EU Directive on Antitrust Damages Actions: an economic analysis

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Abstract

Directive 2014/104/EU on antitrust damages aims at removing practical obstacles to compensation for all victims of infringements of EU antitrust law. Further, the Directive fine-tunes the interplay between private damages actions and public enforcement of the EU antitrust rules by the Commission and national competition authorities. This paper considers the implications for behaviour and efficiency. First, we consider "public enforcement only", next we look at "private damages actions only", and finally we analyse "the interplay between public enforcement and private damages actions". The consequences depend, inter alia, on the level of harm suffered by victims (i.e. customers paying an overcharge), the subjective probabilities of the parties (partly determined by jurisprudence), and legal costs.

1. Introduction

Directive 2014/104/EU on antitrust damages was signed into law on the 26 November 2014.[1] Member States need to implement the Directive in their legal systems by 27 December 2016. The directive brings a number of changes.[2] The Directive aims at removing practical obstacles to compensation for all victims of infringements of EU antitrust law. The Directive applies to all damages actions in the Member States, whether individual or collective. Further, the Directive fine-tunes the interplay between private damages actions and public enforcement of the EU antitrust rules by the Commission and national competition authorities.

In this paper we analyse this "interplay" between private damages actions and public enforcement. We consider "public enforcement only", "private damages actions only", and "the interplay between public enforcement and private damages actions" respectively.[3]

We focus on two questions:

1. *What is the influence on the behaviour of potential cartelists?*
2. *What are the welfare implications?*

Article 1 **Subject matter and scope**

1. This Directive sets out certain <u>rules</u> necessary <u>to ensure that anyone who has suffered harm</u> caused by an infringement of competition law by an undertaking or by an association of undertakings <u>can effectively exercise the right to claim full compensation</u> for that harm from that undertaking or association. It sets out rules fostering undistorted competition in the internal market and removing obstacles to its proper functioning, by ensuring equivalent protection throughout the Union for anyone who has suffered such harm.

2. This Directive sets out rules <u>coordinating the enforcement</u> of the competition rules by <u>competition authorities</u> and the enforcement of those rules in <u>damages actions</u> before national courts.

Article 3 **Right to full compensation**

1. Member States shall ensure that any natural or legal person who has suffered harm caused by an infringement of competition law is able to claim and to obtain <u>full compensation</u> for that harm.

2. <u>Full compensation shall place a person who has suffered harm in the position in which that person would have been had the infringement of competition law not been committed.</u> It shall therefore cover the right to compensation for actual loss and for loss of profit, plus the payment of interest.

3. Full compensation under this Directive <u>shall not lead to overcompensation</u>, whether by means of punitive, multiple or other types of damages.

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[1] The directive was published in the *Official Journal of the European Union* on 5 December 2014.
[2] See: **http://ec.europa.eu/competition/antitrust/actionsdamages/directive_en.html**
[3] A generalized mathematical treatment is presented in the Annex, including a discussion of the 'seriousness' of the cartel and pass on in case the customers are suppliers themselves on a downstream market (rather than consumers).

2. Efficient and inefficient cartels

In analysing the welfare implications of competition policy, it is important to make a distinction between efficient cartels (on balance leading to an increase in welfare) and inefficient cartels (on balance leading to a decrease in welfare). Cartels are generally associated with market power, an increase in prices and welfare losses. Cartels may, however, lead to economies of scale or economies of scope and, therefore, to cost reductions. These efficiency gains might offset the loss due to enhanced market power.[4]

Example: An efficient cartel

An example of an efficient cartel is shown in Figure 1. Assume that the pre-cartel situation is the equilibrium obtained in the case of perfect competition: p = 50 and q = 50. Assume that the formation of a cartel leads to a decrease in marginal costs (MC_{pre} = 50 and MC_{post} = 40). Assume, furthermore, that the post-cartel situation yields the monopoly outcome, p = 70 and q = 30. On the one hand, the cartel yields a deadweight loss of ½ × (70−50) × (50−30) = 200. On the other hand, the cartel leads to costs saving of (50−40)×30 = 300. So, on balance this cartel is welfare enhancing. There is also redistribution involved. The price increase leads to a profit for the cartel and harm for the customers.[5]

Figure 1. An efficient cartel

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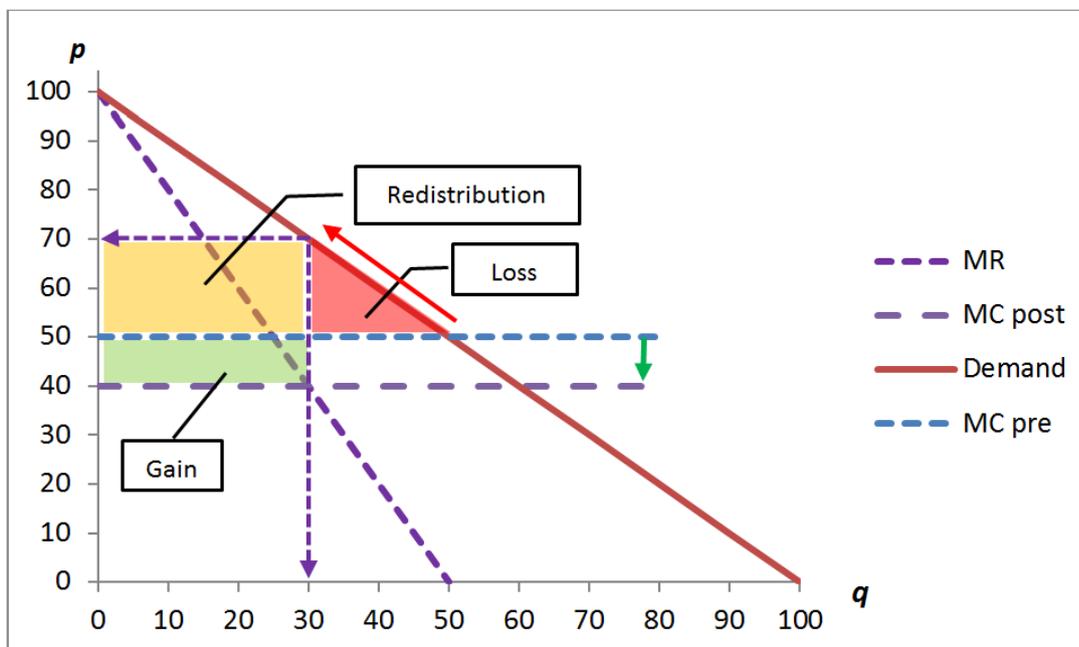
[4]   Cf. Motta (2004: 238).
[5]   Cf. Niels et al. (2011: 337). The idea of weighing the deadweight loss due to price increases and efficiency gains due to costs savings was put forward in a seminal paper by Williamson (1968). See also Williamson (1977).

From an efficiency point of view, preventing inefficient cartels and not deterring efficient cartels would be desirable. This appears to be the intention of EU competition policy. Art. 101(1) TFEU prohibits agreements between undertakings that prevent, distort or restrict competition. Art. 101(3) formulates an exception to this rule for agreements that generate efficiency gains.[6] In practice it is important to avoid false positives (prohibiting efficient cartels) and false negatives (not prohibiting inefficient cartels).[7]

Does the directive help in increasing efficiency?

We consider:

    a. Public enforcement only
    b. Private damages actions only
    c. The interplay between public enforcement and private damages actions

3. Public enforcement only

Public enforcement may influence behaviour by introducing a probability of detection and a fine. We start with the standard law and economics model to analyse the consequences.[8] In theory, public enforcement may result in an optimal outcome. In practice, a number of problems can be expected. First, public enforcement may lead to under deterrence. This is the case if the actual probability of detection or the level of the fine is "too low", given the fine. Second, public enforcement does not provide compensation for damages suffered by victims. Third, there are costs involved in public enforcement.

       Figure 2 presents an overview of the situation. A cartel is faced with probability of detection, P^p. In case of detection, the cartel will be fined. The fine is equal to F. Consequently, the expected fine is equal to P^pF. The cartel will be effectively discouraged if the expected fine is larger than the expected profit. The fines imposed by the European Commission and national (European) competition authorities are related to total turnover of a cartel member. The maximum fine is typically 10% of turnover.

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[6]   Guidelines on the application of Article 81(3) of the Treaty. Official Journal of the European Community, 27-04-2004.

[7]   Ideally, competition law yields an efficient outcome. Posner (1999: 11) suggests that this actually is the case. "There is a remarkable isomorphism between legal doctrine and economic theory. The isomorphism becomes an identity when, as in antitrust (but not only there), the law adopts an explicitly economic criterion of legality."

[8]   Cf. Harrison and Theeuwes (2008: 401).

Figure 2. Public enforcement only
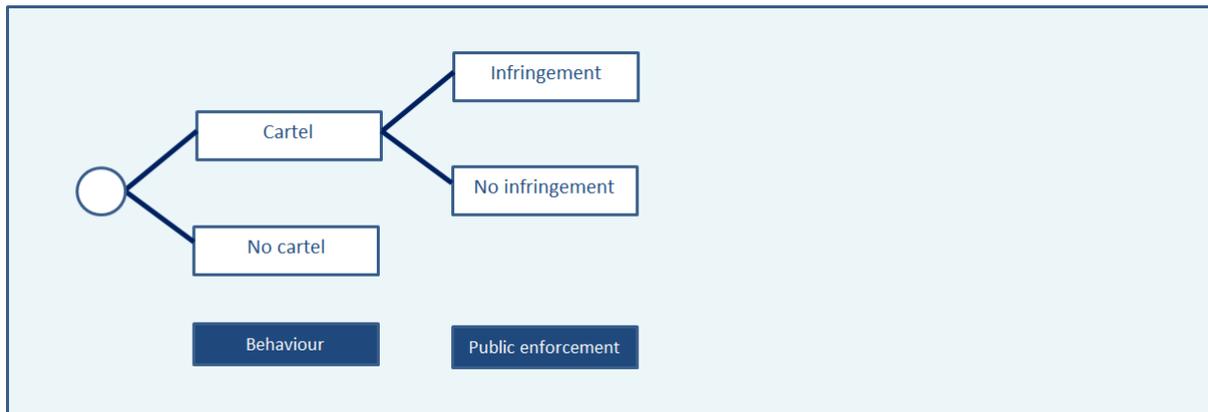
Example: Public enforcement only

Consider the example in Figure 3. Assume that the pre-cartel situation is in perfect competition equilibrium. The equilibrium price is 40 and the quantity is 60. Assume that the cartel leads to a monopoly situation: q = 30 and p = 70. The cartel profit is equal to (70-40)×30 = 900. Assume that the fine is 10% of the total revenue, i.e. 0.1×(70×30) = 210. Then: the cartel will be effectively discouraged if $(1-P^P)$×900 ≤ P^P×210. The critical level of P^p is 81.08%.

Figure 3. Example
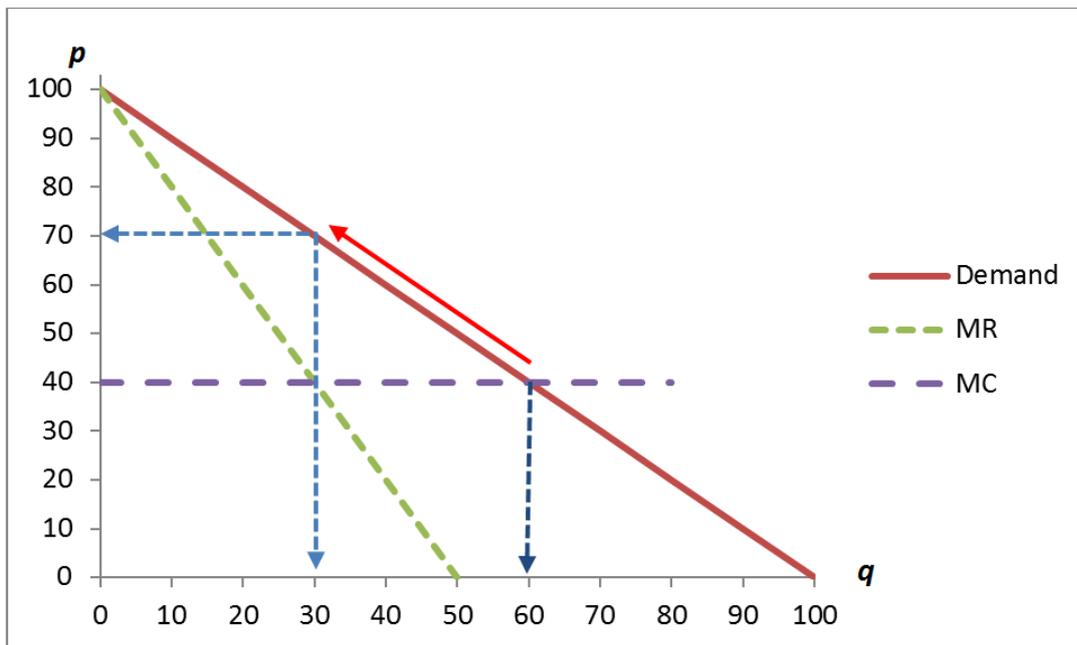
4. Private damages actions only

By raising prices a cartel may cause harm to "victims". Victims of infringements of EU antitrust law may claim damages. As explained in Directive 2014/104/EU victims have a right to claim *full compensation*: "Full compensation shall place a person who has suffered harm in the position in which that person would have been had the infringement of competition law not been committed."[9] Under ideal-typical circumstances, the principle of full compensation will lead to an efficient outcome.[10] In reality, the deterrent effect will depend on the circumstances. To analyse the consequences we use the so-called "optimism model".[11] The analysis is based on three questions:

1. If a cartel is formed and prices are raised, may the victims credibly threaten to bring suit?
2. In case of a credible threat: what is the cartel's best option: making a settlement offer which is acceptable to the victim or allowing things to develop into a trial?
3. Given the answers to the first two questions: is the formation of a cartel effectively discouraged?

Ad 1. Credible threat?

Assume that cartel C has caused harm *H*, *H* > 0, to victim V. V wants to hold the cartel liable. Let V's subjective probability of success in a trial be given by P_v, $0 \leq P_v \leq 1$. If V prevails in the trial, the cartel has to fully compensate harm H. We assume that the European Continental rule for allocating legal costs applies, implying that the loser in a trial not only has to pay his own legal costs, but also those of the winner.[12] Total legal costs are given by *K*. Then, *V's expected net benefit of litigation* is equal to: $P_vH-(1-P_v)K$. V may credibly threaten to bring suit, if $P_vH-(1-P_v)K > 0$.

Ad 2. Settlement of trial?

If the victim can credibly threaten to bring suit, then the cartel may try to settle the dispute out of court. In order to be acceptable for V, the settlement amount must be (at least) equal to V's expected net benefit of litigation. If the cartel does not make an acceptable settlement offer, the parties will end up in court. Let the cartel's subjective probability of prevailing in court be P_c. Then the cartel's expected costs of litigation are equal to $(1-P_c)(H+K)$. A settlement will be obtained if $0 < P_vH-(1-P_v)K \leq (1-P_c)(H+K)$.[13] If there is room for a settlement, we assume that the cartel makes a settlement offer that is just acceptable for the victim, i.e. the settlement amount *S* is equal to the victim's expected net benefit of litigation: $S= P_vH-(1-P_v)K$.

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9   Directive 2014/104/EU, art. 3.

10   An extensive analysis of the consequences of liability can be found in Shavell (1987).

11   Seminal paper in the field are: Gould (1973), Landes (1971), Posner (1973)and Shavell (1982). The model in this paper is based on the model presented in Van Velthoven and Van Wijck (2001).

12   A distinction can be made between the American and the Continental rule for allocation legal costs. Under the American rule each party bears its own costs. Under the Continental (or British) rule the losing party bears all the costs. See for instance Shavell (1982: 59-60) or: Van Wijck and Van Velthoven (2000).

13   Only if P_V and P_C add up to a number larger than 1, the conflict may lead to a trial. For that reason, the model is called "the optimism model".

Ad 3. Cartel or no cartel?

The question of whether the formation of the cartel will be effectively discouraged depends on whether the cartel's expected profits are larger or smaller than the costs associated with a settlement of a trial. More specifically, the cartel will be effectively discouraged if the victim can credibly threaten to bring suit and the expected profit is smaller than *min [$P_vH-(1-P_v)K$, $(1-P_c)(H+K)$]*.

Figure 4. Private damages actions only
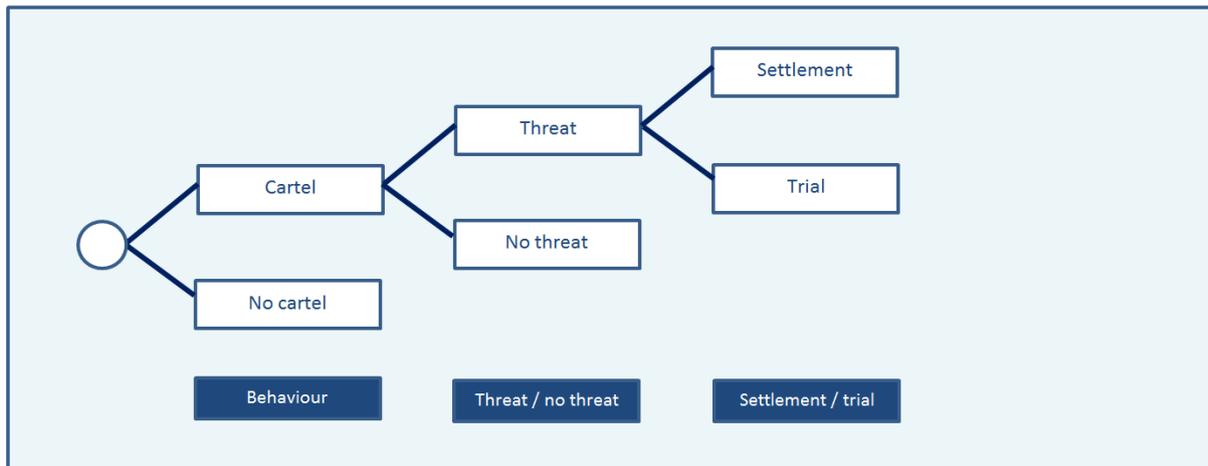
Example: Private damages actions only

Assume: P_V = 0.8, P_C = 0.2, H = 900 and K = 200. Then the answers to the three questions are:

1. Credible threat, since 0.8×900 – 0.2×100 = 700 > 0.
2. Settlement, since 700 < (1–0.2)×(900+100).
3. Cartel, since 700 < 900.

NB: If it is perfectly clear that the victim will prevail, i.e. P_V =1 and P_C = 0, then the outcome will be "No cartel". The reason is that there would be a settlement equal to the profit (900): the formation of an inefficient cartel will be effectively discouraged.

5. Interplay between public enforcement and private damages actions

Both public enforcement and private damages actions may influence behaviour. We analyse the interplay between both systems and investigate the consequences for behaviour and welfare. In this we assume a specific sequence: public enforcement is assumed to precede private damages actions. More specifically, we assume the sequences depicted in Figure 5.

Figure 5. Interplay between public enforcement and private damages actions
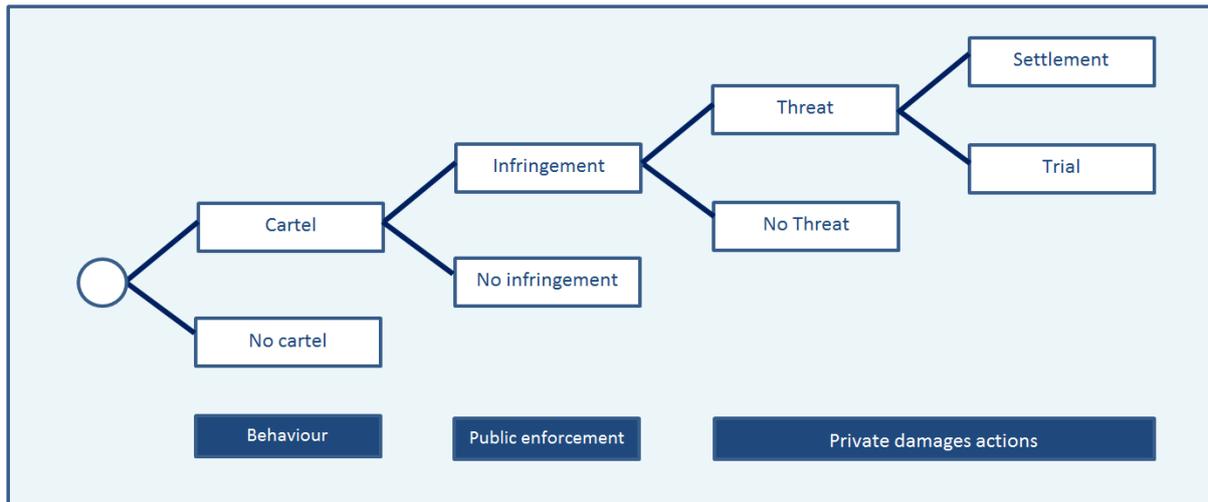
- If public enforcement leads to the conclusion that there is no infringement of competition law, than private damages actions are virtually impossible. That is: the probability that a "victim" will prevail in a trial is zero. Consequently, the victim cannot credibly threaten to bring suit.
- If public enforcement leads to the conclusion that there is an infringement of competition law, than the probability that a "victim" will prevail in a trial is positive. Depending on the circumstances, the victim may credibly threaten to bring suit and this will result in a settlement or a trial.
- The possibility of private damages actions, that may take place after public enforcement of antitrust law, may increase the deterrent function of antitrust law. Whether or not this is the case, depends on the circumstances. More specifically, it depends on whether the victim can credibly threaten to bring suit.

The question of whether the possibility of private damages actions leads to an increase of the deterrent function of competition law depends on the influence of expected costs. And this depends on whether victims may credibly threaten to bring suit:

- If $P_vH-(1-P_v)K > 0$, then expected costs are: $P^p\{F + min\ [P_vH-(1-P_v)K,\ (1-P_c)(H+K)]\}$
- If $P_vH-(1-P_v)K \leq 0$, then expected costs are: P^pF (expected costs in case of public enforcement only).

6. Conclusions and discussion

Directive 2014/104/EU intends to remove practical obstacles to compensation for all victims of infringements of EU antitrust law. In general, liability rules do not only serve a compensation goal.[14] These rules may also influence behaviour and efficiency. In this paper we focussed on implication for behaviour and efficiency. We discussed a number of implications.

1. Due to an improvement of opportunities for private damages actions potential cartelists may be faced with an increase in expected costs. Therefore, they may refrain from entering into a cartel. Consequently, the deterrent function of competition law may be strengthened.
2. If an improvement of opportunities for private damages actions leads to an increase in potential cartelist's expected costs, we may observe a decrease in the critical level of P^p (the minimum probability of detection that leads to deterrence). Consequently, a decrease in public enforcement costs may be obtained.
3. We can expect an increase in the number of conflicts leading to trials and, therefore, an increase in private enforcement costs.

The implications of the possibility of private damages actions depend on a number of factors:

1. The level of harm suffered by victims (customers paying an overcharge) is a first factor. For relatively low levels of harm, victims may not credibly threaten to bring suit, implying that the possibility of private damages actions effectively had no consequences at all.
2. The subjective probabilities of the parties constitute a second factor. Characteristic for the "optimism model" is that a necessary condition for a trial to occur is that parties collectively overestimate their chances. The subjective probabilities are partly determined by jurisprudence. The development of jurisprudence may lead to a convergence of subjective probabilities and, therefore, to an increase in settlement rates.
3. The level of legal costs affects whether a victim may credibly threaten to bring suit and whether a dispute will lead to a settlement or a trial. Therefore, the level of legal costs has an influence of behaviour of potential cartelists and efficiency.

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[14]   Dewees, Duff and Trebilcock (1996: 5-8) distinguish three objectives of the tort system: deterrence, compensation and corrective justice.

In the preceding sections we made a number of restrictive assumptions. Relaxing these assumptions yields a number of potential extensions of the analysis.

We treated the (potential) cartel as a single actor. This actor decides whether or not to act as a cartel. Furthermore, this actor decides on paying damages. A potential extension would be to consider the individual decisions of parties to enter into a cartel. "Where several undertakings infringe the competition rules jointly, as in the case of a cartel, it is appropriate to make provision for those co-infringers to be held jointly and severally liable for the entire harm caused by the infringement".[15] We could, therefor, investigate the incentives for individual parties if joint and several liability is introduced.[16]

We treated the victim as a single actor (threatening to bring suit). In fact, if a cartel decides to increase prices, there will generally be a large number of victims. We could analyse the implications, for instance by studying the consequences of collective action and mass disputes.

We did not discuss the possibility of pass-on. Pass-on effects may influence the amount of harm suffered by customers. "When an injured party has reduced its actual loss by passing it on, entirely or in part, to its own purchasers, the loss which has been passed on no longer constitutes harm for which the party that passed it on needs to be compensated".[17] It is possible to consider pass-on and discuss the relation with the prevailing market conditions.[18]

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[15]   Directive 2014/104/EU, consideration 37.
[16]   Cf. Kornhauser (2013).
[17]   Directive 2014/104/EU, consideration 17.
[18]   Cf. Verboven and Van Dijk (2009), RBB Economics (2012, 2014). In the Annex it will be shown that the possibility of pass-on may influence the minimum deterrent probability.

Annex

A. Assumptions: Perfect competition, customers are consumers

Assumptions:[19]

1. Constant marginal costs of production are equal for each competitor and equal to *c*
2. Textbook static cartel (= monopoly)
3. Linear demand

Therefore the competitive price is equal to *c* and profits are individually zero.

The cartel price is the monopoly price as determined by the same demand curve as for perfect competition and by marginal costs of *c*. Cartel profits are $(p^M - c)q^M$, with p^M = monopoly price and q^M is monopoly quantity.

Define $m = (p^M - c)/p^M$

This is the Lerner-index. This index is called the 'overcharge' in damages litigations cases.[20]

Cartel turnover is $p^M q^M = O$.

Cartel profits can therefore be rewritten as mO:

$$mO = [(p^M - c)/p^M] \times p^M q^M = (p^M - c)q^M$$

Cartel damages in damages litigations are typically defined as the distributional effects of the cartel: a deadweight loss may be considered as damages, however are harder to prove. Therefore mO also determines damages in private litigations cases (in our model).

As customers are consumers, there is no 'pass on'. Pass on means that a customer from a cartel may be able to increase his own prices and passes on (part of) the cartel's price increase. This customer therefore does not suffer damages to the extent that cartel input price increases have been passed on by the customer's higher selling price of its product.

Including the deadweight loss in the damages would imply including 0.5mO, so that total damages would amount to 1.5 mO. We will only discuss the distributional damages.

B. Public enforcement probability leading to deterence

The public enforcement probability of cartel detection is P^p. We assume that private litigation is possible only when a cartel was publicly detected.

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[19]   Perfect competition is assumed for simplicity. Alternatively Cournot or Bertrand competition could have been assumed (Bertrand competition with homogeneous or heterogeneous products).
[20]   See e.g. Practical Guide Quantifying Harm in Actions for Damages Based on Breaches of Article 101 or 102 of the Treaty on the Functioning of the European Union **(**http://ec.europa.eu/competition/antitrust/actionsdamages/quantification_guide_en.pdf), p. 128.

A deterrent effect on cartel behaviour exists when the expected profits of the cartel are lower than the expected costs. Expected costs are determined by the detection probability, the competition authority's fine and the effects of private litigation.

Effects of private litigations are denoted in general by *E*: *E* can be either a settlement amount or damages compensation as ordered by the court.

Define all costs of a private law suit by *K*. These costs include the defendant's and the victim's costs of litigation to be paid by the party that will lose the law suit.

Assumption: *E* in case of a law suit will equal damages *mO* plus *K*.

A competition authority's fine is supposed to be the maximum possible, i.e. 0.1*O.*

A cartel will be deterred if:

$(1-P^P)mO \leq P^P(0.1O + E)$,

or

$(1-P^P)m \leq P^P(0.1+ E/O)$

or

$$P^P \geq \frac{m}{0.1 + m + E/O}$$

If damages are fully compensated and *K* would be zero, then *E/O = m*

It follows that:

$$(1) \quad P^P \geq \frac{m}{0.1 + 2m}$$

C. Influence of litigation

Cartel victims (V) are supposed to be one party with one claim equal to *mO*.

V's subjective probability of winning a law suit is P_V and C's (the cartel's) subjective probability of winning a law suit is P_C.

Note that C's subjective probability of winning a law suit P_C may be seen as C's subjective guess about V's probability of losing the case, so that the higher P_C, the higher the probability that V will lose according to C, independent (generally speaking) of V's subjective probability of winning or losing the case. It follows that in general:[21]

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[21]   Of course, subjective probabilities are formed by information, so that in case of perfect information about actually losing or winning it must follow that $P_C+P_V = 1$.

$P_C + P_V \neq 1$

V and C are assumed to be risk neutral.

V's expected gains from a law suit are

$P_V mO - (1 - P_V)K$

If $P_V mO - (1 - P_V)K \leq 0$, then V cannot credibly threaten to go to court, hence a settlement will not be reached, so that *E=0.*

This means that the deterrence formula becomes:

$$(2) \; P^P \geq \frac{m}{0,1 + m}$$

If P^P is equal to the right hand side in case of (1) or (2), it is called the minimum probability of deterrence.
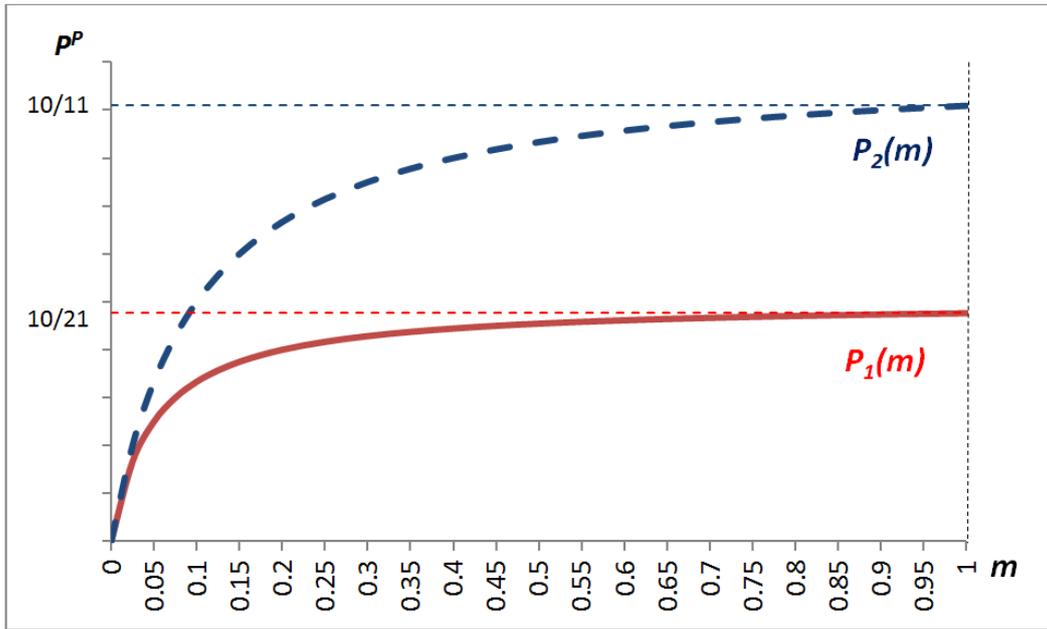
Define

$P_{(1)}(m) = \dfrac{m}{0,1 + 2m}$

$P_{(2)}(m) = \dfrac{m}{0,1 + m}$

$P_{(i)}(m)$, *i* = 1,2 are increasing concave functions of *m*, starting at the origin and $P_{(1)}(m) < P_{(2)}(m)$ for all *m* > 0.

For *m* = 1 (the largest value possible)*, $P_{(1)}(1)$ = 10/21 en $P_{(2)}(1)$ = 10/11.*

Figure A.1 shows these two curves.

Figure A.1. Minimum deterrent probabilities as a function of overcharge

$P_{(1)}(m)$ is the minimum deterrent probability if damages are fully compensated with zero litigations costs K.

$P_{(2)}(m)$ is the minimum deterrent probability in case of administrative fines only.

The necessary condition for damages compensation is

$P_V mO - (1-P_V)K > 0$

or

$$P_V \geq \frac{K}{mO + K}$$

Define $K/O = k$ that measures litigations costs as a fraction of cartel turnover. A 'large' (high turnover) cartel implies lower k.

So:

$$(3)\ P_V \geq \frac{k}{m + k}$$

The potential settlement amount S will then be

$S = P_V mO - (1-P_V)K \geq 0$

or

$S/O = P_V m - (1-P_V)k \geq 0$

14

If this amount is lower than the expected outcome of a lawsuit, settlement will follow:

$(1-P_C)(mO+K) \geq S$

or

$P_C(m+k) \geq P_V m - (1-P_V)k$

or

$$(4) \; P_V + P_C \leq 1 + \frac{k}{m+k}$$

Because of (3):

$$P_C \leq 1 + \frac{k}{m+k} - P_V \leq 1$$

If C or V (or both) thinks that the probability of winning a lawsuit will be sufficiently low (expressed by (4)) a settlement will follow.

Settlement

If settled:

$E/O = S/O = P_V m - (1-P_V)k$

The deterrent probability is defined by

$$P^P \geq \frac{m}{0.1 + m + E/_O}$$

Define the lowest value as the minimum deterrent probability:

$$P(m) = \frac{m}{0.1 + m + E/_O}$$

Define $P(m)$ in case of settlement as

$$P_S(m) = \frac{m}{0.1 + m + P_V m - (1-P_V)k}$$

or

$$P_S(m) = \frac{m}{0.1 + m + P_V(m+k) - k}$$

And

$$(5) \; m \geq P_V m - (1-P_V)k \geq 0$$

Law suit

If a law suit follows:

$(1-P_C)(mO+K) \leq S$

So

$E = (1-P_C)(mO+K)$

Or

$E/O = (1-P_C)(m+k)$

De minimum deterrent probability in case of a trial equals

$$P_L(m) = \frac{m}{0.1 + m + (1 - P_C)(m + k)}$$

$m \geq P_V m - (1-P_V)k \geq (1-P_C)(m+k) \geq 0$

So

$$1 - P_C \leq P_V - \frac{k}{m + k}$$

Also, because of (3):

$$P_V - \frac{k}{m + k} \geq 0$$

If $P_V = k/(m+k)$, then $P_C = 1$

If $P_V = 1$, then $(1-P_C) \leq m/(m+k)$ so that the lowest value for P_C is $k/(m+k)$, or

$$(6) \quad 1 \geq P_C \geq k/(m+k)$$

in which case $P_L(m)$ becomes $P_{(1)}(m) = \dfrac{m}{0.1+2m}$

Corollaries

    a. $0 \leq E/O \leq m$

       Proof: $E/O \geq 0$ follows trivially
       Suppose $E/O > m$:
       - if settled, a contradiction follows because of (5)
       - in case of trial: $E/O = (1-P_C)(m+k) > m$, so that $P_c < k/(m+k)$, which is a contradiction because
       of (6)

    b.   For all $m \geq 0$: $P_{(2)}(m) \geq P(m) \geq P_{(1)}(m)$

       Proof: $P(m)$ is a continuous, decreasing function of E/O; if $E/O=0$, then $P(m) = P_{(2)}(m)$ and if

E/O = m, P(m)= P(1)(m).

c. *P(m) = P(1)(m)* if and only if
   P_V=1 and (1–P_C) ≥ m/(m+k);

   Proof of *P(m) = P(1)(m)* → *P(V)=1* and *(1–P(C)) ≥ m/(m+k)*
   First assume P_S(m)= P(1)(m), then it must be that P_V=1, but also (because of the settlement) *(1–P(C)) ≥ m/(m+k).*
   Now assume that P_R(m)= P(1)(m), then (1–P_C)=m/(m+k), but because of a trial *P(V)m – (1–P(V))k ≥ (1–P(C))(m+k)=m,* hence *P(V)(m+k) –k≥m,* consequently *P(V)=1.*

   Proof of *P(V)=1* and *(1–P(C)) ≥ m/(m+k)* → *P(m) = P(1)(m)*
   If *P(V)=1* and *(1–P(C)) ≥ m/(m+k)* a settlement follows, so P_S(m)= P(1)(m)

d. *P(m) = P(1)(m)* and *k=0* then *(1–P(C)) =P(V)=1.*

   Proof: combine corollary *c.* and *k=0*.

Corollary *c.* means that maximal deterrence will only be possible if and only if V knows with certainty that a trial will be won, and C is insufficiently sure to win the trial. C will then settle and trial costs will be avoided, so that full compensation will be paid.

D. *Taking account of 'gravity' of the cartel*

We assumed above that fines are always equal to 0.1O. However, a cartel may not be effective in realizing monopoly profits and fines may be adjusted downward according to the 'seriousness' or gravity of the cartel.

Assume that the cartel price is *p*, so that $p^M ≥ p ≥ c$ and *m* now denotes *(p-c)/p* rather than the monopoly overcharge, that will now be denoted by $m^M = (p^M – c)/ p^M$.

Hence, for $p^M ≥ p ≥ c$:[22]

$m^M ≥ m ≥ 0$

Gravity may be captured by the 'fine percentage'

¥(m)=0,1m/ m^M

If *m = 0*, the fine is 0 and if *m = m^M* the fine is 0.1O.

The minimum deterrent probability in case of a settlement becomes:

$$P_S(m) = \frac{m}{\frac{0.1}{m^M}m + m + P_V m - (1 - P_V)k}$$

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[22] Note that *m* is an increasing concave function of *p*.

$P_V m - (1 - P_V)k \geq 0$, in case of settlement, or

$$m^M \geq m \geq \frac{(1 - P_V)k}{P_V} \geq 0$$

Assume $m = \frac{(1-P_V)k}{P_V}$ then

$$P_S\left(\frac{(1 - P_V)k}{P_V}\right) = \frac{1}{\dfrac{0.1}{m^M} + 1}$$

Also, for

$$m^M \geq m \geq \frac{(1 - P_V)k}{P_V} \geq 0$$

$P_S(m)$ is a decreasing function in m, so that the minimum deterrent probability becomes smaller the more serious is the cartel (given settlement):

$(1 - P_C) \geq P_V - \frac{k}{m+k} \geq 0$ for all $m \geq \frac{(1-P_V)k}{P_V} \geq 0$

In case of a trial:

$$P_L(m) = \frac{m}{\dfrac{0.1}{m^M}m + m + (1 - P_C)(m + k)}$$

For $m = \frac{(1-P_V)k}{P_V} \geq 0$:

$$P_L\left(\frac{(1 - P_V)k}{P_V}\right) = \frac{1}{\dfrac{0.1}{m^M} + 1 + \dfrac{(1 - P_C)}{(1 - P_V)}}$$

$P_L(m)$ is an increasing function in m.[23]

E. *Pass on: Customers are downstream suppliers*

Assumptions:

- Customers are price takers;
- The cartel increases the price to customers;

We distinguish two situations:

a. Customers of the cartel are suppliers on a perfectly competitive market;
b. One or more customers are a monopolist as a supplier on the downstream market.[24]

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[23] Note that $P(m^M) \geq P\left(\frac{(1-P_V)k}{P_V}\right)$, using $(1-P_V) \leq m/(m+k)$.

Ad a.

Customers' marginal costs just consist of their suppliers' prices. Suppliers have marginal costs *c*. Denote the customers' purchase price as *p*, then without a suppliers cartel:

p=c

Customers' own selling prices on the downstream market are denoted by p^D, so in case of perfect competition downstream:

$p^D = p = c$

In case of the cartel:

$p = p^M > c$

Hence:

$p^D = p = p^M$

The cartel's customers therefore do not have damages, because these are passed on completely to their own customers.

Ad b.

If a customer is a monopolist himself downstream, the cartel will lead to double marginalization.

Purchase price *p=c* before cartel will lead to the same monopoly price on the downstream market as determined in the first section above, now denoted by p^{DM}.

Assume that final demand is:

$p^D = -\delta q + \gamma$

then demand upstream is determined by

$p = -2\delta q + \gamma = -\alpha q + \gamma$

The cartel price becomes

$p^M = (\gamma + c)/2$

The selling price downstream is

$p^{DM}_V = (3\gamma + c)/4$

Without the cartel, the downstream price would have been:

$p^{DM} = (\gamma + c)/2$

The difference is

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[24] At least the customer has some market power.

$p^{DM}_V - p^{DM} = (3\gamma+c)/4 - (\gamma+c)/2 = (\gamma-c)/4 > 0$

The difference in the purchase price is

$p^M - c = (\gamma+c)/2 - c = (\gamma-c)/2$

The overcharge is $m = (p^M - c)/p^M$

Part of this overcharge is passed on to downstream consumers: $(p^{DM}_V - p^{DM})/p^M$ so the actual damage to the direct customer of the cartel is:

$m - (p^{DM}_V - p^{DM})/p^M = [(\gamma-c)/2 - (\gamma-c)/4]/p^M = [(\gamma-c)/4]/p^M = \frac{1}{2}[(\gamma-c)/2]/p^M = \frac{1}{2}m$.

The customer now has lower profits, too, that may count as damages. This is easiest to see in a graph (Figure A.2).

Before the cartel profits for the suppliers upstream are zero ($p=c$), but due to market power on the downstream market, customers of the cartel (suppliers on the downstream market), the selling price to consumers is $p^{DM} = (\gamma+c)/2$. Profits to the downstream suppliers are equal to area B+C in Figure A.2.

Figure A.2. Overcharge and pass on
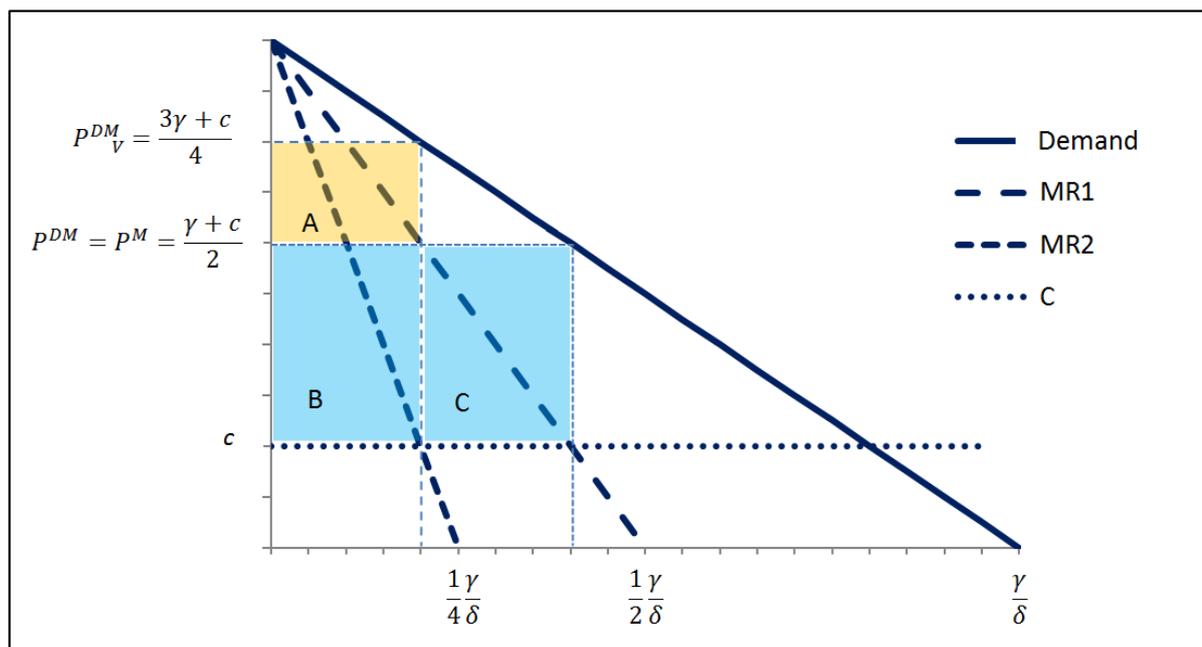
After a cartel is established, the price to customers becomes $p^M = (\gamma+c)/2$ (which is equal to the price for consumers in the absence of a cartel). This higher purchasing price for the cartels' customers will lead to the higher selling price to consumers downstream of $p^{DM}_V = (3\gamma+c)/4$. Profits for the cartel's customers are now equal to area A in Figure A.2.

The overcharge damages are equal to area B, but there is a loss of profit due to the output decrease of area C. Part of both losses are recaptured by the profits as determined by area A (pass on effect).

The minimum deterrent probability will decrease (because damages will be lower). There will be less private damages litigations as a consequence and the probability of settlements will decrease as compared to the results of the first section.

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