

The Design, Practice, and Performance of Corporate Leniency Programs

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Gallery of Price Fixers



- An anti-cartel program may
 - raise the probability of detection
 - raise penalties
- Desistance: causing collusion to stop.
 - Direct effect: cartels are more likely to be caught.
 - Indirect effect: cartels are less stable and collapse sooner.
- Deterrence: preventing cartels from forming.
 - Reducing the average duration of a cartel makes collusion less profitable.
 - Increasing expected penalties promotes deterrence.

- A *corporate leniency program* offers reduced penalties to a cartel member, in exchange for cooperating with the competition authority.
- Overview of talk
 - In theory, how do leniency programs work?
 - In practice, how do leniency programs perform?
 - How can we improve the design of leniency programs?

Introduction

Description of corporate leniency programs

- Leniency programs:
 - U.S. (1978, revised 1993, revised 2004)
 - E.U. (1996, revised 2002)
 - At least 28 countries and unions have leniency programs.
- Leniency programs vary according to
 - conditions for the awarding of leniency.
 - extent of leniency provided.
 - predictability
 - Will an application for leniency be approved?
 - How large are penalties and how much will be waived?

Introduction

Description of corporate leniency programs

Characteristics of a leniency program

- What is required to receive amnesty?
 - At what stage of the process can leniency be received?
 - How many firms can receive leniency?
 - Are all cartel members eligible for leniency?
 - What evidence must be provided in order to receive leniency?
- What does it mean to receive amnesty?
 - How much of government penalties are waived?
 - Are there non-government penalties and are they waived?

Introduction

Description of corporate leniency programs

Before an Investigation	U.S.	E.U.	Japan
First firm	100%	100%	100%
Second firm	PB	30-50%	50%
Third firm	PB	20-30%	30%
Fourth or later firm	PB	0-20%	0

After an Investigation	U.S.	E.U.	Japan
First firm	100%	30-100%	30%
Second firm	PB	20-30%	30%
Third firm	PB	0-20%	30%
Fourth or later firm	PB	0-20%	0

PB - Reduced fine from plea bargaining.

Second cartel member to plead guilty received a mean discount from the maximum recommended sentence of 75% (Connor, 2007)

Theory of Leniency Programs

How does a leniency program affect the functioning of a cartel and the decision to form a cartel?

- Motta and Polo (2003)
- Spagnolo (2003)
- Aubert, Kovacic, and Rey (2003)
- Harrington (2006)

Theory of Leniency Programs

Infinitely repeated Prisoners' Dilemma with n firms.

- If all firms *collude* then firm profit is π^c .
- If all firms *compete* then firm profit is π^{nc} .
- If a firm *competes* when the other firms *collude* then its profit is π^d .
- $\pi^d > \pi^c > \pi^{nc}$.

Theory of Leniency Programs

Collusion without an antitrust authority

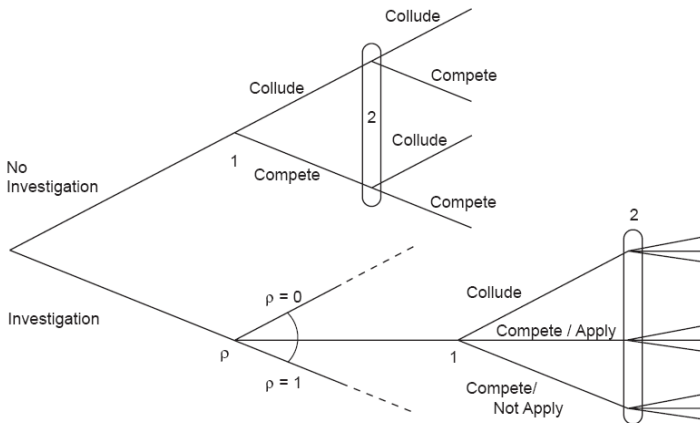
- Grim trigger strategy
 - Period 1: *Collude*
 - Period t :
 - *Collude* if all firms chose *Collude* in all past periods.
 - *Compete* otherwise.
- Equilibrium condition:

$$\frac{\pi^c}{1-\delta} \geq \pi^d + \delta \left(\frac{\pi^{nc}}{1-\delta} \right) \Leftrightarrow \delta \geq \frac{\pi^d - \pi^c}{\pi^d - \pi^{nc}}.$$

Theory of Leniency Programs

Stage game with an antitrust authority

- ρ is the probability of conviction without use of the leniency program.



Theory of Leniency Programs

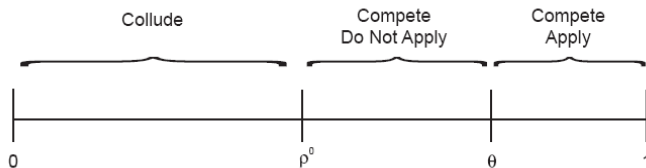
Expected penalties

- If no firm applies for leniency: ρF , where F is the penalty.
- If $m (\geq 1)$ firms apply for leniency and
 - a firm did not apply: F .
 - a firm did apply: $\left[\left(\frac{m-1}{m} \right) + \left(\frac{1}{m} \right) \theta \right] F$.
 - Leniency policy parameter: $\theta \in [0, 1]$.
 - $\theta = 1$: No leniency
 - $\theta = 0$: Maximal leniency

Theory of Leniency Programs

Collusive Equilibrium

- If firms always *Colluded* and the cartel has not been caught then:
 - a firm *Colludes* when $0 \leq \rho \leq \rho^0$.
 - a firm *Competes* when $\rho > \rho^0$ and *Applies* (for leniency) when $\rho > \theta$.
- Otherwise, a firm *Competes*.



Theory of Leniency Programs

Effect of a marginal change in leniency: leniency is high (θ is low)

- Equilibrium Condition:

$$\pi^c + \delta (1 - \rho) V^c (\theta) + \delta \rho (V^{nc} - F) \geq \pi^d + \delta (V^{nc} - \theta F)$$

- $V^{nc} \equiv \frac{\pi^{nc}}{1-\delta}$ is the non-collusive payoff.
- $V^c (\theta)$ is the expected future payoff from continued collusion.

Theory of Leniency Programs

$$\pi^c + \delta (1 - \rho) V^c (\theta) + \delta \rho (V^{nc} - F) \geq \pi^d + \delta (V^{nc} - \theta F)$$

- Deviator Amnesty Effect - more leniency makes collusion more difficult.
 - Deviator would use the leniency program.
 - More leniency reduces the penalty paid by a deviator.
- Cartel Amnesty Effect - more leniency makes collusion less difficult.
 - Leniency does not affect the current period collusive profit.
 - More leniency reduces the future penalty.
 - $V^c (\theta)$ is decreasing in θ .
- Net Effect: More leniency makes collusion more difficult.

Theory of Leniency Programs

Effect of a marginal change in leniency: leniency is low (θ is high)

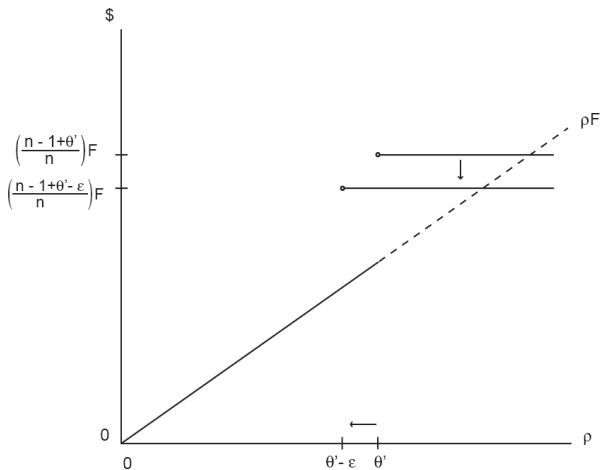
- Equilibrium Condition:

$$\pi^c + \delta (1 - \rho) V^c (\theta) + \delta \rho (V^{nc} - F) \geq \pi^d + \delta (V^{nc} - \rho F) .$$

- Deviator Amnesty Effect disappears.
- Cartel Amnesty Effect remains - more leniency makes collusion less difficult.
- Race to the Courthouse Effect - more leniency makes collusion more difficult.
 - More leniency destabilizes the equilibrium in which firms do not apply.
 - More leniency reduces the future collusive payoff.
- Net Effect - ambiguous.

Theory of Leniency Programs

Race to the Courthouse Effect vs. Cartel Amnesty Effect



Theory of Leniency Programs

Summary of effects

- Deviator amnesty effect - leniency reduces penalties for a deviator
⇒ collusion is more difficult.
- Cartel amnesty effect - leniency reduces expected future penalties for colluding firms
⇒ collusion is less difficult.
- Race to the courthouse effect - leniency destabilizes an equilibrium in which firms remain silent
⇒ collusion is more difficult.

Theory of Leniency Programs

General properties of an optimal leniency program.

- Partial leniency to the first firm can be optimal.
- More generally, maximal leniency is best.
- Leniency should only be given to the first firm to come forward.
 - Leniency to additional firms does not affect the Deviator Amnesty Effect.
 - Leniency to additional firms raises the Cartel Amnesty Effect.

Theory of Leniency Programs

Some research directions

- Allow probability of conviction, ρ , to be persistent over time.
- Allow firms to receive private signals regarding the probability of conviction.
- Allow for firm asymmetries and endogenize cartel size.

Practice and Performance of Leniency Programs

Measuring Usage

Recent experience - U.S. Department of Justice (DOJ)

- 20-fold increase in usage with the 1993 revision.
- As of October 2006, roughly 100 leniency applications had been made.
- Examples of firms awarded amnesty
 - Rhône Poulenc (Vitamins)
 - Christie's (Fine Arts Auction Houses)
 - Carbide/Graphite (Graphite Electrodes)

Practice and Performance of Leniency Programs

Measuring Usage

Recent experience - European Commission (EC)

- Increase in usage with the 2002 revision (Arlman, 2005)
 - 1996 - Feb 2002: 16 applications.
 - Feb 2002 - June 2005
 - 140 leniency applications
 - 75 applying for prior to an investigation.

European Commission (1998-2004)

Year	# of cartel cases	# with leniency	# with full leniency
1998	6	4	0
1999	2	1	0
2000	5	2	0
2001	11	8	2
2002	10	9	5
2003	6	4	3
2004	6	3	1

Practice and Performance of Leniency Programs

Measuring Usage

- Leniency has substantially reduced fines (Case Associates, May 2006)
 - 1999-2004: 30 cartel decisions involving 43 cartels.
 - 40% of fines are waived
 - Fine per firm (in €) reduced from 30.4 million to 18.1 million.
 - Fine per cartel reduced from 161.4 million to 96.2 million.

Practice and Performance of Leniency Programs

Measuring Performance

What is success?

- Success is measured by the reduction of collusion in the economy.
- How has the leniency program impacted ...
 - the probability of successful prosecution?
 - the probability of detection?
 - the average life span of a cartel?
 - the number of cartels?

Practice and Performance of Leniency Programs

Measuring Performance

How many cartels were discovered due to leniency programs?

- Are many cartels applying after having been caught in another jurisdiction?
- Example: Sorbates cartel
 - Chisso received full amnesty from the EC.
 - The day after coming forward to the EC, the U.S. DOJ announced that one of the manufacturers of sorbates had agreed to plead guilty to price-fixing.
- EC, 1999-2004
 - Of 26 cartels receiving leniency,
 - 12 had already been investigated by the U.S. authorities
 - 7 were under parallel investigations.
 - Full leniency was provided in some cartels that were previously detected.

Practice and Performance of Leniency Programs

Measuring Performance

How many cartels were disrupted due to leniency programs?

- Is leniency disrupting well-functioning cartels or being used by cartels that are collapsing?
 - Condition for applying leniency when the cartel is thriving:

$$\delta (\rho F - \theta F) > [\pi^c + \delta (1 - \rho) V^c (\theta) + \delta \rho V^{nc}] - [\pi^d + \delta V^{nc}].$$

- Condition for applying leniency when the cartel is collapsing:

$$\delta (\rho F - \theta F) > 0.$$

- Is a firm applying for leniency because an investigation is imminent?

Practice and Performance of Leniency Programs

Measuring Performance

How many cartels were not formed due to leniency programs?

- Data problem: The population of cartels is not observed.
- If a rise in the number of discovered cartels is correlated with a policy change,
 - is it because the policy has been effective in promoting discovery?
 - is it because the policy is perverse and there are more cartels to be discovered?
 - is it because there are more cartels for other reasons?

Practice and Performance of Leniency Programs

Measuring Performance

Using theory to infer performance.

- How do changes in the *observable* population of discovered cartels relate to changes in the *latent* population of cartels?
- Literature
 - Chang and Harrington (2007)
 - Miller (2007)
- Model the birth and death process for cartels.
 - Cartels form when firms have the opportunity and collusion is stable.
 - Cartels collapse when market conditions make collusion unstable.
 - Cartels are caught by the authorities.

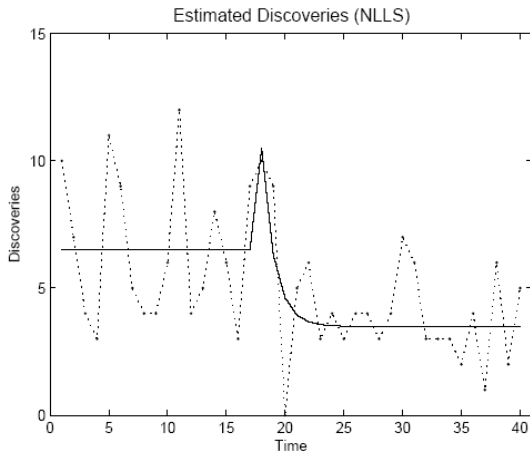
Practice and Performance of Leniency Programs

Measuring Performance

- Estimating the impact of the U.S. Corporate Leniency Program (Miller, 2007)
 - Hypothesis #1: If the 1993 revision resulted in an increase in the probability of discovery then there is an immediate rise in the number of discovered cartels.
 - Hypothesis #2: If the 1993 revision resulted in a decrease in the rate of cartel formation then the number of discovered cartels adjusts to a lower steady-state level.
 - Data: January 1985 - March 2005

Practice and Performance of Leniency Programs

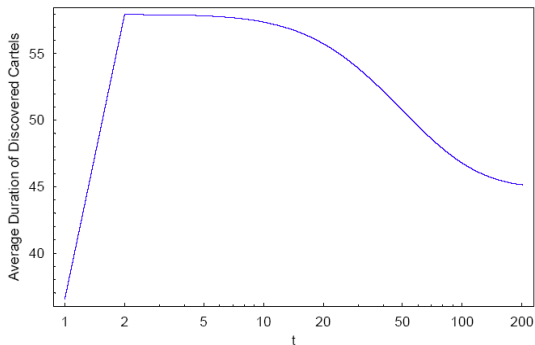
Measuring Performance



Practice and Performance of Leniency Programs

Measuring Performance

- Impact of a leniency program on the duration of discovered cartels.



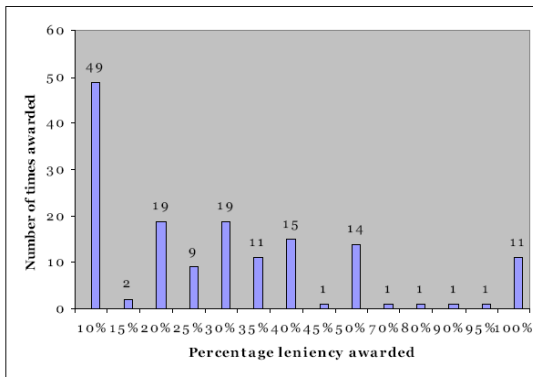
- Hypothesis #3: If effective, a leniency program increases the average duration of discovered cartels in the short-run.

Research and Policy Agenda

Design Issues

How many firms should be eligible for leniency?

- EC - leniency is available for many firms and is extensively provided (Arlman, 2005)



Research and Policy Agenda

Design Issues

- Benefits of partial leniency to many cartel members
 - Adds evidence to make conviction more likely.
 - Economizes on the competition authority's resources.
- Costs of partial leniency to many cartel members
 - Reduces expected penalties.
 - Reduces the race among firms to come forward.
- What difference does leniency to additional firms make?
 - What difference does a third insider witness make?
 - What is the value of 10% leniency to the 4th or 5th firm?

Should the initiator of the cartel be eligible?

- In the U.S., a firm cannot receive leniency if it was an instigator of the cartel.
- Benefit: Having the initiator be ineligible discourages a firm from forming a cartel.
- Cost: Narrowing the pool of eligible firms reduces the race among firms to apply for leniency.

Should the amount of leniency depend on whether an investigation has started?

- Current policies
 - U.S.: 100% of fines are typically waived even after an investigation has begun.
 - Japan
 - Prior to an investigation: 100% of fines are waived for the first firm (50% and 30% for the second and third firms)
 - After an investigation: 30% leniency for the first three firms.
- Analysis of Japanese policy
 - It creates a timing game between the cartel members and the competition authority.
 - Once an investigation starts, the race among cartel members for leniency is significantly reduced.
 - High risk strategy that needs to be effectively managed.

Is leniency too generous?

- Leniency should be used to increase the penalties paid by the remaining members.
- Leniency reduces average fines by 40% in the EC.
- Is too much given away through plea bargaining in the U.S.?
 - Hoffman LaRoche in the vitamins price-fixing case.
 - Strong case as Rhône-Poulenc provided insider evidence.
 - DOJ's sentencing guidelines: \$1.3 to \$2.6 billion.
 - Actual fine: \$500 million.

Should an anti-cartel policy exercise some control over the *competition authority*?

- What are the career concerns of members of the competition authority?
 - Is a guilty plea with reasonable fines considered a "win"?
 - Is success measured by the (observable) number of convictions rather than the (unobservable) number of cartels?
- Does the competition authority take account of how lower fines impacts future cartel formation?
- Should the discretion of the competition authority be limited?
 - In how many firms can receive leniency?
 - In the setting of fines?

Research and Policy Agenda

Complementary Tools: Screening

- *Screening* is a tool to identify markets where collusion is suspected.
- Screening and leniency programs are complements.
 - Leniency programs may be ineffective when there are no suspicions about collusion.
 - Screening can create those suspicions.
 - Identifying an industry for further scrutiny could well induce a race among cartel members to apply for leniency.

Research and Policy Agenda

Complementary Tools: Screening

Deputy Assistant Attorney General Scott Hammond of the U.S. Department of Justice claimed:



But you may be able to *scare* a thief with an economist and that could be enough to induce them to apply for amnesty.

Research and Policy Agenda

Complementary Tools: Expanding the Domain of a Leniency Program

Develop programs to induce other people who have information to report.

- Buyers
- Employees of the colluding firms who are not themselves involved in the conspiracy

Research and Policy Agenda

Complementary Tools: Expanding the Domain of a Leniency Program

Buyers

- In many cartels, buyers are industrial buyers.
- Suspicions might arise because:
 - firms are steadily raising prices without a cost or demand rationalization.
 - some suppliers are no longer willing to bid for their business
 - firms' price changes are more coordinated
- Consider financial rewards to buyers.
 - A reward scheme might replicate the incentives created by private customer damages.

Research and Policy Agenda

Complementary Tools: Expanding the Domain of a Leniency Program

Uninvolved company employees

- Sales representatives
 - They witness the change in prices.
 - They might be instructed not to compete aggressively
 - Not to bid for some company's business
 - Not to deviate from the price list even when business will be lost.
 - Industrial and medical gases cartel members instructed their sales people to focus on "implementing the 5% price increase with existing customers and explaining that competitors could be expected to do the same."
- Administrative staff for a colluding executive may find evidence of clandestine meetings.

Research and Policy Agenda

Complementary Tools: Expanding the Domain of a Leniency Program

- How do you motivate employees to report to the competition authority?
- Proposal: Design a policy whereby both the employee and the company benefit.
 - Financial rewards to the employee.
 - Company has the opportunity to apply for full leniency (under the usual conditions).

Research and Policy Challenges

- Measuring the impact of leniency programs.
- Improving the design of leniency programs.
- Developing complements to leniency programs.