

# Trust and recidivism; the partial success of corporate leniency programs in the laboratory

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## Leniency programs – overview

Reduce sanctions against colluding firms that report the cartel to the AA.

Aims: (i) *deter cartel formation,*  
(ii) *break existing cartels,*  
(iii) *reduce cost AA.*

First initiated in the US (1978, revised 1993), meanwhile implemented in the EU (1996, revised 2002) and in many other countries.

Scott Hammond, Director of Criminal Enforcement of the DoJ Antitrust division:

“Over the last years, the Amnesty Program has been responsible for detecting and prosecuting more antitrust violation than all of our [other investigating tools]”

Neelie Kroes, EU Commissioner for Competition:

“The leniency program is proving to be an efficient tool to detect and punish cartels.”

## Leniency programs – theory

Spagnolo (2004), Motta and Polo (2003)

Leniency programs can be “exploitable”: collude and defect in every period.

Spagnolo (2004)

Optimal (courageous) LP: full amnesty to first reporter plus bonus

Moderate leniency programs deter cartel formation as well because of:

- *protection-from-fines effect*
- *protection-from-punishment effect*
- *risk effect*

## Leniency programs – theory

### Chen and Harrington (2005)

Includes pricing dynamics;  
confirms findings of Spagnolo (2004).

### Aubert, Rey, Kovacic (2006)

Leniency available to individuals;  
LP sometimes works only in case leniency is given to *both* individuals and firms.

## Leniency programs – why conduct an experiment?

1. As non-detected cartels typically are not observed, empirical studies into the effects of LP necessarily do not include the relevant firm sample; according to Spagnolo (2004, p.2):  
“...the actual change in active cartels caused by the Corporate Leniency Policy cannot be observed, and in principle the observed increase in detected cartels could even be due to an increase in cartel activity”.
2. collusion typically is the work of a few men representing even so many firms;
3. an experiment allows for distilling the separate effects of communication, detection probabilities, and LP on prices.

## Leniency programs – experiments

Apestegua, Dufwenberg and Selten (2007, ET)

- one-shot discrete Bertrand pricing game
- all that apply receive fine reductions
- communication about anything
- test a moderate and courage program

Hamaguchi and Kawagoe (2005)

- repeated interaction
- collusion is forced upon subjects

## Experiment – design

- Groups of 3 persons play a discrete pricing game: {101, ..., 110};
- repeated interaction:  $\geq 20$  rounds with the same group;
- moderate leniency: 1<sup>st</sup> - 100% fine reduction, 2<sup>nd</sup> - 50%, 3<sup>rd</sup> - 0%;
- 4 treatments (8 sessions):

	Benchmark	Communication	Antitrust	Leniency
Communication	No	Yes	Yes	Yes
Detection probability	0%	0%	15%	15%
Reporting possibility	No	No	No	Yes
# subjects	36	39	39	42

- duration between 60 and 100 minutes, average earnings € 14.40;
- subjects: undergraduate students from all fields.

## Experiment – design: leniency treatment

- Each round: 7 Steps
  - Step 1: Communication decision
  - Step 2: Communication
  - Step 3: Pricing decision
  - Step 4: *Market price*
    - Earnings:  $(\text{market price} - 100) / \# \text{ winners}$
  - Step 5: Reporting decision
  - Step 6: *Point deduction*
  - Step 7: *Round close*



## Experiment – step 2: communication

**MainForm**

informatie  
 ronde:   
 stap in deze ronde:   
 rest tijd:   
 spaartegoed (pnt):

Geef de laagste en hoogste prijs die voor u nog acceptabel is. U moet minimaal 101 en maximaal 110 invullen.

laagste:       hoogste:

Maak uw keuze en druk op <bevestiging>.

Historie

ronde	bespreking	prijrange	uw prijs	marktprijs	gemeld door U	aantal melder	reductie	verdiens
1	JA	101-110	103	103	NEE	1	0%	-7.30
2	JA	101-110	110	110	NEE	0	-	3.33
3	NEE	-	110	109	NEE	0	-	0.00
4	JA							

## Experiment – step 5: reporting decision

**MainForm**

informatie  
 ronde:   
 stap in deze ronde:

spaartegoed (pnt):

Druk op <melden> indien u uw groep aan wilt melden. Druk anders op <niet melden>.

**MELDEN**      **NIET MELDEN**

Maak uw keuze en druk op <bevestiging>.

Historie

ronde	bespreking	prijrange	uw prijs	marktprijs	gemeld door U	aantal melder	reductie	verdiens
1	JA	101-110	107	103	JA	1	100%	-1.00
2	JA	101-110	110	110				



## Experiment – step 7: round close

**MainForm**

informatie  
**ronde:**   
**stap in deze ronde:**  
  
**rest tijd:**   
**spaartegoed (pnt):**

**Uw groep is door u aangemeld, en u was nummer 2 bij de melding.**

**uw prijs:**   
**marktprijs:**   
**winst:**   
**kosten melding:**   
**puntenaftrek:**   
**netto puntenaftrek:**   
**netto winst:**

**Wacht tot de volgende stap begint.**

Historie

ronde	bespreking	prijsrange	uw prijs	marktprijs	gemeld door U	aantal melders	reductie	verdienste
1	JA	101-110	107	103	JA	1	100%	-1.00
2	JA	101-110	110	110	NEE	0	-	3.33
3	NEE	-	109	109	NEE	0	-	9.00
4	JA	101-110	108	108	JA	3	50%	0.30

## Results - discussion

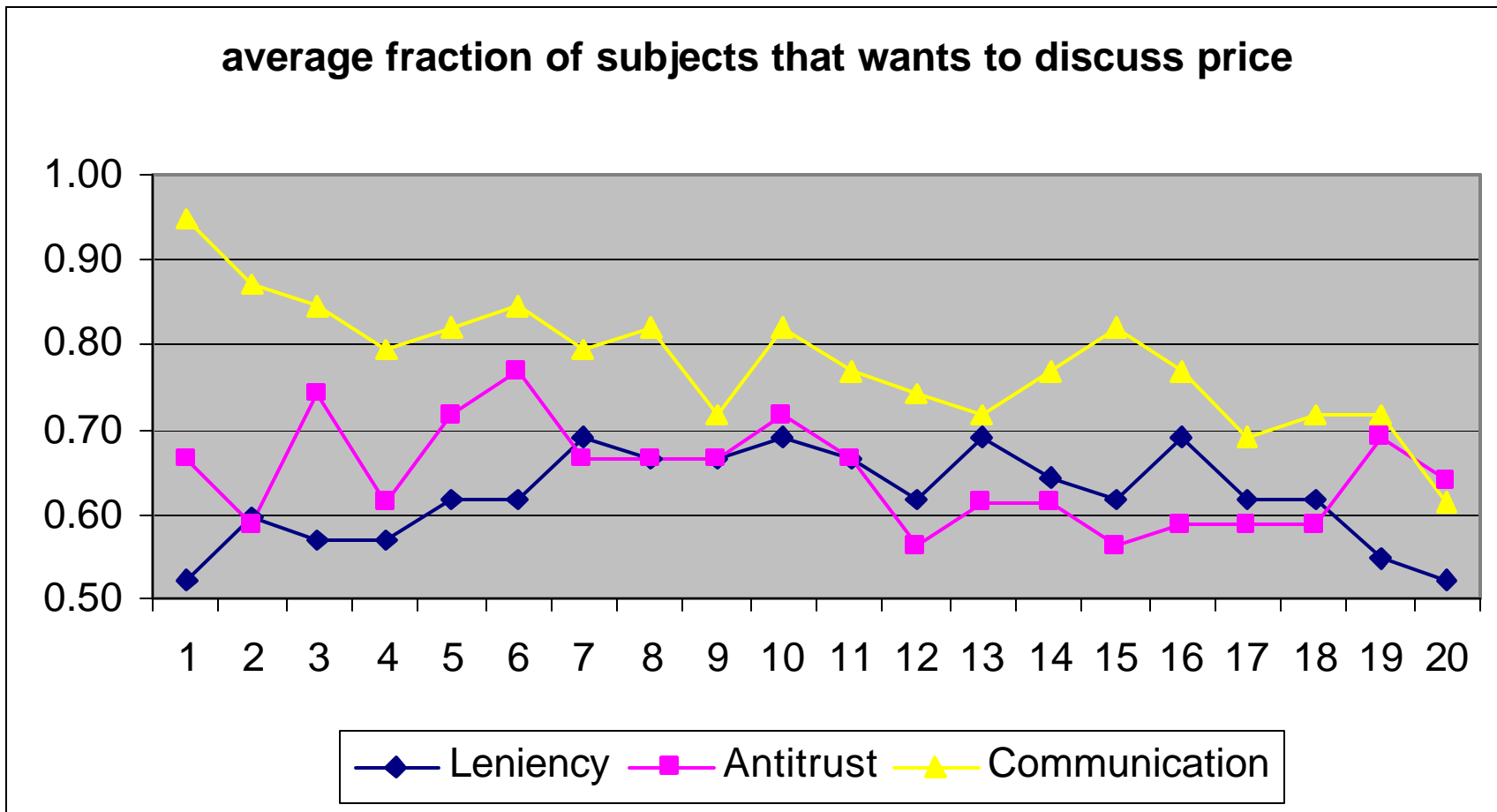
- The use of communication
- Cartel formation
- Cartel duration
- Cartel pricing
- Cartel recidivism

## Results – the use of communication

	Communication	Antitrust	Leniency
Willing to form cartel	78.08	64.74	62.26
Always	30.77	20.51	23.81
Never	0.00	0.00	9.52

- Average willingness to form a cartel reduces due to detection probability; it is not affected further due to LP;
- fraction of subjects that always want to form a cartel reduces due to detection probability; it somewhat increases due to LP;
- fraction of subjects that never wants to form a cartel is not affected by detection probability; it rises significantly due to LP;

## Results – the use of communication

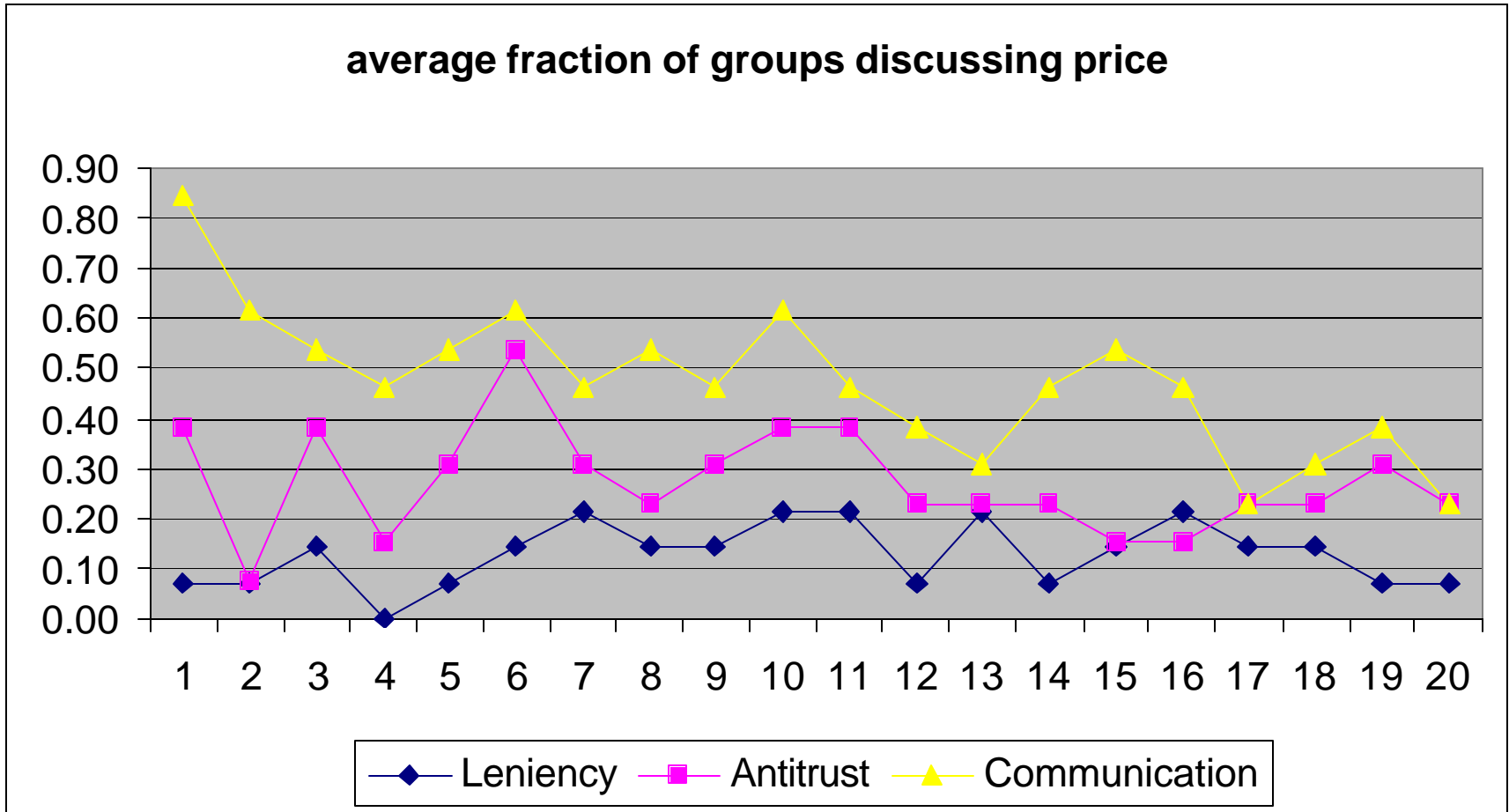


## Results – the use of communication

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Never	0.00	0.00	9.52

- Average willingness to form a cartel reduces due to detection probability; it is not affected further due to LP;
- fraction of subjects that always want to form a cartel reduces due to detection probability; it increases (weakly significant) due to LP;
- fraction of subjects that never wants to form a cartel is not affected by detection probability; it rises significantly due to LP;
- variability over time of the average willingness to form a cartel reduces due to detection probability; it reduces further due to LP.

## Results – cartel formation



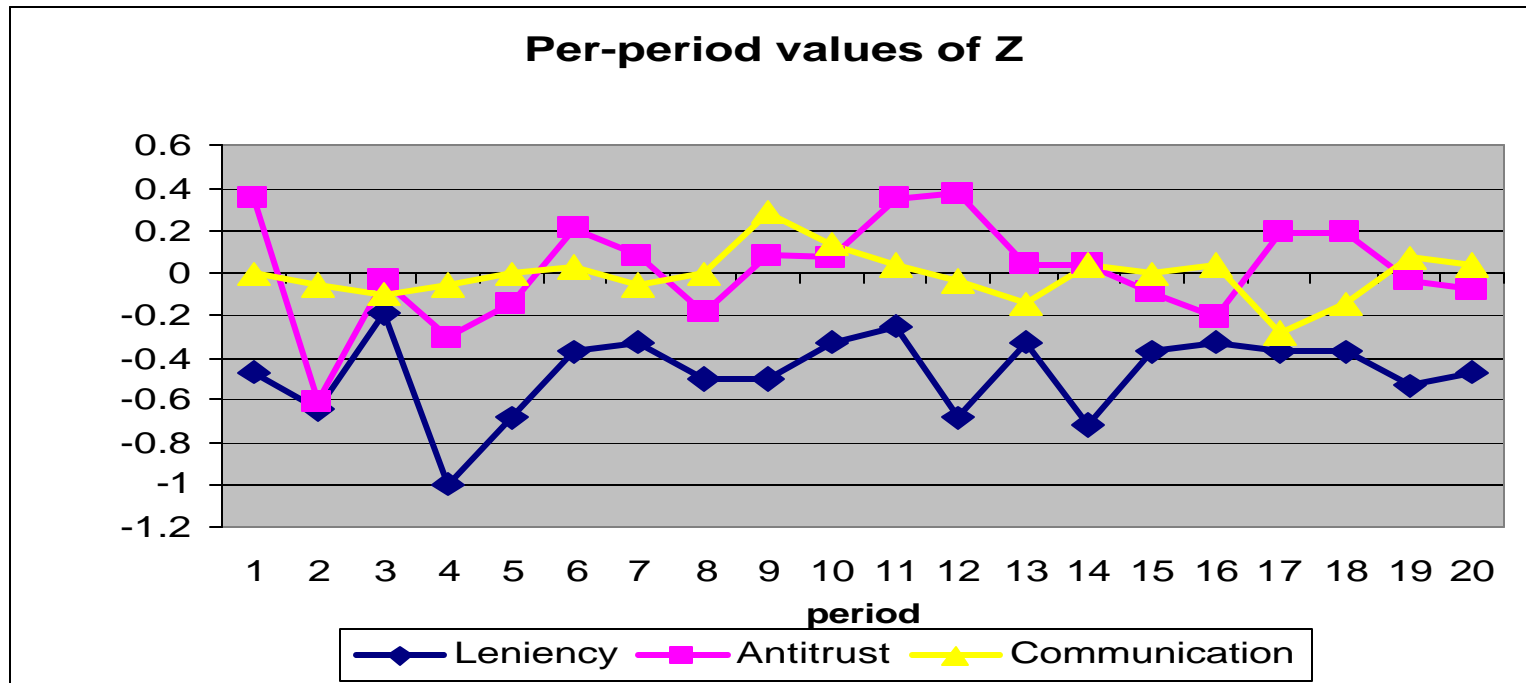


## Results – cartel formation

- How does the number of subjects that wants to establish a cartel relate to the number of cartels actually formed?
- Are the subjects who indicate that they want to communicate randomly distributed across groups?
- $Z > (<) 0$ : more (less) cartels are formed relative to the benchmark case where subjects are randomly assigned to groups.

## Results – cartel formation

- $Z > (<) 0$ : more (less) cartels are formed relative to the benchmark case where subjects are randomly assigned to groups.



Result #1: Non-cooperators are more persistent in their behavior in Leniency

## Results – cartel duration

Average cartel lifetime

	Benchmark	Communication	Antitrust	Leniency
Mean	*	1.34	1.33	1.00
Median	*	1	1	1
Minimum	*	1	1	1
Maximum	*	20	12	1

## Results – cartel duration

	Fraction of cartels			Fraction of cartel members	
	Defection	Detection	Reporting	Defection	Reporting
Communication	0.67	--	--	0.52	--
Antitrust	0.68	0.17	--	0.50	--
Leniency	0.94	0.03	0.78	0.72	0.40

- introduction of a detection probability does not influence (i) the fraction of cartels that defect, nor (ii) the fraction of defecting cartel members
- Result #2: In Leniency the fraction of defectors is substantially higher than in Antitrust.

## Results – cartel duration

	Defect		Not defect	
	Win	Not win	Win	Not win
not report	48.9%	71.0%	66.7%	62.5%
report	51.1%	29.0%	33.3%	37.5%
1 <sup>st</sup>	66.7%	66.7%	100.0%	55.6%
2 <sup>nd</sup>	25.0%	22.2%	0.0%	33.3%
3 <sup>rd</sup>	8.3%	11.1%	0.0%	11.1%
Observations	47 (44.8%)	31 (29.5%)	3 (2.9%)	24 (22.9%)

- Protection-from-fines motive is an important motive to apply for leniency
- Punishing defectors seems a less important motive to apply for leniency

## Results – cartel pricing

Average agreed-upon price

Benchmark	Communication	Antitrust	Leniency
*	109.40 (1.41)	109.12 (1.60)	109.60 (1.03)

Fractions of succesful and unsuccessful communications

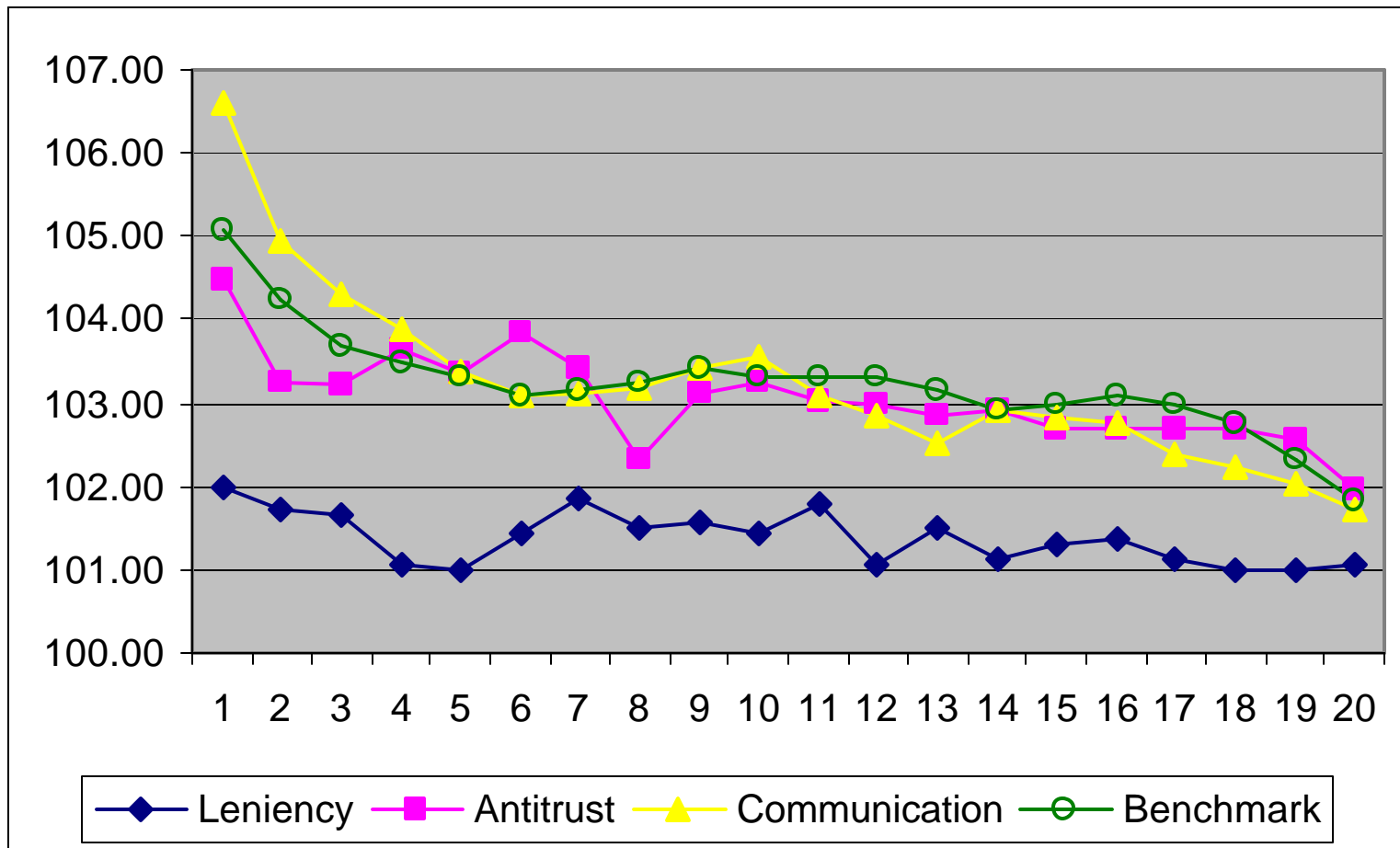
	Benchmark	Communication	Antitrust	Leniency
Successful	*	92.68	92.96	97.30
Unsuccessful	*	7.32	7.04	2.70

## Results – cartel pricing

	Benchmark	Communication	Antitrust	Leniency
All groups	103.24	103.31	103.04	101.38
Cartels	*	105.43	104.82	103.39
Non-cartels	103.24	101.40	102.38	101.08

- Leniency leads to a lower average price
- Communication does however matter:
  - in all three treatments, price communications yield higher prices
  - for non-cartel groups, the average market price is lower than in Benchmark

## Results – cartel pricing



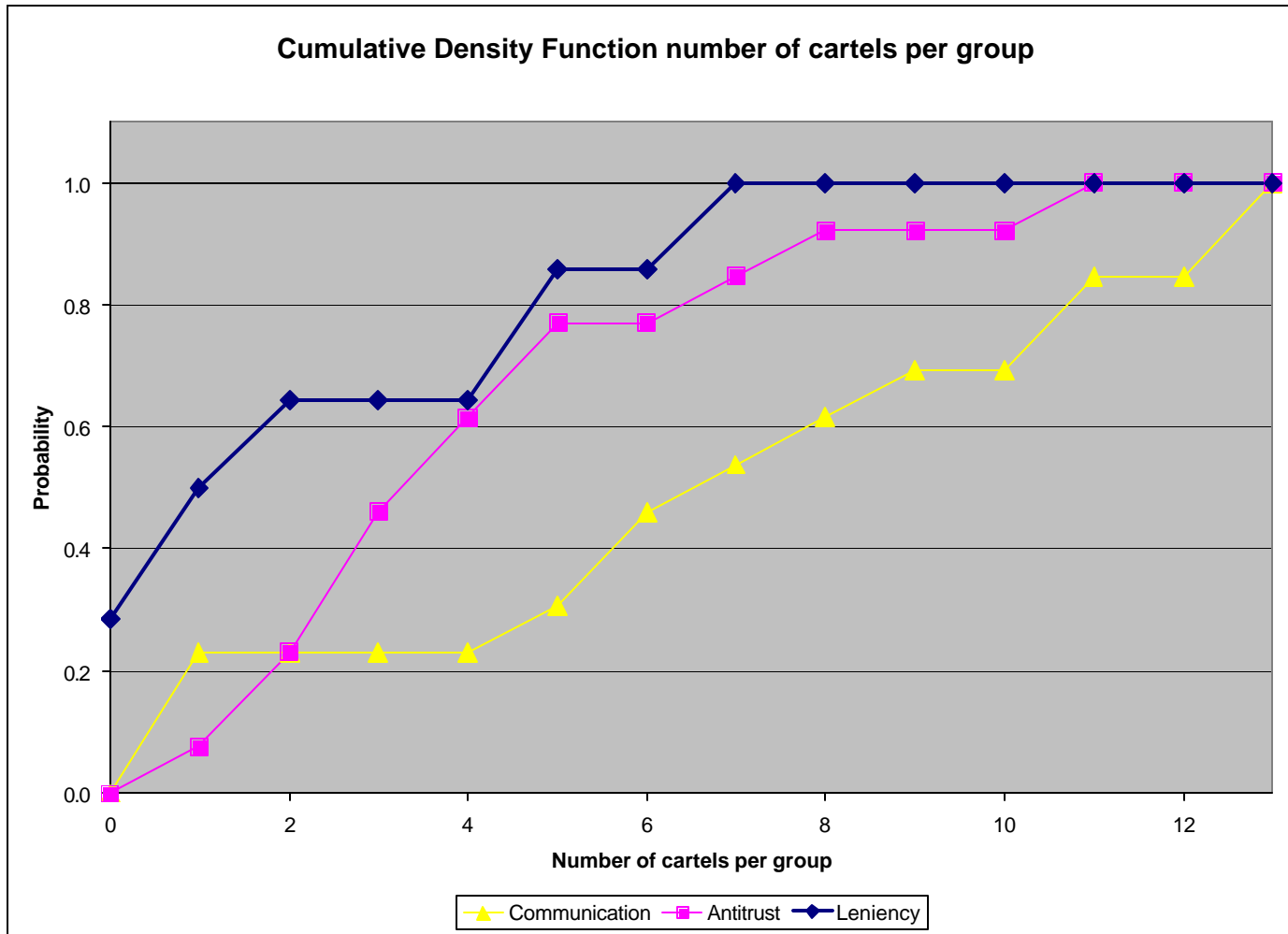


## Results – cartel pricing

	Communication	Antitrust	Leniency
Average agreed-upon price	109.40	109.12	109.60
Average defection size	4.65	4.89	5.92

- In Communication, price undercuttings are large: on average 50% of the coordinated-upon price (net of MC);
- a detection probability does not significantly influence the average size of the price undercut;
- Result #3: introducing a LP increases the average size of the price undercut to 62% of the coordinated-upon price (net of MC).

## Results – cartel recidivism



## Results – cartel recidivism

	Benchmark	Communication	Antitrust	Leniency
Average number of cartels	*	7.08	4.46	2.57
Estimated slope CDF number of cartels	*	0.0700 (0.0040)	0.0925 (0.0095)	0.0884 (0.0088)

- t-test: Communication < Antitrust, Leniency; Antitrust = Leniency;

## Conclusions

- ❑ Moderate leniency programs lead to lower prices, because:
  1. non-cooperators are more persistent in their behavior thereby blocking cartel formation;
  2. defection is more prominent in cartels that are formed (and 2/3 of all cartels are reported);
  3. defection is more severe in the sense that the difference between the agreed-upon price and the undercutting price increases.
- ❑ However:
  - no evidence that leniency programs impact cartel recidivism (those that apply for leniency will collude again).
- ❑ Possible future experiments:
  - equal leniency treatments for sequential applicants
  - optimal leniency programs (“bonus” scenario)