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Preventing Innovative Cooperations: The Legal Exemptions Unintended Side Effect

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Abstract

In 2004, European competition law had been faced with considerable changes due to the introduction of the new Council Regulation No. 1/2003. One of the major renewals was the replacement of the centralized notification system for inter-company cooperations in favor of a so-called *legal exemption* system. We analyze the implications of this reform on the agreements firms implement. In contrast to previous research we focus on the reform's impact on especially welfare enhancing, namely *innovative* agreements. We show that the law's intention to reduce the incentive to establish illegal cartels will be reached. However, by the same mechanism, also highly innovative cooperations might be prevented. To avoid this unintended effect, we conclude that only fines but not the monitoring activities should be increased in order to deter illegal but not innovative agreements.

Key words: Competition policy, competition law enforcement, legal exemption system

JEL-Categories: K42, L40

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Zusammenfassung

Das europäische Wettbewerbsrecht wurde in den vergangenen Jahren grundlegend reformiert. Eine der zahlreichen Änderungen bestand in der Einführung der Kartellverfahrensverordnung Nr. 1/2003 im Jahr 2004, wodurch das zentralgesteuerte Genehmigungsverfahren für Unternehmenskooperationen (Kartellverbot mit Erlaubnisvorbehalt) durch das sogenannte System der Legalausnahme ersetzt wurde. Eine Anmeldung der Unternehmenskooperation ist danach nicht mehr nötig. Anstelle der Kartellbehörde müssen nun die Unternehmen selbst prüfen, ob ihre Vereinbarungen die Freistellungsvoraussetzungen erfüllen und somit automatisch vom Kartellverbot ausgenommen sind. Die Folgen dieser Reform auf die Kooperationsvereinbarungen von Unternehmen werden in dieser Arbeit untersucht. Im Gegensatz zur bisherigen Forschung konzentriert sich dieser Artikel jedoch insbesondere auf wohlfahrtssteigernde, innovative Kooperationen. Es wird gezeigt, dass einerseits der Anreiz zu illegalen Vereinbarungen reduziert wird. Mittels des gleichen Mechanismus' werden andererseits jedoch auch besonders innovative Vereinbarungen unterbunden. Um diesen Effekt zu verhindern, sollten lediglich die Strafen, nicht aber die Intensität der Wettbewerbsaufsicht erhöht werden.

Schlagworte: Wettbewerbspolitik, Durchsetzung des Wettbewerbsrechts, Legalausnahme

JEL-Klassifikation: K42, L40

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1 Introduction

In 2004, European competition law[1] had been faced with considerable changes due to the introduction of the new Council Regulation No. 1/2003. The EC's intention of introducing the new legal instrument was to free resources in order to establish a more efficient and simpler system of control.[2] One of the major renewals was the replacement of the centralized notification system for inter-company cooperations in favor of a so-called *legal exemption* system. While in the past, firms had to notify their agreements to the European Commission (EC), they now have to rely on a self-assessment whether the conditions for an exemption from the cartel ban are fulfilled.

There is a variety of research analyzing the legal consequences of this reform. However, the implications from an economic point of view have been rarely discussed. This is a crucial issue since the introduction of the legal exemption and the associated threat of *ex-post* punishments if the conditions of Article 81(3)[3] are not fulfilled puts cooperations at risk. Therefore, not only illegal but also intended legal cooperations might be prevented. Now, legal agreements can be interpreted as welfare enhancing. First, the cooperating parties are obliged to transfer a fair share of the resulting benefits to the customers. Furthermore, the agreements have to contribute to improving the production or distribution of goods or to promoting technical or economic progress. Hence, if the reform leads to a reduction in legal agreements by introducing additional regulatory risk, total welfare is likely to be reduced, too.

Previous research on the reform's economic implications has primarily discussed its potential impact on the type of arrangements firms might implement and further on modeled the firms' reactions. Barros (2003) analyzes the legal uncertainty created by the removal of the notification system, focusing on the consequences the reform has on the

1 The term "competition law" is mainly used in Europe, whereas "antitrust" derives from American English. However, we use the terms "competition law" and "antitrust law" synonymously.

2 Preamble 10 of the White Paper, OJ EC C 132/1 from 12 May 1999.

3 According to Article 81(1), agreements between undertakings, decisions by associations of undertakings, and concerted practices which may affect trade between Member States and which have as their object or effect the prevention, restriction or distortion of competition within the common market are prohibited. Article 81(2) declares those agreements null and void. But Article 81(3) contains an exception from the categorical cartel ban as agreements among competitors can have de facto also positive effects both for participating undertakings and consumers, e.g. R&D agreements. Thus, if the conditions stated in paragraph 3 are fulfilled, Article 81(1) can be declared inapplicable.

type of cooperation agreements. He finds that, in general, firms will implement less restrictive agreements. Neven (2002) instead concentrates on the incentive to engage in anti-competitive agreements. He comes to the result that type I errors (beneficial agreements considered an infringement) and type II errors (unlawful practices admitted) are induced if the current *ex-post* control system remains unchanged. In order to mitigate these errors, he suggests a higher penalty and a more intensive monitoring to increase the likelihood of detection.

Another work close to ours is that of Bergès-Sennou et al. (2006). The authors assume that firms are aware of the status of the agreement (in contrast to the assumption in Barros' and Neven's models) and analyze the impact of a given policy on the firm's decision signing an agreement. They compare the *ex-ante* and *ex-post* control regime by considering a model of imperfect audit. Their primary result is that the notification regime is only superior to the legal exemption model if the risk of errors in the evaluation is quite high. With increasing accuracy *ex-post* control becomes preferable. However, previous research has not taken recent adjustments in European competition law into account. These changes aim at an increased probability of detection and increased fines imposed on companies that infringe EC competition law. By that, the effectiveness and efficiency of the competition rules via both *ex-post* detection and *ex-ante* deterrence shall be enhanced.

This paper analyses the effect of the legal exemption on a firm's cooperation decision. In contrast to previous research we focus on the reform's impact on especially welfare enhancing namely *innovative* agreements. First, we show that the law's intention to reduce the incentive to establish illegal cartels will be reached. However, by the same mechanism, also highly innovative cooperations might be prevented. This, indeed, is of major political importance. A law preventing innovative cooperations would be a direct contrast to the Lisbon strategy and might, in the long run, endanger Europe's competitiveness. We argue, in contrast to Neven (2002), that only fines but not the monitoring activities should be increased in order to deter illegal but not innovative agreements, therefore.

The remainder of the paper is organized as follows: The next section introduces into the economic theory on law enforcement and gives an overview of European Antitrust regulation. Section three presents recent research that has discussed the benefits and deficiencies of the European cartel law modernization from an economic perspective. In the fourth section the economic implications of the reform will be analyzed by applying an approach based on decision theory. Herein, we show that under the law enforcement certain innovative agreements may be ruled out which causes an unintended side effect of the legal exemption rule. The last section summarizes the findings and concludes.

2 The Economics of Law Enforcement – Economic Theory and European Practice

Optimal law enforcement should facilitate beneficial, welfare enhancing agreements while all anti-competitive agreements should be deterred. Furthermore, enforcement errors should be avoided. Such errors could occur as on the one hand desirable agreements would be falsely considered as an infringement (type I error) with the effect that beneficial agreements would be prohibited. On the other hand, unlawful practices might falsely be considered to be beneficial (type II error) with the effect that welfare decreasing practices were approved. Finally, enforcement costs should be minimized. Ideally, the benefits of the competitive processes that are preserved outweigh the administrative costs of detection and sanctioning violations of the competition rules (van den Bergh, 2006). By introducing such an optimal enforcement system, anti-competitive behavior would be fully deterred, producing no errors at zero costs.[4]

In order to achieve optimal enforcement the legislator has to decide upon three basic dimensions of law enforcement (Shavell, 1993): the timing of legal intervention (*ex-ante* versus *ex-post* control), the form of the sanctions, and the role of private parties versus public authorities. With respect to the first dimension an *ex-ante* control system has the advantage of providing the competition authority with information about market developments. Furthermore, agreements that do not fulfill the exemption conditions will only be approved if certain adjustments are carried out. On the other hand, an *ex-ante* control system implicates a higher degree of regulation and higher administrative costs. The optimal sanctioning scheme concerning the second dimension depends on the deterrence level. Imprisonment should only be employed if monetary sanctions cannot deter from illegal behavior appropriately, as imprisonment is socially more expensive. In reference to the third dimension, a private enforcement should be favored "where private parties quite naturally come into possession of information" (Shavell 1993, p. 267). In contrast, when information is difficult and costly to obtain, public enforcement will be necessary. In a federal context such as the European Union a fourth dimension occurs: the division of competences between a central authority or national enforcement agencies (van den Bergh, 2006). While a centralized approach allows for a uniform application of the competition law, a decentralized approach has the advantage that the responsible competition authority is closer to the market and thus might obtain the relevant information easier and at less cost.

In reality, the legislator faces various difficulties defining optimal law enforcement in antitrust. One of the obstacles are severe information asymmetries. These exist between enterprises that conclude anti-competitive agreements and the competition authority.

4 The theory on law enforcement builds up on the seminal work of *Becker* (1968). However, most literature on the subject has been published in the last 15 years. For an overview see e.g. *Garoupa* (1997), *Polinsky, and Shavell* (2000).

Therefore, the competition authority and third parties have to gather information through a costly procedure as they do not possess perfect knowledge about the existence and the content of restrictive practices.

However, firms do not possess information lying outside their scope, like market characteristics and the application of legal rules (Pirrung, 2004). Hence, firms have to incur information costs in order to gather these facts. They are not able to distinguish at zero costs and without error whether their agreements are lawful or not.

With these deficiencies in mind the legislator has to choose enforcement mechanisms "that ensure, at reasonable cost, a reasonable degree of compliance with the law" (Posner 2001, p. 266). Hence, such mechanisms should provide adequate incentives for compliance with the law at the lowest possible costs.

Concerning the four dimensions of law enforcement stated above, by enacting Regulation No. 17, the European Commission chose (1) monetary fines as the form of sanction (whereas in the US also imprisonment is used). Furthermore, the EU antitrust policy relies (2) on public enforcement (whereas in the US private enforcement plays a major role) and (3) on a notification duty: Restrictive practices that fulfill the conditions of Art. 81(3) have to be notified before they come into force (*ex-ante* control). Finally, (4) a centralized enforcement system was chosen as only the Commission, being Europe's highest ranked competition authority, had the competence to exempt restrictive practices from the cartel ban.

With the modernization of European competition law the enforcement system changed from an *ex-ante* to an *ex-post* control for agreements that fall under 81(3). Additionally, both national competition authorities and national courts are now allowed to apply Article 81(3). Thus, the system changed also from centralized towards decentralized enforcement.

3 Literature Review

The economic impact of this comprehensive reform on the quality of enforcement has been analyzed by only a few authors, yet. Problems that have been addressed include the implications of a decentralized application of European competition law (Geradin, 2002), the incentive to engage in anti-competitive agreements after the modernization (Neven, 2002), the consequences the reform has on the type of agreements that firms implement (Barros, 2003), in how far the system switch affects overall economic efficiency (Pirrung, 2004), and the change of the stage of intervention from an *ex-ante* to an *ex-post* control (Bergès-Sennou et al., 2006).

Geradin (2002) found that in a decentralized system information asymmetries increase as the notification system is abolished and competition authorities are not longer able to collect information about market developments via the notification. On the other hand decentralization reduces asymmetries as national competition authorities are closer to the relevant information than a central authority like the Commission.

Neven (2002) investigates firms' incentive to engage in anti-competitive agreements both before and after the reform. He comes to the result that when firms have the duty to notify, most firms use that option and conclude agreements as restrictive as allowed. After the removal of the obligatory notification, a fraction of firms would behave conservatively and implement agreements that fall short of what would be allowed. Hence, beneficial agreements would not be implemented (type I error). Additionally, a range of firms would implement unlawful agreements (type II error). In order to mitigate these errors, he suggests a higher penalty and an increased likelihood of detection.

Barros (2003) instead focuses on the legal uncertainty created by the removal of the notification system. Like Neven, he analyzes the consequences the reform has on the type of agreements firms implement and models the firms' reactions. He finds that on the one hand, firms will implement more restrictive practices as they do not have to notify anymore. On the other hand, the decrease in legal certainty will foster firms to follow a more conservative practice implementing less restrictive agreements. He concludes that the latter effect will dominate the former.

Pirrung (2004) analyzes whether the reform affects the overall economic efficiency in terms of costs and benefits. Without the obligation to notify agreements firms do not reveal important information to the Commission anymore. This leads to a transparency loss and a larger information asymmetry than under Regulation No. 17. On the other hand, affected firms have to face higher risk costs under the new regulation as they cannot predict how law enforcers might evaluate a certain practice. Finally, the author states that the new system induces a higher probability of legal errors due to the decentralization. In total, Pirrung is in serious doubt whether Regulation No. 1/2003 will enhance the efficiency of law enforcement.

Another work discussing the implications of the reform is that of Bergès-Sennou et al. (2006). In contrast to the assumption in Barros' and Neven's models these authors assume that firms are aware of the status of their agreements and analyze the impact of different policies on the firm's decision to sign an agreement. For that purpose, they compare the *ex-ante* and *ex-post* control regime by considering a model of imperfect audit. Their primary result is that the notification regime is only superior when the risk of errors in the evaluation is quite high. With an increasing accuracy *ex-post* control becomes preferable.

Over all, previous research on European competition policy and the current reforms in particular has unveiled the following: A notification regime should be favored if the risk of errors in the evaluation of agreements is high (Bergès-Sennou et al., 2006). Since Pirrung (2004) showed that the new system induces a higher probability of legal errors due to the decentralization one might conclude that a notification procedure should be favored. However, the system switch induces firms to follow a more conservative practice implementing less anti-competitive agreements (Barros, 2003). Although this effect seems to be dominant, Barros also points out that firms will implement more restrictive practices as they do not have to notify anymore. In order to deter firms from such an illegal behavior Neven (2002) suggests increasing both the fine and the probability of detection.

A very important side effect of the reform has been neglected, yet. The question how the legal exemption rule affects intended legal and especially welfare enhancing innovative agreements when information asymmetries remain high and legality is *ex-ante* unobservable, still remained unanswered.

By applying a decision theory model, we analyze whether the current setting is effective in general, e.g. will deter from illegal behavior. In a second part we will discuss the effect on innovative cooperations which are *ex-ante* hardly to distinguish from illegal agreements from the perspective of the competition authority.

4 The Model

4.1 Basic Concept

The overall aim of the modernization of European competition law was to make antitrust enforcement simpler and more efficient. Therefore, the Commission abolished the notification and authorization system in order to be able to focus on the most serious infringements of competition law. We first analyze the effectiveness of competition law enforcement after the modernization by modeling the decision process of a firm that has to decide in favor or against an unlawful agreement. Secondly, we investigate whether there might be unintended side effects of the regulation probably influencing Europe's Lisbon Strategy. Therefore, we analyze how innovative agreements are affected by the law's incentive mechanisms.

For our analysis of the effectiveness of the new European competition law, we assume the following:

In a first step, a firm has to decide whether to go an *ex-ante* illegal or legal path for cooperation with a competitor or not. The first option implies a cooperation which is *ex-ante* known to be illegal (C_c). The second possibility is expected to be an innovative agreement (*ex-ante*) (C_I), which can, however, turn out to be (considered as) illegal at the end. After deciding whether to follow the (*ex-ante*) illegal or legal path, the company has to decide whether to cooperate or not. If an agreement will be concluded, a positive extra profit ($\pi > 0$) can be gained.[5]

In a second step, the Antitrust Authority (AA) enters the game. As the notification procedure has been abolished with the introduction of Regulation No. 1/2003, the AA is *ex-ante* not aware of any agreements anymore. Hence, the AA is also not able to observe *ex-ante* the legality of firms' agreements. Now, by what means could the AA identify illegal cooperations? One might assume positive extra profits as a primary proxy as those can rather be achieved by cooperations with limited competition (i.e. cartel agreements or innovative agreements). However, also identifying extra profits is *ex-ante* impossible. Nevertheless, high (extra) profits have a public effect; i. e. competitors file a complaint at the AA (or due to whistle blowing). Therefore, we assume the probability of investigation (p) increasing with the level of profit (π). Formally, this yields to:

$$\frac{\partial p}{\partial \pi} > 0 \quad . \tag{0.1}$$

5 The case of unprofitable cooperations is excluded, that for further analysis, the possibility of non-cooperation needs not to be taken into account.

Furthermore, p is a probability lying in the range $0 \leq p \leq 1$. If the agreement will not be detected and investigated by the AA (1-p), the firm earns a positive profit (π). If the agreement is detected, it will come to litigation and the firm has to bear the costs (c) for defending itself irrespective of the outcome of the proceeding.

If the firm will be found guilty, it has to pay a fine ($f(\bullet)$). The probability of being punished depends on AA's aptitude to make an error of judgment. It is given by q with $0 \leq q \leq 1$ where q is assumed to be independent.[6] Even in the case of detection, an illegal agreement might be exculpated. This assumption of possible legal errors is also mentioned in Pirrung (2004) who expects a higher probability of legal errors due to the decentralization introduced with Regulation No. 1/2003. If the firm is found guilty, the agreement would be declared illegal and void according to Article 81(2) and the firm would have to pay a fine ($f(\pi)$). In our model, the fine a convicted firm has to pay increases with the profit, likewise.[7] Consequently, this implies:

$$\frac{\partial f}{\partial \pi} > 0 .$$

In practice, a fine imposed on companies that infringe EC Treaty rules depends on the total turnover of the enterprise.[8] A basic amount (up to 30% of the sales related to the infringement) will be adjusted depending on the duration and longevity of the cartel. The final amount of the fine shall not exceed 10% of the total turnover. However, since the profit is a critical factor for the assessment of the gravity of the infringement, it seems reasonable to model the fine as a function of the profit. This reasoning goes in line with van den Bergh (2006, p. 313), who argues that, 'from a deterrence perspective, the turnover is not a sound basis for calculating the fine.' In order to determine the efficient fine, van den Bergh proposes to use the gain brought about by the infringement instead of the turnover. Furthermore, as the deterrence would be reduced if enterprises only had to pay a fine lower than their profit, the Commission can impose fines which ex-

6 It has to be noticed that consequently, q gets assigned to different evolvements in the decision tree, in a way that a wrong decision given an innovative agreement implies punishing and a wrong decision if a cartel has arisen means not identifying the cartel at all.

7 Guidelines on the method of setting fines to be imposed on companies that infringe EC Treaty rules, see press release IP/07/857 from 28 June 2006: Competition: Commission revises Guidelines for setting fines in antitrust cases, available on:

http://europa.eu/rapid/pressReleasesAction.do?reference=IP/06/857&format=HTML&aged=0&language=EN&guiLanguage=en (accessed on 09/04/2008)

8 See guidelines on the method of setting fines to be imposed pursuant to Article 23(2)(a) of Regulation No 1/2003, OJ 2006 C 210/2 from 1 September 2006.

ceed such profits.[9] Additionally, the concerned firm might be faced with compensation claims,[10] in any way it would suffer some kind of financial loss.

Figure 1:
Decision tree

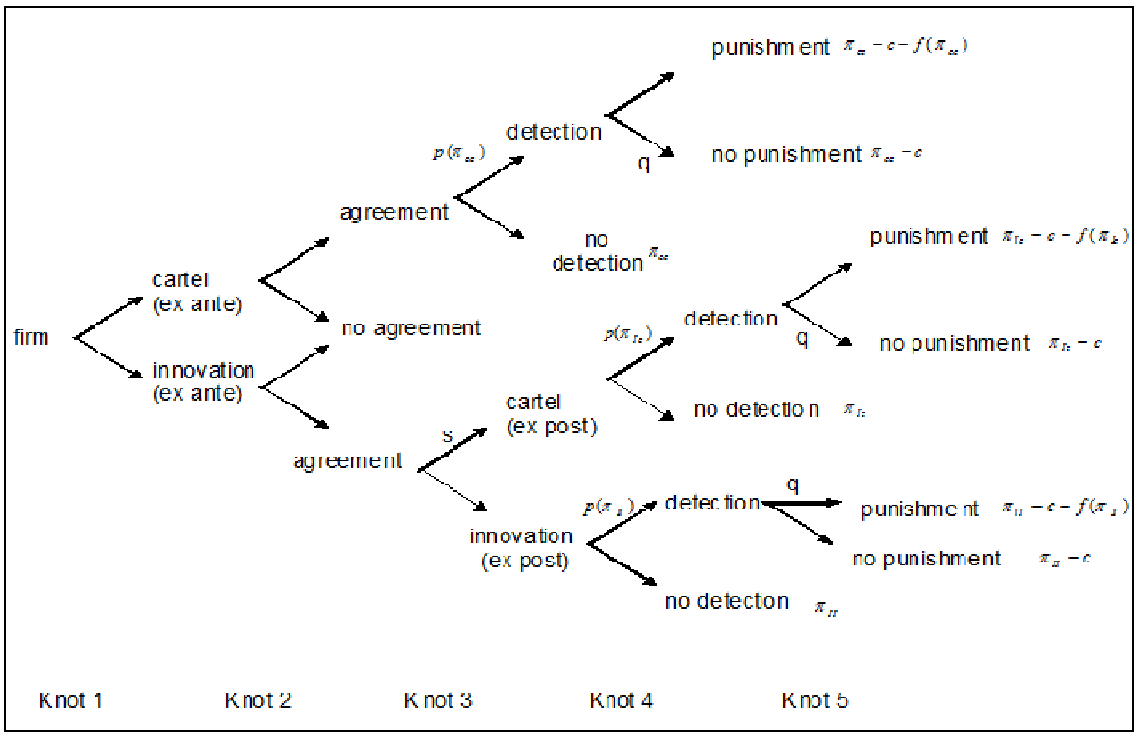

Figure 1 shows the decision tree a company faces.

If the firm decides to start an illegal cooperation and hence earns positive profits, it is confronted with the possibility of being detected $p(\pi_{cc})$. If there is no detection, the company can earn an extra profit π_{cc}. After detection, AA enters the game and decides about the illegality of the cooperation. As the upper path determines per definition an illegal cooperation, the probability of being punished is given by (1-*q*), which yields to a payoff at the final stage of $\pi_{cc} - c - f(\pi_{cc})$. This payoff depends on the final profit minus the defending costs and the fine. If AA misjudges the cooperation and declares it as legal (although it is illegal), this leads to a payoff to the tune of $\pi_{cc} - c$ with probability *q*.

Otherwise, if the firm decides to start an (*ex-ante* or intended) innovation (lower path), an additional knot (*ex-post* cartel or *ex-post* innovation) enters the decision tree, at which the former legal agreement turns out to be indeed legal or, contradicting the for-

9 See Case T-9/99, *HFB Fernwärmetechnik vs. Commission*, [2002], II-1487 paras. 451-456.

10 Compensation claims are a new institution in European Competition Law and can be filed in addition to a public litigation. In our model, potential compensation claims are considered to be part of the fine.

mer expectations, it turns out to be illegal.[11] The probability that the company had a wrong upfront appraisal is determined by *s*, whereas the probability that the company was not mistaken is given by (1-*s*). Again, also *s* lies in the range of $0 \le s \le 1$. If the cooperating companies err about the legal nature of their intended innovative cooperation and it turns out to be a cartel, the decision path evolves identically as mentioned for the illegal cooperation. The only difference in development is caused by the ascertained values for profits and probabilities. Herein, the possible final outcomes are given by $\pi_{Ic} - c - f(\pi_{Ic})$, if AA detects and punishes the cooperation, which gets ascribed the probability (1-*q*). $\pi_{Ic} - c$ results, if AA detects but does not punish the agreement although it is illegal (misjudgment) and the profit, if there is no detection at all is given by π_{Ic}.

If the innovative cooperation turns out to be indeed an innovation, which provides extra profits, the probability of being detected is given by $p(\pi_{II})$. Under the circumstances of no detection the firm can earn profits of π_{II}. If detection occurs, AA can again decide whether to punish the company or not. If AA decides in favor of a punishment although the cooperation is legal, i.e. AA misjudges with probability *q*, the overall profit for the company yields $\pi_{II} - c - f(\pi_{II})$. Under no punishment the profit is given by $\pi_{II} - c$.

The firm decides whether to join an unlawful agreement or not by calculating the expectation values (*E*) for all possible paths. The expectation value of the upper path gets ascribed *E(C)*, whereas the expected value for the lower path is given by *E(I)*. A single path is only taken into consideration if its expected value is of positive sign. Comparing both alternatives a company decides in favor of the higher expectation value. Hence, a cartel cooperation is preferred if *E(C)>E(I)*, while *E(I)>E(C)* leads to a preferableness of the innovative agreement.

The expectation value for an illegal cooperation is given by:

$$E(C) = [(\pi_{cc} - c - f(\pi_{cc}))(1-q) + q(\pi_{cc} - c)]p_{cc} + (1 - p_{cc})\pi_{cc}. \quad (1)$$

This simplifies to:

$$E(C) = \pi_{cc} - p_{cc}[c + f(\pi_{cc})(1-q)]. \quad (2)$$

The expectation value for the lower path consists of two separate expectation values (sub-expectation values), *E(IC)* and *E(II)*, which can be calculated in the fourth knot. *E(IC)* is the expectation value at knot four if the company had a wrong appraisal *ex-ante*, such that the innovative cooperation turned out to be illegal. *E(II)* signals consequently the expectation value if the *ex-ante* information was correct and the cooperation is indeed innovative. The sub-expectation values are given by:

11 In case of illegality a cartel arises.

$$E(IC) = [(\pi_{Ic} - c - f(\pi_{Ic}))(1-q) + q(\pi_{Ic} - c)]p_{Ic} + (1-p_{Ic})\pi_{Ic}, \quad (3)$$

which is equivalent to:

$$E(IC) = \pi_{Ic} - p_{Ic}[c + f(\pi_{Ic})(1-q)] \quad (4)$$

and

$$E(II) = [(\pi_{II} - c - f(\pi_{II}))q + (1-q)(\pi_{II} - c)]p_{II} + (1-p_{II})\pi_{II}, \quad (5)$$

which can be simplified to:

$$E(II) = \pi_{II} - p_{II}[c + f(\pi_{II})q]. \quad (6)$$

It can easily be verified that E(IC) equals E(C), if $\pi_{cc} = \pi_{Ic}$.

Combining the two previously mentioned sub-expectation values and weighting them with *s* yields therefore:

$$E(I) = (1-s)[\pi_{II} - p_{II}[c + f(\pi_{II})q]] + s[\pi_{Ic} - p_{Ic}[c + f(\pi_{Ic})(1-q)]]. \quad (7)$$

Reshuffling terms leads to:

$$E(I) = \pi_{II} + s(\pi_{Ic} - \pi_{II}) - c[p_{Ic}s + (1-s)p_{II}] - p_{II}f(\pi_{II})q(1-s) - p_{Ic}f(\pi_{Ic})(1-q)s \quad (8)$$

The first two terms state the expected profit for the lower path. If the profit in case of an *ex-post* cartel exceeds the reachable profit from the innovative agreement, i.e. $\pi_{Ic} > \pi_{II}$, the maximum expected value for the path increases by the difference in profits weighted by *s*. Otherwise, the maximum profit decreases. If instead $\pi_{Ic} = \pi_{II}$ the maximum possible expectation value is given by π_{II}.

The second term determines the defending costs, which increase with the probability of being detected. As $p_{Ic}s = (s-1)p_{II}$ never holds, these will always exhibit a positive value.[12]

The last two terms signal the punishment fees, one for each possible profit. They are weighted with the probabilities that AA (*q*) or the company itself (*s*) make a mistake concerning their judgment.

Concerning legal and illegal cooperations in the context of the Council Regulation No. 1/2003, two different problems can occur. Firstly, under the existence of both possibilities for cooperation, it might occur that the legal cooperation is overruled by the illegal

12 For the proof in detail see Appendix 1.

cooperation. Secondly, given the existence of positive probabilities for a company or the Antitrust Authority to make mistakes, innovative agreements can be prevented.

For further analysis, we distinguish between the above mentioned problems, therefore.

4.2 Positive Discrimination of Illegal Cooperations

This section shows that, under the existence of two options for cooperation (cartel and innovation), it might occur that the legal cooperation is overruled by the illegal cooperation. First, we assume that all profits are equal, such that $\pi_{cc} = \pi_{Ic} = \pi_{II}$. Consequently, the probabilities of being detected and the level of fines are equal.[13]

If all profits are equal, the previously mentioned expectation values simplify to:

$$E(I) = \pi_{II} - c[ps + (1-s)p] - pfq(1-s) - pf(1-q)s \tag{9}$$

and

$$E(C) = \pi_{cc} - p[c + f(1-q)]. \tag{10}$$

In order to determine which path is favored, one might compare the break-even points at which the expectation values for each path reach zero. As long as the expected profits are equal, our analysis is reduced to a comparison of the different terms which describe cost and fine (c and $f(*)$). Consequently, we compare:

$$cp + fp(s - 2sq + q) \text{ with} \tag{11}$$
$$cp + pf(1-q)$$

Formula (11) can be reformulated to:

$$(1-2q)s + q \Leftrightarrow (1-q). \tag{12}$$

The terms can only become equal if $s = 1$, which means that the probability that the company misjudged the cooperation's legality *ex-ante* is 100%. Given that $s = 1$, *E(C)* equals *E(I)* and, hence, no path is preferred.

With $s < 1$ and $q \geq 0.5$, the expectation value for the innovative agreement is lower than the value for the illegal agreement. $q \geq 0.5$ implies that there is a high probability for AA to take the wrong decision. As q is independent, this means that on average 50% of the audited agreements were collated to the wrong category.

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13 Let therefore f denote $f = f(\pi_{cc}) = f(\pi_{Ic}) = f(\pi_{II})$ and the probability of being detected p denotes $p_{cc} = p_{Ic} = p_{II}$.

On the other side, $s < 1$ and $q < 0.5$ yields higher expectation values for the innovation path. Concluding, herein exists an incentive to favor an illegal cartel agreement instead of the innovation.

The more realistic case might be the second one. However, given asymmetric information particular cases of auditing could belong to the first case. A similar result can be stated for a situation when the cartel profits exceed those from innovation $\pi_{cc} > \pi_{Ic} > \pi_{II}$, with $p_{cc} > p_{Ic} > p_{II}$ and $f(\pi_{cc}) > f(\pi_{Ic}) > f(\pi_{II})$. In such a case, it can also be shown that under certain parameter constellations, illegal agreements overrule legal innovative agreements.[14]

Given a benevolent but imperfectly informed Antitrust Authority raises the question of how optimal law enforcement should look like. As q is regarded to be exogenous, the AA can influence the expectation value and hence the cooperation decision only via its signals on the level of the fine *(f)* and the probability of an investigation *(p)*. These signals can be considered optimal if they allow lawful cooperations but prevent unlawful agreements. Accordingly, wrong signals might foster illegal agreements. In order to keep the expected value of a planned illegal cooperation *E(C)* negative, the competition authority has to increase the probability of an investigation as well as the legislator has to ensure that the fine reaches an appropriate deterring level. This result supports the findings of Neven (2002), who stated that the introduction of the legal exemption system leads to an increasing number of unlawful competitive practices. Thus, he claimed to increase both the probability of detection as well as the penalty in order to increase the deterrence effect.

In line with Neven's findings, the legislator indeed adjusted the parameters. In order to increase the probability of detection a new leniency policy was enacted in 2002, the resources for cartel detection have been extended by establishing a new cartel-busting directorate within DG Competition in 2005 and, finally, several sector inquiries have been initiated in 2006. The second parameter, the fine, has been also adjusted as in September 2006 the guidelines for setting fines were revised, allowing for higher penalties.[15]

4.3 Discrimination of Innovation due to Regulation Errors

In the following section we show that the existence of positive probabilities for a company or Antitrust Authority to make mistakes may lead to the exclusion of innovative agreements. The exclusion of innovative agreements is reached as soon as the expecta-

14 For lucidity the proof and adherent statements are omitted here, for further details see Appendix 2.

15 Furthermore, private enforcement was improved. But the impact of damage claims on antitrust enforcement is not yet studied as only a few cases of private litigation are known. And in these cases, a damage claim follows the public proceeding. Up to now, no damage claim was used to detect cartel activity.

tion value for the lower path becomes negative.[16] The analysis is provided in two steps. In a first step we show that the expectation value of an *ex-ante* innovation, which turned out to be a cartel (E(IC)), later can reach negative values if the fine and the costs for defending are set very high. The second step shows that given the latter results, there exists also a possibility for the expectation value of the innovation path (E (I)) to become negative.

Coming back to equation (6)

$$E(II) = \pi_{II} - p_{II}[c + f(\pi_{II})q]$$

the expectation value for E(II) becomes negative if:

$$\frac{\pi_{II}}{p_{II}} < [c + f(\pi_{II})q]. \tag{13}$$

Hence, the parameters which determine costs exceed the reachable profit divided by p_{II}. As soon as $f(\pi_{II})$ is a linear function of π_{II} or given by a fraction of π_{II} with $\pi_{II} > f(\pi_{II})$, the main driver for the expectation value to become negative is given by the defending costs (*c*).

Going a step further and analyzing the overall expectation values for the lower path which is given by

$$E(I) = sE(IC) + (1-s)E(II) \tag{14}$$

allows further conclusions of possible side effects of the existence of legal exemptions. For $s \rightarrow 0$, the overall expectation value becomes negative. As soon as $s > 0$, the sign of the expectation value depends on the difference in profits provided by the *ex-post* illegal or *ex-post* legal agreement. Again, in this case, the avoidance of innovative agreements due to the existence of errors, defending costs, and fines cannot be expelled.

For demonstration, we provide a simple example for the lower path to reach negative values. Assume that the possible profit from the upper path exceeds both possible profits from the lower path, such that $\pi_{cc} > \pi_{Ic} = \pi_{II}$. This is rather realistic as the company believes *ex-ante* that the cooperation is innovative, which can be caused by the fact that the company cannot distinguish between the two possible outcomes as soon as these are

16 Innovative agreements might fall under the block exemption regulation on research and development agreements, which would reduce firms' uncertainty about the legality of the agreement. However, we assume a remaining uncertainty as firstly, it is not always clear whether the agreement results in an innovation. Secondly, in order to apply the block exemption, firm's collective market share shall not exceed 25 percent. Finally, the Commission has the possibility to withdraw the benefit of the regulation.

equal. Hence, solving equation (14) for $\pi = \pi_{Ic} = \pi_{II}$, and aiming the expectation value to be positive,[17] this yields:

$$\pi > p[c + sf(1-q) + fq(1-s)]. \tag{15}$$

Reshuffling terms and assuming for simplicity that $s = q$, we end up with:

$$\frac{\pi}{p} > c + 2qf - 2qqf\ . \tag{16}$$

As $2qf > 2qqf$, it is obvious that the possible profit has to exceed the defending costs plus a mark-up given by $(2qf - 2qqf)$.

However, if the expectation value is negative, rational firms avoid not only illegal, but also highly innovative agreements, supporting the hypothesis that the introduction of the legal exemption system leads to a decrease in the number of welfare enhancing and innovative agreements.

4.4 Effect of a Change of Adjustment Parameters

The analysis above showed that the probability of detection *p*, the defending costs *c* and the fine *f* have a crucial impact on the level of the expectation value. The literature on optimal law enforcement suggests to maximize the level of fine and to keep the probability of detection and therefore the costs of enforcement low in order to deter from anti-competitive behavior. If the fine is not maximal, society could save enforcement costs by raising the fine and lowering the probability without affecting the level of deterrence (Becker, 1968; Polinsky and Shavell, 1979).

If, in our model, the parameters p and f are altered the expectation value changes as follows:

$$\frac{\partial E(C)}{\partial f(\pi_{cc})} = -p_{cc}(1-q)\ . \tag{17}$$

In the case of an illegal cartel the expectation value decreases with an increasing fine. The same applies in the case of an *ex-ante* lawful agreement. If the fine will be increased, the expectation values decline for both the intended and the actual innovative agreement:

$$\frac{\partial E(IC)}{\partial f(\pi_{Ic})} = -p_{Ic}(1-q) \tag{18}$$

17 Recall, only positive expectation values lead to a decision for a certain path in the decision tree.

$$\frac{\partial E(II)}{\partial f(\pi_{II})} = -p_{II} q \,. \tag{19}$$

However, if the probability q of AA making the wrong decision decreases, an increase in the fine will have a much larger impact on the expectation value of unlawful agreements: It drops to a greater extent than the expectation value of an innovative agreement. Such an intended effect deters from illegal behavior while hardly affecting innovative agreements. On the other hand, if AA does a bad job and q increases, this finding turns around and the innovative agreement befalls a higher drop in its expectation value.

In the case of a change in the probability of detection, the costs – in contrast to a change of the fine – can become crucial:

$$\frac{\partial E(C)}{\partial f(p_{cc})} = -c - f(\pi_{cc})(1-q) \tag{20}$$

$$\frac{\partial E(IC)}{\partial f(p_{Ic})} = -c - f(\pi_{Ic})(1-q) \tag{21}$$

$$\frac{\partial E(II)}{\partial f(p_{II})} = -c - f(\pi_{II})q \,. \tag{22}$$

Assuming that the costs c are constant (and low), only the parameters q and f have an essential impact on the expectation values. The effect would correspond to the previously mentioned result if f is changed. Again, if q decreases, this would lead to a larger decrease of the expectation value for an unlawful agreement than for an innovative one and vice versa.

The comparison between a change in the level of the fine and the probability of detection shows that the latter can have a huge impact on innovative agreements if the costs of litigation are high. If the fine is increased, the expectation values especially of unlawful agreements tend to decrease. However, if the probability of detection is increased, the effect depends on the costs of litigation. If these are high, both the expectation value for illegal and innovative agreements decrease. Hence, the legislator should keep the costs of a litigation low, if these can be influenced. Furthermore, it seems reasonable to increase the fine and reduce the probability for wrong decisions instead of increasing the probability of detection.

5 Conclusions

In 1999, the Commission initiated a comprehensive reform of European competition law. The most prominent part was the enactment of Regulation No. 1/2003 in 2004. This paper analyzes the reform's impact on the incentive to conclude unlawful agreements as well as especially welfare enhancing *innovative* agreements. Therefore, we model a firm's trade-off concerning illegal or legal and innovative or non-innovative agreements in a decision theoretic setting. We find that on the one hand, the new procedural rules contribute to the law enforcement by reducing the incentive to establish illegal cartels. On the other hand, by the same mechanism, also innovative cooperations might be prevented. Thus, the legal exemption rule might prevent innovative cooperations which contrasts the Lisbon Strategy and might, in the long run, endanger Europe's competitiveness.

Furthermore, we show that increasing the fine leads to a higher deterrence level of unlawful agreements whereas innovative agreements are still encouraged. If, however, the probability of detection will be increased and the costs of litigation are high, both unlawful and innovative agreements are further deterred.

These results are only partly consistent with previous research on the implications of the modernization. Neven (2002) among others suggested increasing both the probability of detection as well as the penalty in order to increase the deterrence effect.

In contrast, we come to some different economic policy advice. If ever possible, the legislator should keep the costs of a litigation low. Additionally, Antitrust Authorities should be well-staffed and equipped to reduce the probability for wrong decisions *ex-ante*. Fines might be increased. Nevertheless, the probability of detection should not be increased as this would lead to higher costs for society (Becker, 1968) as well as welfare losses due to a reduction in innovative agreements.

Future research should analyze the effect of the new regulation on total welfare. Additionally, the effectiveness of the reform package including its recent adjustments should be investigated in a dynamic context.

Appendix 1

The expectation value for the innovative path is given by:

$$E(I) = \pi_{II} + s(\pi_{Ic} - \pi_{II}) - c[p_{Ic}s + (1-s)p_{II}] - p_{II}f(\pi_{II})q(1-s) - p_{Ic}f(\pi_{Ic})(1-q)s \text{ , (23)}$$

here, the second term states the defending costs, which depend on the probability of being detected and the probability that the company received wrong information *ex-ante*. This term will always reduce the maximum possible expectation value, which is determined by the first two terms, as $c[p_{Ic}s + (1-s)p_{II}]$ cannot become negative.

As *c* is per definition a positive value, the latter term can only become negative if:

$$p_{Ic}s < -(1-s)p_{II} \quad (24)$$

$$p_{Ic}s < (-1+s)p_{II} \text{ .} \quad (25)$$

Since $(1-s)p_{II} > 0$;

this implies that

$$-(1-s)p_{II} < 0 \text{ .}$$

Hence, $p_{Ic}s < 0$.

Because $0 \le q \le 1$ and $0 \le s \le 1$, the term $(1-s)p_{II}$ on the right hand side cannot become negative (the lowest value for the right hand side is given by zero), such that the total value of the right hand side can never reach a positive value. Consequently, if the left hand side has to approach a lower value than the right hand side, this implies that $p_{Ic}s < 0$, which is per definition precluded.

Appendix 2

Again, if the cartel is preferred, it must hold that *E(C)* > *E(I)*. Assuming that $\pi_{cc} > \pi_{Ic} > \pi_{II}$, this yields to:

$$\begin{aligned}&\pi_{cc} - p_{cc}[c + f(\pi_{cc})(1-q)] > (1-s)[\pi_{II} - p_{II}[c + f(\pi_{II})q] \\ &+s[\pi_{Ic} - p_{Ic}[c + f(\pi_{Ic})(1-q)]]\end{aligned} \tag{26}$$

Assume further that the probability of detection, as well as the fee, are linear dependent on excess profits (π).[18] Define: $\Delta_1\pi_{cc} = \pi_{Ic}$ and $\Delta_2\pi_{cc} = \pi_{II}$, with $\Delta_1, \Delta_2 < 1$ and consequently $\Delta_1 p_{cc} = p_{Ic}$, $\Delta_2 p_{cc} = p_{II}$ inequality (26) can be rewritten as:

$$\begin{aligned}&\pi - pc + pf - pfq > \Delta_2\pi - \Delta_2 pc - \Delta_2^2 pfq + \pi s(\Delta_1 - \Delta_2) + spc(\Delta_2 - \Delta_1) \\ &+pfqs(\Delta_2^2 + \Delta_1^2) - pfs\Delta_1^2\end{aligned} \tag{27}$$

Solving for the probability *q* that AA makes a mistake, the following solutions have to be distinguished:

Solution 1:

$$q < \frac{(\pi - pc + pf - \Delta_2\pi + \Delta_2 pc - \pi s\Delta_1 + \pi s\Delta_2 - spc\Delta_2 + spc\Delta_1 + pfs\Delta_1^2)}{pf(1 - \Delta_2^2 + s\Delta_2^2 + s + \Delta_1^2)}$$

if

$$0 < pf - \Delta_2^2 pf + pfs(\Delta_2^2 + \Delta_1^2)$$

and

Solution 2:

$$q > \frac{(\pi - pc + pf - \Delta_2\pi + \Delta_2 pc - \pi s\Delta_1 + \pi s\Delta_2 - spc\Delta_2 + spc\Delta_1 + pfs\Delta_1^2)}{pf(1 - \Delta_2^2 + s\Delta_2^2 + s + \Delta_1^2)}$$

if

$$0 > pf - \Delta_2^2 pf + pfs(\Delta_2^2 + \Delta_1^2)$$

Solution 1 states that if the probability that AA slips up (*q*) is smaller than the ratio on the right hand side and if the additional constraint, which is given by $0 < pf - \Delta_2^2 pf + pfs(\Delta_2^2 + \Delta_1^2)$ holds, a cartel is preferred. Furthermore, a cartel overrules an innovative agreement if *q* exceeds the right hand side and if $0 > pf - \Delta_2^2 pf + pfs(\Delta_2^2 + \Delta_1^2)$.

18 The assumption of linear dependence simplifies the proof. The results can also be assigned to exponential dependence.

Therefore, an additional statement about the parameters in the constraint has to be added.

Considering $0 < pf - \Delta_2^2 pf + pfs(\Delta_2^2 + \Delta_1^2)$ and solving for the probability of a firms error (s) -which highlights the probability that the firm assumes *ex-ante* that their agreement is innovative which emphasizes *ex-post* to be a cartel- this has to fulfill:

$$\frac{\Delta_2^2 - 1}{(\Delta_2^2 + \Delta_1^2)} < s .$$

As Δ_2^2<1, the ratio on the left hand side becomes negative. Hence, solution 1 is valid for all probabilities s.

From solution 2 follows:

$$\frac{\Delta_2^2 - 1}{(\Delta_2^2 + \Delta_1^2)} > s ,$$

which can never hold as s determines a probability and has to lie in the range of

$0 \le s \le 1$ therefore. A positive value for the left hand side can only be reached if Δ_2^2=1, which is excluded by assumption.[19]

Concluding, solution one gives the necessary parameter constellation such that the expectation value for the cartel exceeds the innovative agreement. The same relation holds for exponential dependence of fees and detection probabilities on excess profits.

19 Δ_2^2=1 would lead to the proof in Appendix 1.

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