling to trade with a firm that has violated the law
4 and the loss of reputation among clients and/or input suppliers, while the
5 former represents the reduction in the stock market value of the firm's shares
6 (when this is quoted in the stock market) that may affect its ability to raise
7 capital.

8 It is important to note that it is the sum of all these costs, and not just
9 the sanctions imposed by a CA or a court, that is relevant because what
10 determines the behavior of a firm are the overall gains and losses imposed
11 by a given course of action with respect to alternative ones.²⁵

12 It is also important to highlight that the level of the loss depends on
13 two elements: the law on the books and how it is enforced. The sanctions
14 imposed by the CA (or by a court) depend on the criteria set out in the law
15 regarding the type of sanctions and maximum level they can reach, and on
16 how these criteria are actually applied (i.e., enforcement). For instance, if
17 the monetary fine can reach up to 10% of the turnover of a firm, but no
18 fine of this level has ever been imposed, even when a serious breach of the
19 law takes place, firms will not expect to have to pay such a figure, despite
20 what the law says. Similarly, the damages a firm can be expected to pay
21 depend on whether it is legally possible to undertake a private enforcement
22 action, on the legal framework that discipline these actions (e.g., whether
23 class actions are possible or whether there is the treble damage rule) and
24 on how tough courts have been in their decisions.

25 From this consideration, it emerges that the characteristics of the
26 judicial system matter substantially, both in terms of the expected sanction
27 and of the threat represented by damages. Stock market reactions, instead,
28 only depend on the response of markets to the convictions. Therefore, they
29 do not depend on specific policy variables, but rather on a more diffuse set
30 of norms that may be influenced by many policies.

²⁵In some country, public enforcement and the risk of being imposed a sanction by a CA or a court, represent the major, if not the only loss, that a firm incurs when violating competition law, while in others, private enforcement and damage payments present the bulk of a loss a firm can face. The relative importance of the two varies across legal systems; countries and time (e.g., see the current increase in private damage actions in the European Union).

1 **3.2. Features that affect the probability of detection** 2 **and conviction**

3 The probability agents attribute to the occurrence of being apprehended
4 after breaching the law depends mostly on the policing activity of the CA.
5 This is affected by the amount of resources the CA devotes to this activity
6 and the investigative powers it holds.²⁶

7 3.2.1. Financial and human resources

8 The enforcement of competition law is a direct result of the quantity and
9 the quality of the financial and human resources that a CA can employ. The
10 greater the amount of the resources and the better their quality, the more
11 likely the competition authority is able to identify behaviors impairing
12 competition.

13 3.2.2. Powers during investigation

14 Another feature that affects the probability of detection and conviction
15 is the type of investigative powers held by the CA. The stronger these
16 powers, the better the information that the CA can gather. These powers can
17 include the ability to inspect the premises of the firm under investigation,
18 the ability to inspect private premises of their employees, the ability to
19 wiretap conversations, the ability to compel the investigated firms to provide
20 information, as well as the ability to compel third parties to cooperate with
21 the investigation.²⁷

²⁶We need to point out that some aspects of the sanction policy may also alter the probability of detection. This occurs through the leniency programs that grant immunity to those firms that reveal the existence of a cartel. One of the deterrence effects of leniency programs works exactly through a modification of the perceived probability that a cartel is uncovered by a CA, as the incentive firms have to cooperate with the enforcer improves the chance that the latter will discover illegal activities that would have remained unknown otherwise. See Buccirossi and Spagnolo (2007).

²⁷With respect to the financial and human resources and to the investigative powers, of course, we are not claiming that from a social point of view, it is optimal to set them at their maximum feasible level; we just maintain that there is a monotone positive relations between them and the (perceived) probability of crime detection.

3.3. *Features that affect the probability of errors*

The features discussed in the previous subsection are likely to affect not only the “quantity” of the enforcement activities but also their “quality.” If more accurate information is available, the CA is less likely to commit errors of both types (Lagerlöf and Heidhues, 2005). Some characteristics of the sanction policy can also improve the ability of the CA to meet the standard of proof needed to legally prove anticompetitive conduct. For example, leniency programs, when combined with adequate sanctions, can reduce the probability of errors. Full or partial leniency is usually granted if the self-reporting firm provides evidence that contributes to the formation of a legal proof of the agreement or that allows the CA to understand more clearly its functioning and its impact on the market. The evidence provided by the leniency applicant strengthens the case and reduces the probability that firms that are actually guilty are acquitted by the CA or in subsequent judgments.

The probability of errors depends on various features of a competition policy regime. The most important ones are: the quality of the law; the level of independence of the CA (and of the court); and the degree of separation between the investigator and the prosecutor. These are briefly discussed below.

3.3.1. *Quality of the law*

So far, we have defined deterrence and over-deterrence with reference to the prevention of conducts that reduce or enhance social welfare. However, these may not be the conducts that are declared illegal or legal by the competition legislation. Rules are imperfect and they can draw the boundary between legal and illegal conducts in a way that does not necessarily coincide with the boundary between socially-enhancing and socially-damaging behaviors.

The quality of the rules is a matter of judgment, which makes defining this policy variable extremely difficult. However, one can observe whether the competition legislation (and the soft law that disciplines its actual application, e.g., guidelines) has rules that make the division between legal and illegal conducts closer to their effect on social welfare, according to the prevalent economic theory. Key factors, for instance, are whether

the competition law allows an efficiency defense, whether the CA can consider non-economic goals in evaluating the effects of potentially abusive behaviors, whether an economic analysis of the effect of the behavior is required, whether the standard of proof is based on a rule of reason or a *per se* prohibition, whether state-controlled firms are exempted even when competition with private firms in the provision of commercial activities, and whether there is a general exemption for one or more industries.

3.3.2. Independence

A further relevant factor affecting the deterrence properties of competition policy regimes is the independence of the CA with respect to political or economic interests. A CA that makes its decisions by taking into account interests that are (potentially) in contrast with those that should guide its activity is more likely to commit both types of errors.²⁸

Important elements for determining the level of independence of a CA are its institutional status (i.e., whether it is a court, an independent public sector body, or a branch of a ministry) and whether the government has the power to over-rule a decision made by the CA or to block an investigation.

Ideally, one should consider not only the level of formal independence of a CA, i.e., as guaranteed by the legal framework, but also the level of effective independence, which depends on its actual ability to avoid interference and capture from the government or from the business community.

3.3.3. Separation of powers

A final relevant characteristic of a competition policy regime is the degree of separation between the body performing the investigation on an allegedly anticompetitive behavior and the one making the decision on whether

²⁸For discussion of the importance of having a CA that is independent of the government, see Rey (2003), Voigt (2009), Oliveira *et al.* (2005), OECD, (2005a, b) and Høj (2007). Moreover, a CA makes decisions that pursue its true objective if it is not influenced by the “regulated” firms, as argued by the vast literature on the so called “regulatory capture”; see Stigler (1971), Peltzman (1976), Posner (1971; 1974; 1975), Becker (1983), and Laffont and Tirole (1991).

1 this behavior should be sanctioned. The stronger the separation between
2 prosecutor and adjudicator, the more balanced the decision is likely to be.
3 This, in turn, reduces the probability of an error.²⁹ Similarly, it matters
4 whether the appeal court is a specialized body with competence only
5 on competition matters or whether it is the appeal body for all judicial
6 decisions, and how long the appeal procedures are (see OECD, 2005c).

7 **3.4. Conclusions on the determinants of deterrence**

8 We believe that the six sets of policy variables described in this section —
9 (1) sanction policy and damages; (2) financial and human resources;
10 (3) powers to investigate; (4) quality of the law; (5) independence; and
11 (6) separation of powers — represent the main institutional and enforce-
12 ment aspects on which the level of deterrence of a competition policy regime
13 depends.

14 There might be other determinants of deterrence that do not fall within
15 the six categories outlined. However, we believe that these are less important
16 and that the six areas listed are the ones that the CAs and courts, as well
17 as the legislators and governments, should focus in order to increase the
18 effectiveness of competition policy regimes.

19 The deterrence properties of a competition policy regime depend also
20 on the quality of the judiciary system and of the institutions in general, as
21 well as on the type of social norms that guide the conducts of the agents.
22 However, these are factors that are more difficult to modify and that are
23 shaped by circumstances. Hence, in this chapter, we focus on those factors
24 more directly linked to the competition policy regime and which are more
25 easily changed.

26 **4. Measuring Deterrence**

27 Measuring deterrence is an extremely difficult task because the deterrent
28 effect implies that firms choose a different behavior from the one they
29 would have adopted without competition legislation and enforcement. To
30 measure this effect, one would have to be able to determine the actions that

²⁹See Block *et al.* (2000), Dewatripont and Tirole (1999), Neven and Röller (2005), Duso *et al.* (2007), Posner (1988), and Wils (2004).

1 firms would have undertaken had they not been constrained by the risk of
2 a sanction, which means measuring the occurrence of certain events in a
3 pure and only hypothetical world (e.g., Davies and Ormosi, 2013).

4 Any researcher who wants to measure the level of deterrence of the
5 enforcement of a given law or regulation faces this type of problem because
6 it is impossible to directly observe intentions if these do not materialize
7 into actions. In some cases, it is possible to study how the number of
8 breaches has changed over time when there has been a change in the level
9 of the sanction, in the probability of detection or in the enforcement effort.
10 For example, if the length of the maximum imprisonment sentence for a
11 house theft is increased, it is possible to measure its deterrence effect by
12 measuring the change in the rate of break-ins. However, calculating the
13 rate of change is possible only if one has a reliable knowledge of the total
14 number of violations committed in a given period of time. In the case
15 of crimes like bank robberies or homicides, understanding if their total
16 number has changed is relatively easy because most of them are reported
17 to the police. The same does not apply to competition law breaches, a large
18 share of which might go undetected.

19 Among the different types of anticompetitive practices, cartels are the
20 most problematic because only a fraction of them are likely to be detected.
21 This is especially true when cartels take place in retail markets where it
22 is difficult for asymmetrically informed and often dispersed consumers to
23 determine whether they paid a competitive or a collusive price. Hence, the
24 level of deterrence on cartels cannot be measured by direct observation.

25 The abuses of a dominant position and anticompetitive agreements
26 other than cartels, instead, tend to be reported more often, because they
27 tend to affect a limited number of large players, who are generally aware
28 of the obligations imposed on dominant firms. However, because of the
29 difficulties faced by firms in judging whether a given behavior is pro- or
30 anticompetitive, there is a high risk of over-reporting.

31 As for anticompetitive mergers, if there is an obligation to notify, there
32 are data on the total number of mergers and on the share that are blocked.
33 In this case, direct observation of the degree of deterrence may be possible.
34 However, the number of blocked mergers may underestimate the number
35 of anticompetitive concentrations because a large share of mergers do not
36 yield the efficiency effects forecasted.

1 In conclusion, measuring the deterrence effect of competition policy
2 on the behaviors of firms and their managers is a rather complex task.
3 The remainder of this section reviews the literature on the subject. We first
4 examine those papers that tried to assess the deterrent effect of competition
5 policy on cartels and abuses, and then consider the papers on deterrence
6 and merger control policies.

7 **4.1. *Agreements and unilateral conducts***

8 There are very few studies that try to ascertain the level of compliance
9 with competition law, and hence its deterrence effect, and to understand the
10 factors that influence it. A large part of these are based on surveys of the
11 affected firms or of their legal advisors that attempt to measure the intentions
12 of firms and their managers with regard to anticompetitive practices and how
13 these have been altered by competition policy. These studies obtain mostly
14 qualitative results, but provide some useful insights on the determinants of
15 compliance with competition law.

16 Beckenstein and Gable (1986) provide the results of a survey of all
17 US antitrust practitioners (external and in-house ones) on changes in the
18 frequency of violations of the Sherman Act and on the causes that led
19 firms to commit them, as well as on the methods adopted by firms to
20 ensure compliance with the act. The responses refer to the period from
21 the late 1950s through the late 1970s. The survey did not report any major
22 change in the frequency of violations over time, even though the degree of
23 enforcement was seen as increasing. Further, the respondents perceived the
24 probability of a cartel being detected as much lower than the probability
25 that an attempt to monopolize was found out. The most powerful deterrence
26 instruments were considered to be the risk of imprisonment and the threat
27 of private suits for damages, followed by fines and the cost of the court
28 cases (which at the time was substantially smaller than today).

29 Around the same time, Feinberg (1985) explored the effects of the EU
30 competition policy on horizontal agreements and parallel imports in the
31 Member States, relying on an anonymous survey of the opinions of antitrust
32 practitioners based in Brussels. The survey was run in the early 1980s,
33 10 years after the European Commission introduced financial penalties for
34 breaches of Article 101 (at the time Article 81) and examined the changes
35 it brought about.

1 The key results reported by Feinberg are that the risk of being
 2 investigated and sanctioned by the European Commission was seen has
 3 having increased since the late 1970s and as having a deterrent value,
 4 but there was no agreement on whether antitrust violations were more or
 5 less common than 10 years before. He also found that the most common
 6 cause of anticompetitive behaviors was considered to be the pursuit of
 7 corporate gain. The suggestions put forward by the respondents to promote
 8 compliance were higher fines, greater encouragement of private damage
 9 suits, and imposition of penalties on the managers of the offending firms.

10 Nielsen and Parker (2005) followed a slightly different approach in
 11 that they surveyed the affected firms, rather than their advisors. The two
 12 authors describe the responses obtained from questioning a sample of
 13 Australian firms on their level of compliance with the Trade Practice Act
 14 (the Australian competition and consumer legislation). Their key findings
 15 are that most businesses claim a high degree of actual compliance with the
 16 Act and rate the threat of an enforcement action highly.

17 Nielsen and Parker also find that the level of compliance does not vary
 18 much across industries and that larger businesses exhibit a greater level of
 19 compliance and greater awareness of the rules than smaller firms do.

20 Some CAs are directing their attention to the issue of deterrence (see
 21 Section 4.2). The UK Office of Fair Trading (2007) ran a survey of antitrust
 22 lawyers and in-house legal advisors to assess the level of deterrence and
 23 over-deterrence that competition law enforcement generates in the UK, as
 24 well as the key factors that influence business compliance. The results of this
 25 research show that the deterrent effect in the UK is quite high, in particular
 26 for cartels and other anticompetitive agreements, but less so for abuses of
 27 a dominant position.³⁰

³⁰The study found that companies abandoned, or significantly modified, a large number of possible anti-competitive agreements and conduct because of the risk of being investigated. The survey of antitrust lawyers suggests that over the 2000–2006 period, the following ratios of agreements and initiatives were abandoned, or significantly modified relative to those which resulted in violations: cartels 5:1, commercial agreements 7:1, and abuses 4:1. The company survey produced significantly larger ratios: cartels 16:1, commercial agreements 29:1, and abuses 10:1, showing that external advice is sought only at a late stage in any business planning.

1 In both surveys, the respondents suggested improving the deterrence
2 aspect of competition law in the UK by spending more on publicity and edu-
3 cational campaigns, encouraging private damages actions, speeding up the
4 decision-making process, increasing the number of criminal prosecutions
5 for cartels, and strengthening the enforcement activity.

6 Another attempt to quantify the deterrent effect of competition policy
7 through a survey was made by the US Department of Justice (2000).
8 The authors conclude that if the Department stopped enforcing Section 1 of
9 the Sherman Act, there would be an estimated 150% increase in the number
10 of violations over the following five years and an increase (not quantified)
11 in their aggressiveness.

12 4.1.1. Assessing the deterrence effects of competition policy 13 on cartels using hard data

14 A few studies try to assess the deterrence effect on cartels using hard data.
15 An OFT commissioned study by Davies and Majumdar (2002) attempts
16 to quantify the deterrent effect of competition policy on cartels by relying
17 on empirical findings made in other studies. The two authors conclude
18 that, on the reasonable assumption that typical demand elasticities are less
19 than 8.5, competition policy has a substantial deterrent effect on cartels,
20 possibly leading to an actual price of about one-seventh of the full monopoly
21 price.

22 More recently, Brenner (2009)³¹ estimates the relationship between
23 leniency applications under the EU 1996 leniency notice, the size of the
24 fines actually imposed, and the duration of the investigations. The study
25 concludes that the EU leniency program had no significant effects on the
26 hazard rate at which cartels break down, nor on their expected duration.
27 Indeed, in 2002, the leniency notice was considerably revised.

28 Miller (2009) estimates the likely impact on deterrence of the unan-
29 ticipated introduction of a leniency program by looking at variation in
30 the number of cartels discovered. Miller applies his methodology to all
31 the cartel indictments that took place in the US between 1985 and 2005,
32 and finds that the introduction of the leniency program is likely to have

³¹ See also the methodological work of Harrington and Chang (2009).

1 considerably enhanced the ability of the Department of Justice to detect
2 and deter collusion. He estimates that over that period the cartel detection
3 rate increased by about 62%, and that the rate of cartel formation fell by
4 about 59%. Surprisingly, he also finds that the spike in cartel discovery
5 occurred slightly before the introduction of the leniency program, and
6 that the increased protection from damage suits for leniency applicants
7 (de-trebling of damages) and the strong increase in sanctions for other cartel
8 members, introduced by the Antitrust Criminal Penalty Enhancement and
9 the Reform Act in 2004, did not have any significant effect on the number
10 of cartels uncovered.

11 Ormosi (2013) adapts capture–recapture methods borrowed from the
12 ecology literature to present a simple and parsimonious tool to estimate
13 time-dependent cartel discovery rates. By allowing for heterogeneity across
14 firms, population dynamics, and time-dependence, the method allows to
15 make inference on cartel detection rates in quite general scenarios. The
16 basic idea of the method is to trap, mark, and release animals several times
17 and then to make inference on population parameters — e.g., size, capture,
18 and survival rates — by observing the proportion of “recaptured” animals.
19 The main result of this study is that cartel detection in the EU during the
20 1985–2009 period lies between 1/10 and 1/5 of the total number of existing
21 cartels.

22 **4.2. Mergers**

23 The deterrence effect of merger control policies is also studied through
24 surveys. Aaronson (1992) describes a survey of the Times top 500 firms,
25 conducted by Coopers and Lybrand in 1991, on their perception of the
26 activity of the UK CAs. From these results, he concludes that competition
27 policy has a low deterrent effect because of a combination of limited
28 knowledge of the rules among top managers and of lack of clarity about the
29 criteria followed by the two CAs in reaching decisions (both around 40%).

30 In 2005, the Dutch Competition Authority (NMa, 2005) studied the
31 nature and magnitude of the deterrence effect on mergers. Using a survey
32 of 16 competition lawyers, followed by a set of interviews with firms,
33 investment banks and private equity companies, they found that firms try
34 to predict and minimize interventions by the CA. A more recent study by
35 Baarsma *et al.* (2012) completed a similar survey for the Dutch competition

1 authorities and find some evidence that merger policy rarely seems to deter
2 over-deter, i.e., deter pro-competitive merger activity.

3 The OFT survey previously mentioned also included questions about
4 mergers. The survey of antitrust lawyers suggested that, over the 2004–2006
5 period, at least five proposed mergers were abandoned or modified for
6 each one merger blocked or remedied by one of the CAs. The survey also
7 suggested that a merger is more likely to be abandoned or modified if there
8 has been a recent inquiry by the Competition Commission in the sector.

9 4.2.1. Assessing the deterrence effects of merger 10 control using hard data

11 Very few papers try to assess the deterrence effects of competition policy
12 on mergers using hard data. Stigler (1966) performs an exercise of this
13 type in the mid-1960s. He found that the fraction of horizontal mergers
14 fell relative to that of conglomerate and vertical ones after the US merger
15 control procedure became tougher in the 1950s.

16 More recently Seldeslachts *et al.* (2009) focus on the impact of different
17 policy tools on the deterrence of mergers using a dataset on merger decisions
18 relative to the 1992–2003 period in 28 OECD countries. The measure
19 deterrence the authors analyze the change in the number of notified mergers
20 as a function of different merger policy actions. The main explanatory
21 variables are the number of “prohibitions”, the number of “authorizations
22 with remedies”, and the number of “authorization with a commitment by
23 the CA to monitor the post-merger behavior”. Their findings provide strong
24 support for the hypothesis that prohibitions have a deterrence effect on
25 future merger frequencies, but not for the hypothesis that the imposition of
26 remedies has such effect. However, the authors do not discuss whether the
27 level of deterrence engendered by the prohibitions is the desirable one, i.e.,
28 whether it causes over-deterrence.

29 In a subsequent paper, Clougherty and Seldeslachts (forthcoming)
30 employ deterrence methodology, based on conditional probabilities, to elicit
31 whether different merger policy instruments (investigations, remedies, and
32 prohibitions) impact the composition of proposed merger activity in various
33 US industrial sectors, as in the original study by Stigler (1966). They use
34 data from the annual reports published by the US Department of Justice
35 and the Federal Trade Commission over the 1986–1999 period. They show

1 that the composition of horizontal merger activity is negatively influenced
 2 by the application of past antitrust actions more than by past antitrust
 3 investigations. In particular, they find both the conditional probability of
 4 detection (eliciting an investigation), and even more so the conditional
 5 probability of punishment (eliciting an antitrust action) to yield deterrence
 6 effects on the relative number of horizontal mergers in subsequent years.
 7 However, the conditional probability of eliciting a severe punishment
 8 (prohibitions versus remedies) does not indicate significant deterrence.
 9 Furthermore, their results for the US suggest that there is no significant
 10 difference in the deterrence effect of prohibitions and remedies.

11 More recently, a study by Duso *et al.* (2013) analyze a sample of
 12 368 mergers scrutinized by the European Commission over the 1990–2007
 13 period, and study the deterrence properties of different merger policy tools.
 14 They identify anticompetitive mergers by looking at the share price reaction
 15 of non-merging rival firms to a merger announcement and assume that
 16 mergers that significantly benefit rivals are anti-competitive, while mergers
 17 that significantly hurt rivals are pro-competitive.³² The remaining mergers
 18 are considered to be welfare neutral. Duso, Gugler, and Szücs then analyze,
 19 by means of a multinomial probit, the likelihood of a merger being anti- or
 20 pro-competitive, if compared to welfare neutral, as a function of merger-
 21 specific characteristics and the ratio of past decisions to notifications.
 22 They find that when the Commission's prohibition ratio increased in the
 23 two quarters prior to a newly notified merger, the likelihood of anti-
 24 competitive merger is significantly reduced, while the likelihood of clearly
 25 pro-competitive mergers is not affected. Hence, prohibitions seem to deter
 26 but do not over-deter. They further analyze the effect on deterrence of
 27 the major reform of the EU merger regulation accrued in 2004. In the
 28 post-reform period, almost no prohibitions are observed yet this lack of
 29 prohibitions is partially overcome by an increase in the number of merger
 30 withdrawn, which seem to deter anti-competitive mergers post-reform.
 31 Finally, the authors show that an increased use of phase-1 remedies in
 32 the past two quarters, significantly reduces the likelihood that a proposed
 33 merger is anti-competitive, but only after the 2004 reform.

³² See Farrell and Shapiro (1990) and Duso *et al.* (2007) for a discussion of this methodology.

4.3. *Measuring deterrence by assessing the quality of key institutional features*

A few studies try to measure the effectiveness of competition regimes by assessing how well specific institutional features score against a well-defined best practice and aggregating this information in one or a set of indicators. These features are very close the ones identified in Sections 2 and 3. Since the effectiveness of a competition regime is strongly linked to its ability to deter anticompetitive behaviors, these indicators can be interpreted as measures of deterrence.

An example of this methodology can be found in the studies by Buccirossi *et al.* (2011), Buccirossi *et al.* (2013), Hoy (2007), Nicholson (2004), Voigt (2009), and Vitale *et al.* (forthcoming). Each of these studies relies on a slightly different set of institutional features.

4.4. *Conclusions on how to measure deterrence*

Overall, the existing literature on the level of deterrence is quite limited. There seems to be a general agreement on the fact that the pursuit of gain is the main cause behind any competition law's violation, which suggests that an appropriate sanctioning policy and an active private enforcement should have a good deterrent effect. Indeed, the answers to those surveys that ask what could increase compliance suggest higher fines, a greater opportunity to bring damage actions, and harsher penalties for the individuals involved. In addition, ambiguity of the law is quoted as another important cause behind abuses of dominant position, which suggests that infringement decisions, to the extent they clarify the scope of the prohibition and determine *ex-post* deterrence, can also play an important role with respect to these infringements. With respect to mergers, which do not lead to sanctions but only to the imposition of remedies or to prohibitions, the latter appear to have the strongest deterrence effect on anticompetitive mergers.

5. *Conclusions*

To what extent a competition policy regime is able to deter true anticompetitive behaviors is key to its effectiveness. Notwithstanding this obvious proposition, the deterrence properties of the institutional and enforcement features of a competition regime need further research. In this chapter, we

1 try to provide a comprehensive overview of the subject. On the basis of
2 the general economic theory of law enforcement and on its application to
3 the enforcement of competition law, we identify several factors that are
4 likely to affect the degree of deterrence of a competition policy regime.
5 In our opinion, the main institutional and enforcement feature on which
6 the deterrence of anticompetitive practices depends are: (1) sanctions and
7 damages; (2) financial and human resources; (3) powers to investigate;
8 (4) quality of the law; (5) independence from political influence; and
9 (6) separation of investigative and adjudicatory power. These influence
10 the level of the loss that agents are expected to bear when breaching the
11 law, the perceived probability of detection and the perceived probability
12 of errors by the competent CA. Deterrence is also influenced by other
13 general features of the context in which the competition legislation is
14 applied such as the quality of the judiciary system and of other institutions
15 and the type of social norms that guide the conducts of economic actors,
16 but these are not characteristics specific to the competition policy regime
17 itself.

18 A much more complex issue is how to measure deterrence of anticom-
19 petitive behaviors. A large number of the attempts to measure deterrence
20 made so far are based on surveys. This is because, especially for non-merger
21 infringements, this method is the only way to obtain direct information on
22 changes in the behavior of firms due to the threats posed by the enforcement
23 of antitrust rules. Surveys have many limitations, including the risk of
24 biased responses and the difficulty of comparing results across countries.
25 Some researchers try to measure deterrence through hard data, but this
26 literature is still very limited and further research is needed to improve our
27 understanding of the phenomenon. A few others have used indicators based
28 on how competition policy regime scores against an accepted best practice
29 to assess the effectiveness, and hence the deterrence effect, of different
30 regimes.

31 Finally, the most challenging task, both theoretically and empirically,
32 is how to distinguish between “good” and “bad” deterrence. We identify
33 the features of a competition policy regime that make deterrence stronger.
34 However, this does not mean that any change of these features that increase
35 deterrence is socially desirable. Indeed, more deterrence is needed if
36 and only if the current features of a competition policy regime lead to

1 under-deterrence. If, on the contrary, firms are already over-deterred, then
 2 the competition policy regime should be changed so as to make the threat
 3 of its enforcement less harsh. Our understanding of this last topic is still
 4 unsatisfactory.

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