The Determination of Optimal Fines in Cartel Cases:
The Myth of Underdeterrence

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1. « The determination of optimal fines in cartel cases: Theory and practice »
   Concurrences 4-2011 (Allain, Boyer, Ponssard)
2. http://www.cirano.qc.ca/pdf/publication/2011s-35.pdf (Boyer, Kotchoni)
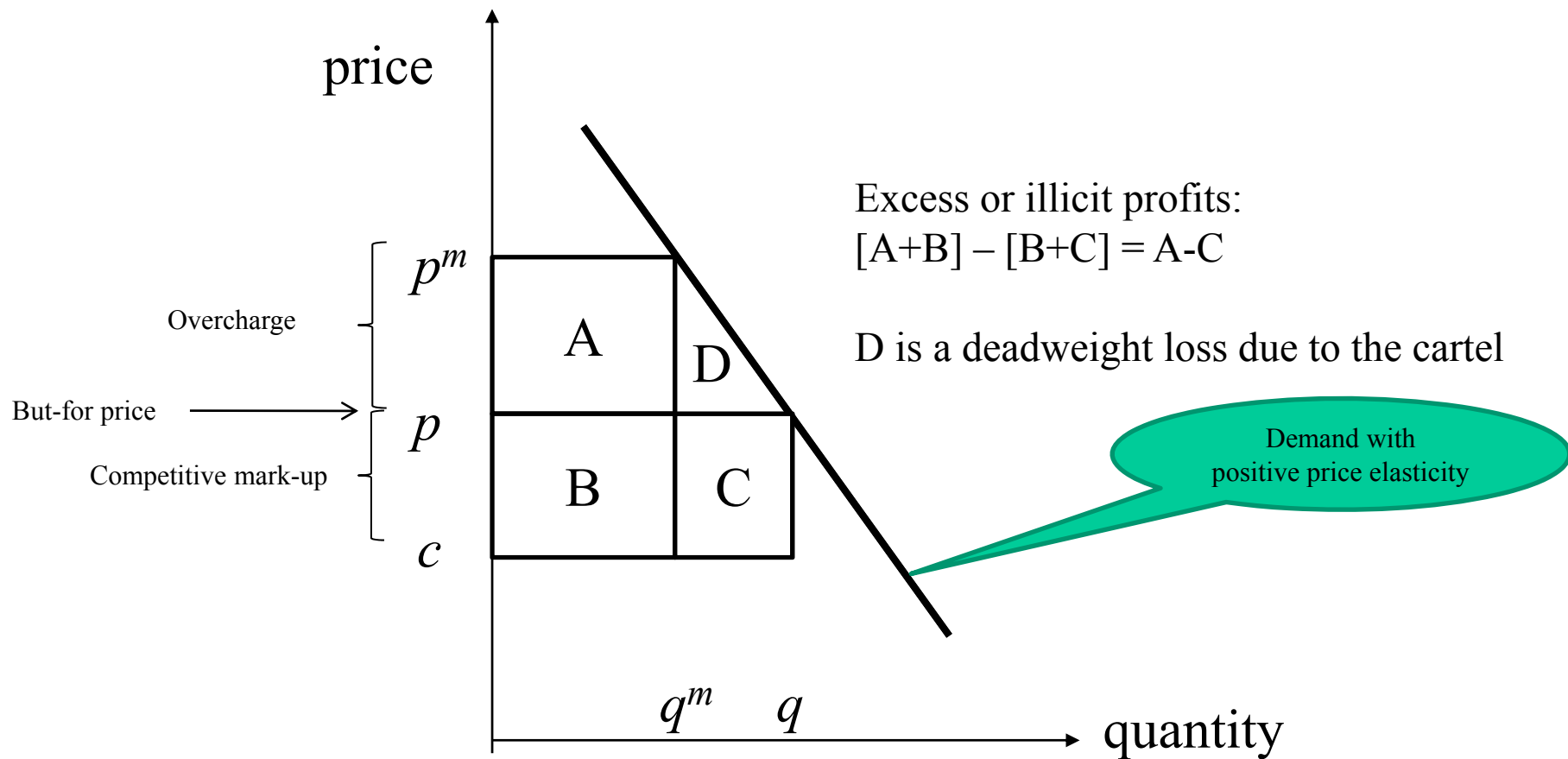3. http://www.cirano.qc.ca/pdf/publication/2011s-34.pdf (Allain, Boyer, Kotchoni, Ponssard)

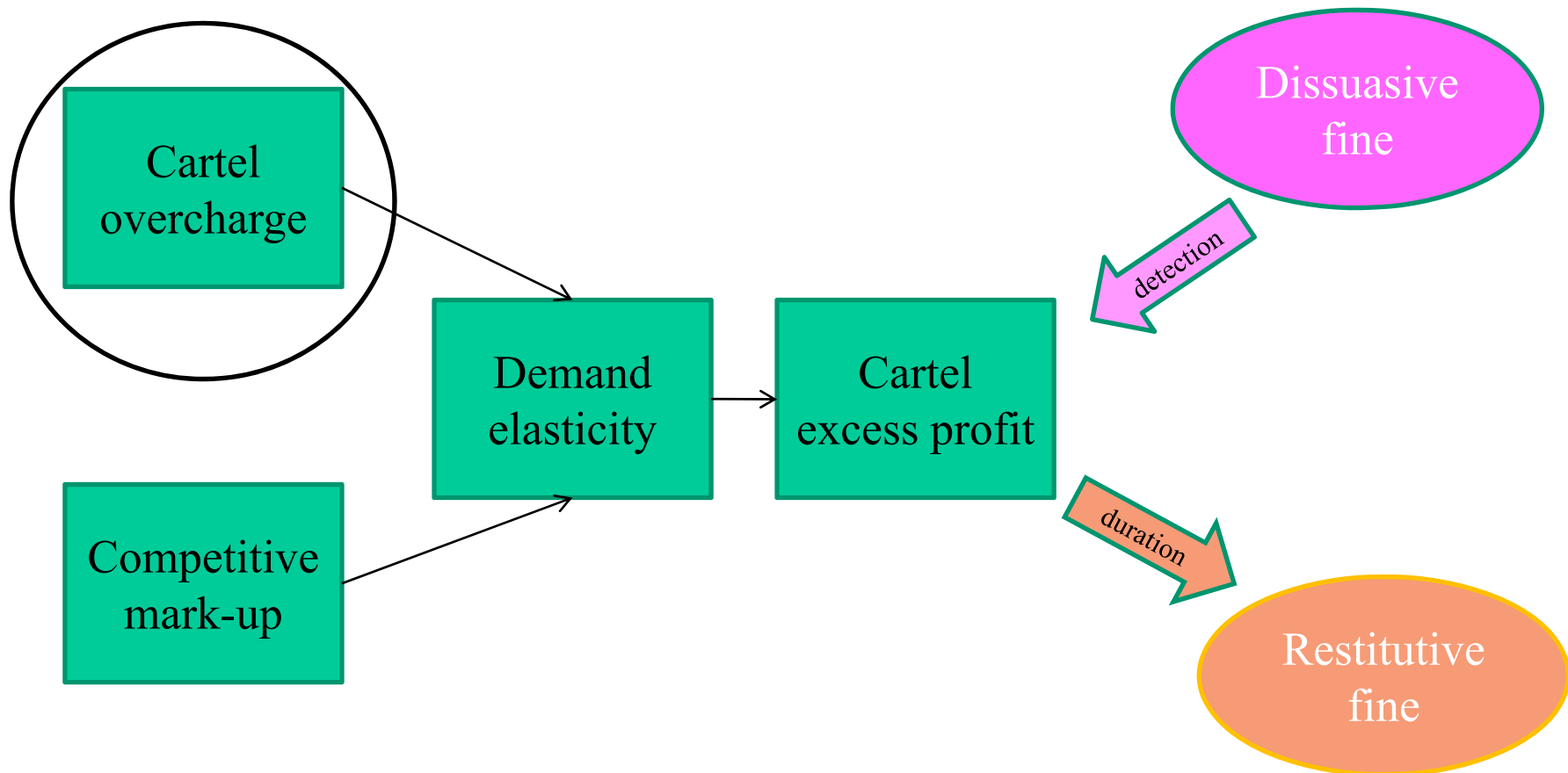**Conference in honor of Michel Moreaux, Toulouse, November 18, 2011.**

THE MAIN POINTS

1. The level of fines recently inflicted by the EU antitrust authority:
    293 million € (10 cases) over the period 1995-1999
    3 500 million € (30 cases) over the period 2000-2004
    9 800 million € (33 cases) over the period 2005-2009.

2. A number of authors have claimed that the current level is <u>still much too low</u> to deter cartels: Connor (2010), Combe and Monnier (2010) are two important studies (which make the present one feasible)

3. Their arguments are based on <u>a</u> measure of cartel overcharges and <u>a</u> theory of deterrence (dissuasive fines)

4. We question their measure and theory, point out a number of flaws in their analyses, and revisit their judgment on the recent level of fines

5. Our conclusion is that the recent level of fines is appropriate and adequately dissuasive

6. Some recommendations for settings cartel fines are discussed

The cartel excess profit depends on the cartel overcharge, the competitive mark-up and the demand elasticity

price

Excess or illicit profits:
[A+B] – [B+C] = A-C

D is a deadweight loss due to the cartel

p^m

Overcharge

But-for price

p

Competitive mark-up

A

D

B

C

c

Demand with positive price elasticity

q^m q

quantity

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Evaluation of the cartel overcharge (main reference Connor, 2006... 2010)

Determining the Representative Mean/Median
of Overcharge Estimates

1. Our analysis of the Connor database, which contains 1120 studies or analyses of cartels over time and regions, shows (see Figure 3 and Table 1 of the BK paper):

   - A large number of relatively small values, small number of very large values: outliers or influential observations create biases in the characterization of a representative mean overcharge estimate.

   - A large number of zero overcharge estimates (7.2%) and a large number of large overcharges ≥50% (22.6% with an average overcharge estimate of 137.3%):
     - ❖ zero overcharges may be negative rounded up to 0 (mass probability at 0);
     - ❖ ≥50% overcharges may not be fully credible in light of economic theory. Cohen and Scheffman: "*Price increases of 10% or more are beyond belief*"

   - The mean overcharge estimate is 45.5% overall, 49% for strictly positive estimates, which may not be fully credible as averages; when the 5% largest overcharges are left out: from 49% to 32%; the average is 20.6% for cartels with positive overcharge estimates less than 50%. (For more, see Table 1 of the BK paper)

   - Some overcharge estimates are misinterpreted (p^m versus p) and/or exaggerated (Lerner index)

2. Overcharge estimates are explained by two different sets of variables:

      a) those logically and directly related to overcharges, the Y variables:

            duration

            scope (domestic or international)

            bid-rigging or not

            found or pleaded guilty or not

            region

            period (law regime)

      b) those that are not, the Z variables:

            estimation method

            publication media

3. Meta-analysis (analysis of analyses) serves to purge the results from abnormal or contextual influence

4. Bias-corrected overcharge estimates are obtained by taking out the statistically significant effects of the two bias-capturing or abnormally influent Z variables

5. The significant heterogeneity in the data requires that sophisticated econometric techniques be applied:

- Outliers (0% and ≥50%) must be excluded for two reasons: (1) their inclusion creates biases – see subsection 5.1 of the BK paper - and distorts the relevancy of the results (our subsample: 786 cartels or 70% of cartels in the database); (b) they may not be fully credible or reasonable based on economic theory. Cohen and Scheffman: "*Price increases of 10% or more are beyond belief*" and *"the Justice Department's assertion that price-fixing conspiracies would typically result in a mark-up over competitive level of ten percent […] is not supported by the available evidence. […] This conclusion has important implications because of the potential inefficiencies that may arise from overdeterrence"*

- But this may create a loss of information problem (a sample selection bias). We use Heckman methodology to deal with this sample selection problem, an advanced but well documented method in statistical fields/applications. It is widely used in many "statistical fields", including economics, medicine, labor studies, psychology, social studies, and others (J. Heckman, 2000 Nobel prize)

- Four homogenous clusters (groups of cartels) are constructed to account for the remaining heterogeneity in the data. The purpose is to allow the bias in overcharge estimates to vary across the different clusters. It does.

- We use linear and <u>log-linear</u> specifications to ensure a better control of the heterogeneity and a better fit

Main Econometric Results (BK paper)

1. Our results show that the bias captured by variables Z (estimation method and publication source) is substantial and economically significant.

2. The bias-corrected mean and median estimates obtained by neutralizing the effects of those bias-capturing variables suggest that the mean bias-corrected overcharge estimate for cartels with raw positive overcharge estimates under 50% (the bulk of cartel cases) is approximately **13.6%** with a median of **13.6%**, while the mean for all cartels of all types is **17.5%** with a median of **14.1%**. These values must be considered as <u>upper bounds</u> (given our conservative assumptions).

3. In the present context, the median values are more informative and reliable as representative characteristics of cartel behavior.

4. The bias-corrected overcharge estimates reveal a more homogenous behaviour of cartels across different types, geographical locations and periods than suggested by the raw overcharge estimates: *a cartel is a cartel is a cartel*.

Assessing Excess Cartel Profits
(Buccirossi & Spagnolo 2007, as used in Combe and Monnier 2010)

1. Buccirossi and Spagnolo (2007) "old-method": $\Delta\pi$ is a function of the cartel overcharge k, the competitive mark-up m and the elasticity of demand (and sales) e

$$\Delta\pi / S = k[(1 + m)(1 - ek) - em] / [(1 + m)(1 + k)(1 - ek)]$$
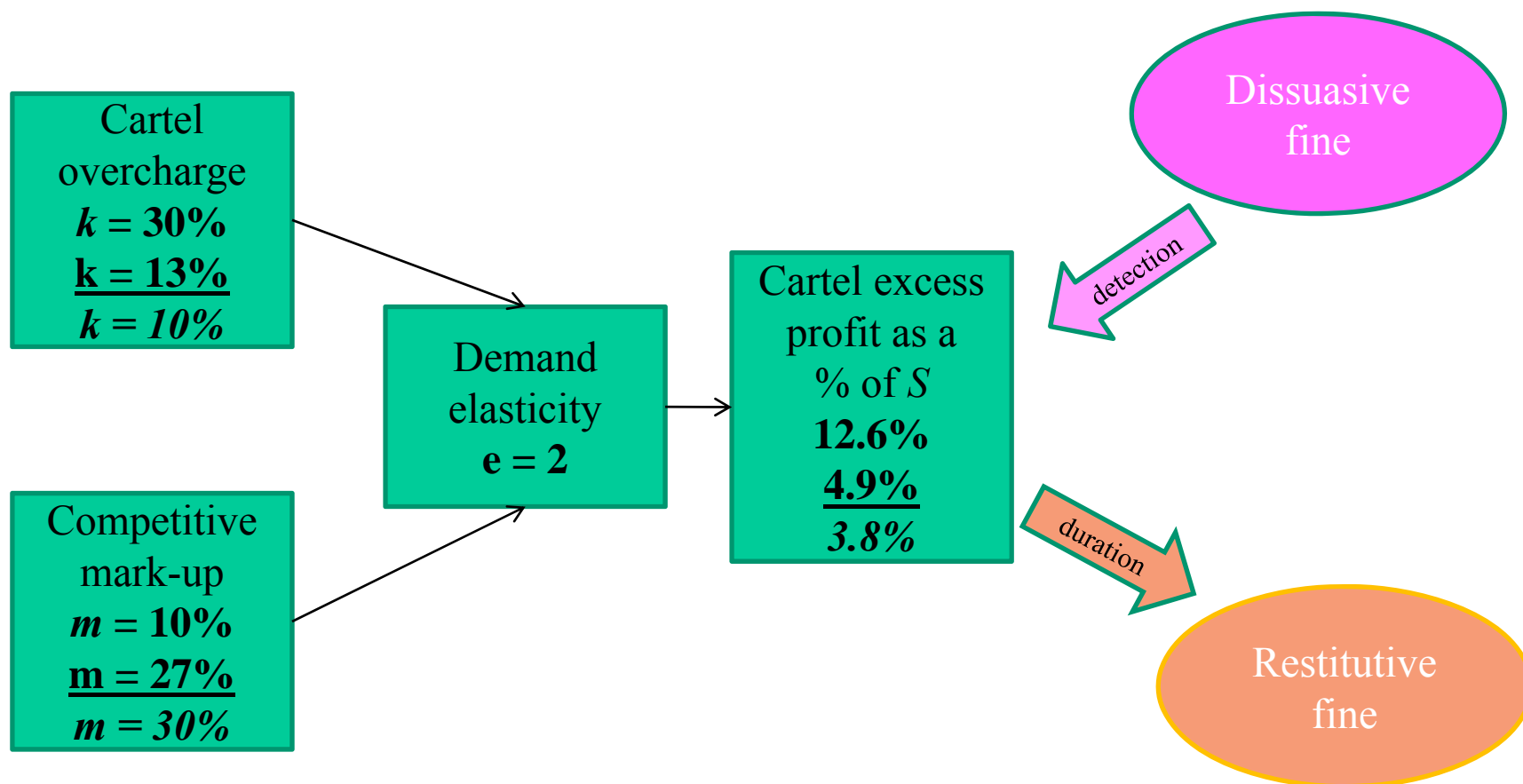
2. Potential pitfall: Yardstick methods (if different MC or elasticities)

3. Potential pitfall: Lerner index $\dfrac{p - c}{p} : \dfrac{p^m - c}{p^m}$ vs $\dfrac{p^m - p}{p^m}$

4. Potential pitfall: Dynamic (repeated) interactions underlying m: likely to be larger if small number of firms, repeated interactions, demand is volatile but growing fast, cost of capital is low, investments are significantly irreversible (sunk). Moreover, BLM (2011) show that along an industry development path, episodes of tacit collusion may be followed by episodes of intense competition and vice-versa.

5. Potential pitfall: Even if a cartel is shown to be present, its effects may be small as k may be small while m Is large (Important: k, m, e are not independent: effect of e).

Illustrations
Applying Buccirossi and Spagnolo with $k + m = 40\%$

Cartel overcharge
$k = 30\%$
$\underline{k = 13\%}$
$k = 10\%$

Competitive mark-up
$m = 10\%$
$\underline{m = 27\%}$
$m = 30\%$

Demand elasticity
$e = 2$

Cartel excess profit as a % of S
12.6%
$\underline{4.9\%}$
3.8%

Dissuasive fine

detection

duration

Restitutive fine

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There are two approaches to obtain the dissuasive fine
The static multi-period one,
implicitly used by Combe and Monnier but with <u>the wrong α</u>
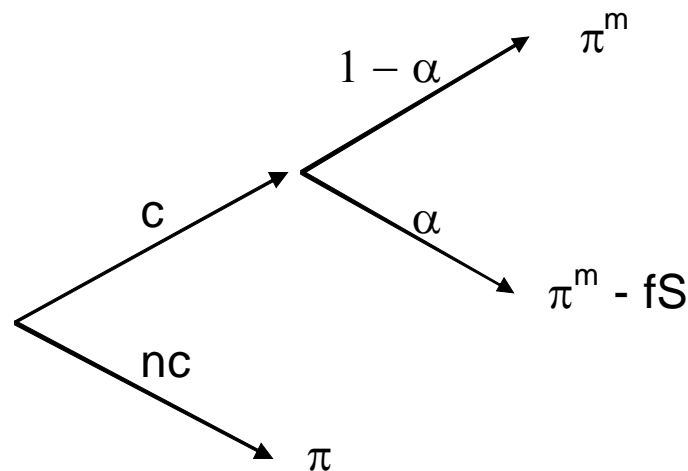
|	
c	cartel
nc	no cartel
α	Prob of detection
π	but-for profit
π^m	cartel profit
S	cartel sales
f	Fine as a % of S
F=fS	Fine in €

$E\Pi$ along c $= (1-\alpha)\pi^m + \alpha(\pi^m - F)$; $E\Pi$ along nc $= \pi$

F is dissuasive IFF it is larger than $\Delta\pi / \alpha$, or $n\Delta\pi / \alpha_n$ (not $n\Delta\pi / \alpha$)

with $\alpha_n = 1 - (1-a)^n$

There are two approaches to obtain the dissuasive fine
The dynamic one,
which should be preferred from an economic point of view

A. Cartels are dynamic organizations

B. Participants reassess their strategies (participation vs. defection) on a regular basis

C. Current and future costs (including potential fines) and benefits are changing and uncertain

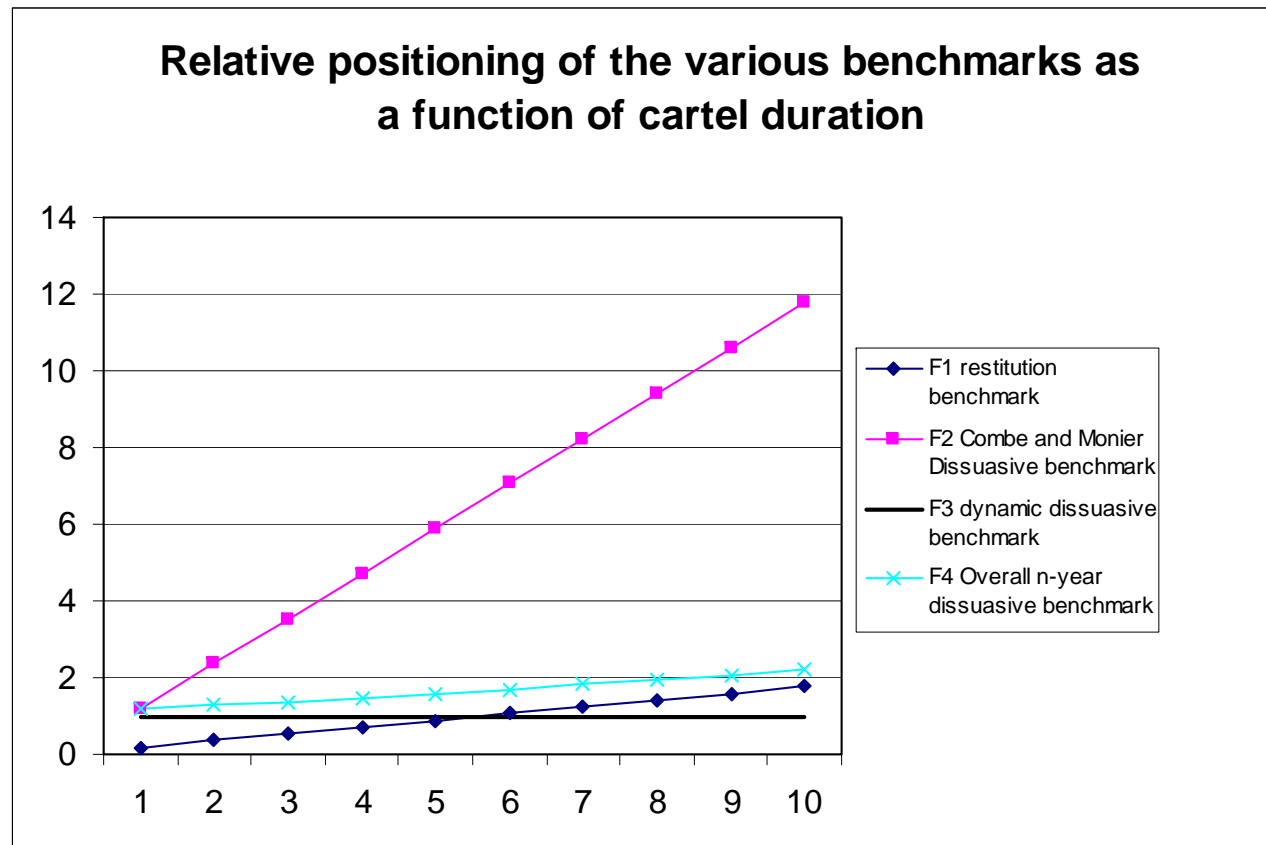D. Firms evaluate their options and discount the future at their cost of capital
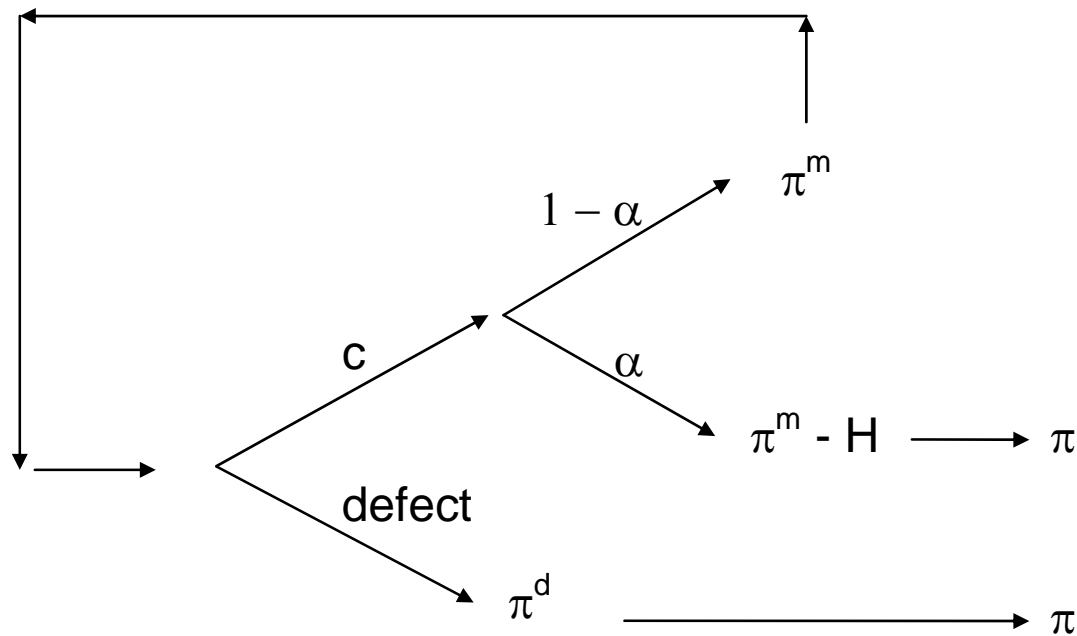
c	cartel
defect	move out
α	Prob of detection
π	but-for profit
π^m	cartel profit
Π^δ	profit of defect
δ	Discount factor
H	Fine in €

$$E\Pi \text{ along c } = \; = \frac{\pi^M + \alpha(-H + \dfrac{\delta}{1-\delta}\pi)}{1 - \delta(1-\alpha)}; E\Pi \text{ along defect} = \pi^D + \frac{\delta}{1-\delta}\pi$$

$\Rightarrow H$ is dissuasive IF (sufficiency) it is larger than $(1-\alpha)\Delta\pi / \alpha$

Comparing the benchmarks as a function of cartel duration with a <u>similar</u> $\Delta\pi$, a probability of detection $\alpha = 15\%$, and normalizing F3 at 1 (Note that F3 is NOT a function of n)

Relative positioning of the various benchmarks as a function of cartel duration

Legend:
- F1 restitution benchmark
- F2 Combe and Monier Dissuasive benchmark
- F3 dynamic dissuasive benchmark
- F4 Overall n-year dissuasive benchmark

label	Definition
F1	$n\Delta\pi$
F2	$n\Delta\pi/\alpha$
F3	$(1 - \alpha)\,\Delta\pi/\alpha$
F4	$n\Delta\pi/\alpha_n$
F1/F3	$n\alpha/(1-\alpha)$
F2/F3	$n/(1-\alpha)$
F4/F3	$n\alpha/(1-\alpha)\alpha_n$

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Parameters	With Combe and Monnier cartel overcharge	With Boyer and Kotchoni cartel overcharge
	(1)	*(3)*
cartel overcharge *k*	*30%*	*13%*
competitive markup *m*	*10%*	*27%*
Excess profit as a percentage of sales (B&S 2006)	*12.6%*	*4.9%*
Annual probability of detection	*15%*	*15%*
cartel duration (years)	*6*	*6*
Restitution F1	*75.5%*	*29.4%*
C&M dissuasive F2	*503.5%*	*195.8%*
Our dynamic dissuasive F3	*71.3%*	*27.7%*
Dissuasive F4	121.3%	*47.1%*

Fines as a % of affected one-year sales

A factor of 2.6

A factor of 18

Parameters	With Combe and Monnier cartel overcharge	With Boyer and Kotchoni cartel overcharge
	(1)	(3)
cartel overcharge k	20%	13%
competitive markup m	10%	17%
Excess profit as a percentage of sales (B&S 2006)	11.6%	7.0%
Annual probability of detection	15%	15%
cartel duration (years)	6	6
Restitution F1	69.7%	42.0%
C&M dissuasive F2	_464.6%_	279.5%
Our dynamic dissuasive F3	65.8%	_39.6%_
Dissuasive F4	111.9%	65.8%

Fines as a % of affected one-year sales

A factor of 1.7

A factor of 11.7
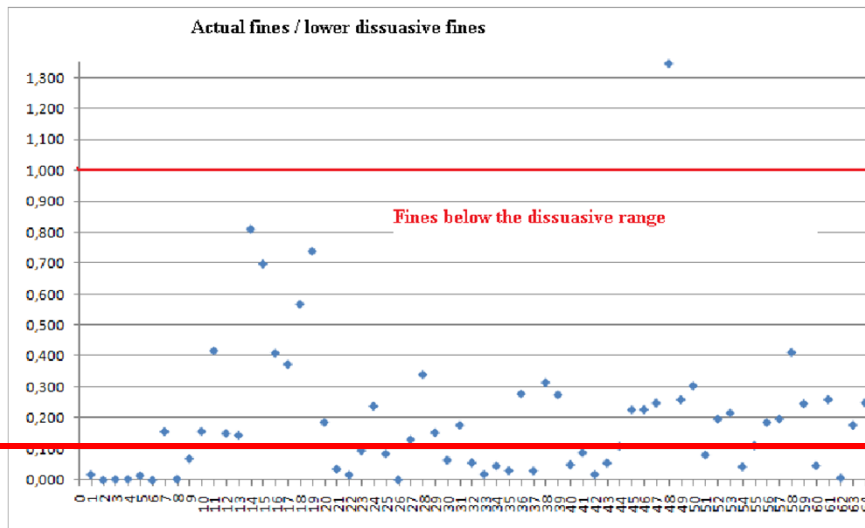
Assuming a factor 1/2
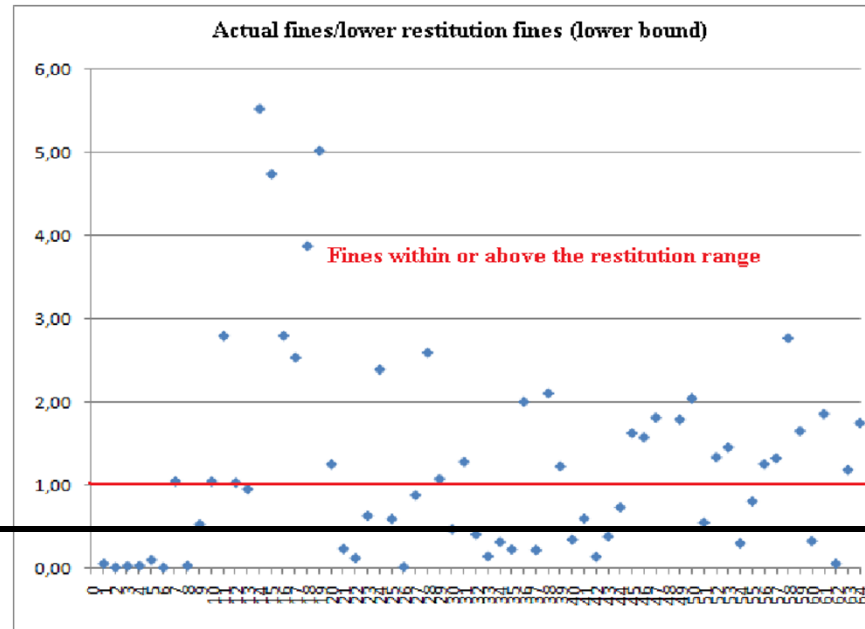
64 European cartels

We obtain that
65% paid more than
the restitution fine,

instead of 50%
in Combe and Monnier

Assuming a factor 1/10

64 European cartels

We obtain that
56% paid more than
the dissuasive fine,

instead of 1.5%
in Combe and Monnier

Cento Veljanovski, "Deterrence, Recividism and European Cartel Fines"(Case Associates, July 2011):

"Others have argued that this way of calculating the deterrence multiplier is too simplistic. [Allain, Boyer, Kotchoni and Ponssard] suggest that the Commission's fines result in both a reasonable approximation of the losses inflicted by cartels and deterrence for the majority of firms. Based on much a lower average overcharge of 13% estimated by Boyer and Kotchoni, ... [they] show that the fines as a percentage of annual sales needed to deter firms from entering into a cartel is massively lower. ... They find that 56% of the fines in their sample (of 64 firms for the period 1975 to 2009) are above the deterrent benchmark. Applying this to the sample above suggests that fining under the 2006 Penalty Guidelines would adequately deter many firms from participating in cartels, at least going forward. If [Allain, Boyer, Kotchoni and Ponssard] work is confirmed by other scholars then it has significant policy implications."

Recommendations on Setting Fines

1. *Cartel fines should be set at the dynamic dissuasive fine level F3.*
   Alternatively, the rule could be max{*F3, F1*} *if it is considered important that the fine be*
   at least restitutive when F3< F1.

2. *Define <u>major</u> offenses through a threshold such as*
   - **an annual turnover on the relevant market is above 1 billion Euros**
   - **a fine estimated to be above 100 million Euros**
   - **a fine estimated to be above 50% of affected sales**

   For <u>major</u> offenses, fines should be based on an explicit evaluation of the effects of the cartel
   - **a proper representation of the <u>but-for environment</u>**
   - **a proper estimation of the economic damages**

   For all other offenses, fines should be based on a simplified economic analysis including
   - **a standard cartel overcharge (over a range of 5%, 10% to 15%)**
   - **estimates of demand elasticity (over a range of 0, 1, 2)**
   - **Estimates of competitive mark-up (depending on the industry standards).**

The Next Steps

I. *Review recent decisions on cartel in order to assess more thoroughly the above assertions on recent fine levels (slide 27)*

II. *Develop the working tools (cookbook) to characterize relevant <u>but-for environments</u> in 2 above (slide 29)*

III. *Analyze in depth some representative recent cases*

IV. *Develop enhanced Guidelines for efficient and incentive-based programs of compliance toward competition rules and regulations*

III. *Develop enhanced Guidelines for proper cooperation between competitors to favor investments and employment in industries that are volatile and quasi natural monopolies (large fixed and sunk costs, with low variable costs), while deterring the formation and/or sustainability of cartels in such industries*

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