

# A Report on Collusion and Cartels: Science, Policy, and the Law

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# Introduction

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- *Explicit collusion* is when coordination occurs using express communication.
- *Tacit (or non-explicit) collusion* is when coordination occurs without express communication.

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  - 2 Policy: What is the state of competition policy against explicit collusion?

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- 1 Science: What have we recently learned about explicit collusion?
  - 2 Policy: What is the state of competition policy against explicit collusion?
  - 3 Law: What does it mean to unlawfully collude and can we effectively prosecute tacit collusion?

# Understanding Collusive Practices

Standard features of theoretical and empirical models

- Coordinate on prices (and/or quantities)
- Monitor firms' prices for compliance
- Punish by all firms lowering prices
  - Temporary or permanent return to competitive pricing
  - Price war - temporary implementation of prices below competitive level

# Understanding Collusive Practices

**Property 1: In many cartels, monitoring is in terms of sales, not price.**

- Common properties of many recent cartels in intermediate goods markets
  - Price is not public information.
  - Collusive agreement is a market allocation in terms of, for example, sales quotas.
  - Monitoring involved comparing sales to the agreed-upon quotas.

# Understanding Collusive Practices

## Lysine Cartel (1992-95)

Annual Market Allocation (tons)

Company	Global	Europe
Ajinomoto	73,500	34,000
Archer Daniel Midlands	48,000	5,000
Kyowa	37,000	8,000
Sewon	20,500	13,500
Cheil	6,000	5,000

- Kanji Mimoto of Ajinomoto was assigned the task of preparing monthly "scorecards" for the cartel.
- Each company telephoned or mailed their sales volumes to Mimoto.
- Mimoto prepared a spreadsheet that was distributed at the quarterly maintenance meetings.





# Understanding Collusive Practices

**Property 2: In many cartels, punishments are asymmetric and not symmetric price wars.**

Asymmetric punishments include

- transfers such as through inter-firm sales
  - Lysine: guaranteed buy-ins
  - Citric acid: buy-backs
    - Example: At the November 14, 1991 meeting in Brussels, it was determined that Haarmann & Reimer needed to buy 7,000 tons of citric acid from ADM.
- focused price war on a deviator's customers

# Understanding Collusive Practices

TABLE 3—INTERNATIONAL STEEL AGREEMENT (1926)

Country	Allocated market share (percent)
Germany	40.45
France	31.89
Belgium	12.57
Luxemburg	8.55
Saar Territory	6.54

*Source:* Alfred Plummer (1938).

#### ARTICLE 5

Every month each country's actual net production of crude steel during that month shall be ascertained, in relation to the figures indicated by the quotas.

#### ARTICLE 6

If the quarterly production of a country exceeds the quota which was fixed for it, that country shall pay in respect of each ton in excess a fine of 4 dollars, which shall accrue to the common fund, in addition to the payment provided for in Article 1.

#### ARTICLE 7

If the production of any country has been below the quota allotted to it, that country shall receive in compensation from the common fund the sum of 2 dollars per ton short.

# Understanding Collusive Practices

Why are punishments asymmetric?

- Pareto improvement for firms relative to symmetric punishments
- Symmetric punishments are less effective when monitoring is in terms of sales.

# Understanding Collusive Practices

**Result:** When market demand is highly inelastic then almost no collusion is sustainable with symmetric punishments. (Harrington & Skrzypacz, *RAND Journal of Economics*, 2007)

- Consider a duopoly in which there is a symmetric punishment ("price war") if either firm has a market share above  $\hat{s}$ .
- If firm 1 undercuts the collusive price,
  - it *increases* the probability that firm 1's market share exceeds  $\hat{s}$  which makes a price war *more* likely.
  - it *decreases* the probability that firm 2's market share exceeds  $\hat{s}$  which makes a price war *less* likely.
- These offsetting effects cancel each other out so a firm's price does not affect the probability of a price war.
- A firm then cheats as there is no future profit loss  $\Rightarrow$  all collusive agreements are unstable.

# Understanding Collusive Practices

Two-tier asymmetric punishment will sustain collusion.

- Penalties for overproduction sustain higher prices.
  - A firm makes a payment of  $x$  to its rivals for each unit it sells.
  - If a firm expects to transfer  $x$  to the other firms for each unit it sells, it will price higher because its marginal cost is effectively higher by  $x$ .
  - Transfers can be consummated through inter-firm sales.
- Threat of collapse of collusion ("price war")
  - If firms do not honor the compensation scheme then collusion collapses.
  - Firms then find it optimal to make these transfers.

# Understanding Collusive Practices

**Challenge:** In practice, monitoring was in terms of *self-reported* sales which, generally, were not verifiable.

- Internal stability requires that these reported sales be truthful.
- Some misreporting in the lysine cartel
  - Cheil claimed to the EC that it sometimes reported "misleading" sales information.
  - Ajinomoto hid 3,500 tons of lysine from the cartel's auditors; for example, an internal memo read: "Hide 1,000 tons in Thailand internal business."

# Understanding Collusive Practices

Harrington & Skrzypacz (*American Economic Review*, 2011)

- Internal stability requires that firms find it optimal to
  - ① set the collusive price
  - ② truthfully report sales (which proves to be the binding condition)
  - ③ make transfers
- How is a firm induced to truthfully report high sales?
  - Price war is more likely when the aggregate sales report is lower.
  - A firm that reports lower sales makes a lower transfer but then it enhances the likelihood of a price war.
- Collusion is stable when market demand is sufficiently stable.



# State of Competition Policy



OFFICE OF FAIR TRADING



- 1 Recent developments in the fight against cartels
- 2 Critical analysis of leniency programs
- 3 New policy directions

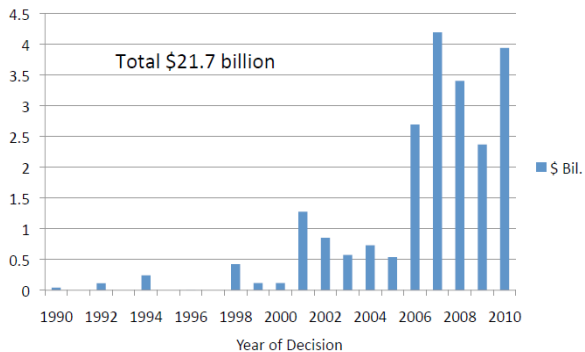
# State of Competition Policy

- A revolution in the global perspective on cartels in the last 20 years.
- Wide-spread adoption of competition laws
- Increased enforcement - more resources, more cases, higher fines in many jurisdictions
- Exemplified in the European Union
  - Mario Monti, former European Commissioner for Competition (2000):  
*"Cartels are cancers on the open market economy."*

# State of Competition Policy

## Deterrence

### European Commission Fines Imposed, 1990-2010



8/2/11

J M Connor, Purdue U.

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# State of Competition Policy

## Leniency Programs

- A *leniency program* offers reduced penalties to cartel members in exchange for cooperating with enforcement authorities.
- 1993: U.S. Dept of Justice revised corporate and individual leniency programs
- 1996: European Commission adopted leniency program
- 2009: Chile adopted leniency program
- More than 50 jurisdictions have leniency programs
- General experience is that leniency programs are very active in terms of applications

# State of Competition Policy

## Leniency Programs



Luis Berenguer Fuster  
Head, Comisión Nacional de la Competencia (Spain)

*"The leniency program entered into force on Thursday, 28 February 2008. On Friday 22nd February, I received a phone call telling me that there were people queuing at the entrance of the CNC. I could hardly believe it."*

# State of Competition Policy

## Leniency Programs

### Are leniency programs reducing the frequency of cartels in an economy?

- Some concerns about leniency programs:
- ① Leniency applications are coming from dying cartels
  - European Commission official raised this concern at a conference in June 2006.
  - Leniency program may then be raising penalties but is it destabilizing cartels?
- ② Leniency applications could be reducing non-lenieny enforcement.
  - EC economists (2007): "DG Competition is now in many ways the victim of its own success; leniency applicants are flowing through the door of its offices, and as a result the small Cartel Directorate is overwhelmed with work."
  - Could the cartel rate go up because non-lenieny enforcement is sufficiently weakened?

# State of Competition Policy

## Leniency Programs

Harrington & Chang (*Journal of European Economic Association*, 2009; Working Paper, 2012)

- Population of markets
- Heterogeneity across markets: markets differ in a parameter that affects cartel stability (e.g., firm demand elasticity)
  - Explains why cartels are more common in some industries.
- Heterogeneity in a market over time: market conditions (e.g., demand)
  - Explains why cartels may collapse (irrespective of competition policy).

# State of Competition Policy

## Leniency Programs

- Cartel birth - Exogenously firms have the opportunity to cartelize and succeed in doing so if it is stable.
- Cartel death - A cartel dies when
  - collusion is no longer stable (because of market conditions) or
  - detected, prosecuted and convicted by the competition authority either due to
    - the leniency program
    - an investigation without use of the leniency program
- Characterize steady-state cartel rate generated by this birth-death process.



# State of Competition Policy

## Leniency Programs

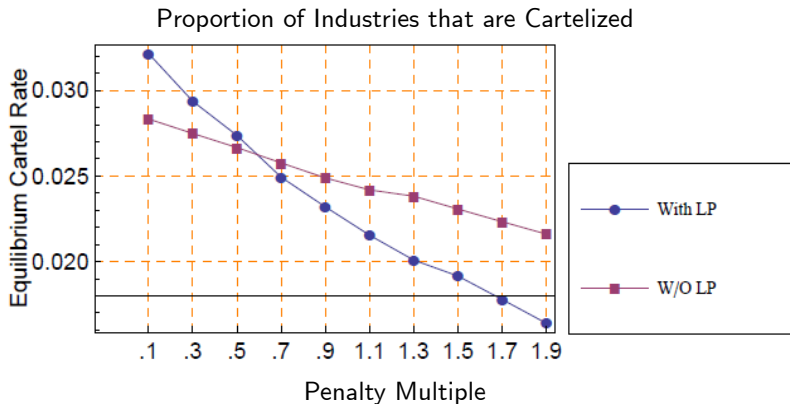
Concern #1: Many leniency applications are coming from dying cartels.

- In equilibrium, all leniency applications come from dying cartels.
  - When collusion is stable, firms do not want to apply for leniency in order to preserve a future collusive profit stream.
  - When collusion is unstable, firms race for leniency.
- Leniency program is still destabilizing cartels
  - In anticipation of a race for leniency upon cartel collapse, expected penalties are higher.
  - This makes collusion less profitable and widens the set of conditions whereby cartel collapse occurs.

**Result:** Even if all leniency applications come from dying cartels, a leniency program can still be destabilizing cartels.

# State of Competition Policy

## Leniency Programs



# State of Competition Policy

## Leniency Programs

Concern #2: Leniency applications could reduce non-lenieny enforcement.

A leniency program could cause non-lenieny enforcement to be

- *weaker* because there are fewer resources available to prosecute them.
- *stronger* if the leniency program deters cartel formation so there are fewer cartels and fewer non-lenieny cases to prosecute.

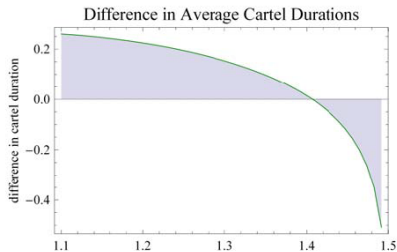
**Result:** A leniency program can weaken non-lenieny enforcement to the extent that the cartel rate is higher.

# State of Competition Policy

## Leniency Programs

A leniency program results in fewer cartels forming but those that form have longer duration  $\Rightarrow$  cartel rate to rise.

- Least stable cartels are deterred from forming because of a potential race for leniency.
- Most stable cartels have longer duration because non-lenieny enforcement is weaker.



Industry type (less stable cartels  $\rightarrow$ )

# State of Competition Policy

## Leniency Programs

A leniency program raises the cartel rate when

- leniency cases are still reasonably resource-intensive and
- penalties are low.

**Takeaway:** Budgetary resources and penalties are critical complements to a leniency program.

**Takeaway:** Importance of evaluating the impact of competition policy on the cartel rate.

# State of Competition Policy

## Leniency Programs

### Experience of Chile's leniency program

- Over four years, only one application (by a U.S. firm)
- Why so few applications?
  - Are penalties too low? (Recently raised cap to approx. US\$30 million per defendant)
  - Is the perceived probability of conviction too low? (Might now be higher with recent success in retail pharmacy case.)
  - Does the corporate culture discourage turning in fellow executives?

# State of Competition Policy

## Policy Directions

- 1 Screening
- 2 Whistleblower rewards
- 3 Criminalization

# State of Competition Policy

## Policy Directions: Screening

*Screening* is the use of market data to identify markets where collusion is suspected.

- Purpose of screening is to identify markets worthy of investigation.
- Screening has been performed with some success in Brazil, Mexico, The Netherlands, South Africa.
- Leniency programs and screening are complements:
  - *Screening enhances the efficacy of a leniency program*: The more likely a cartel member believes it'll be caught, the more apt it is to apply for amnesty.
  - *Leniency program enhances the efficacy of screening*: A cartel that is identified through screening may induce firms to apply for leniency.



# State of Competition Policy

## Policy Directions: Whistleblower Programs

*Whistleblower program* offers rewards to individuals who report a cartel but are not part of the cartel.

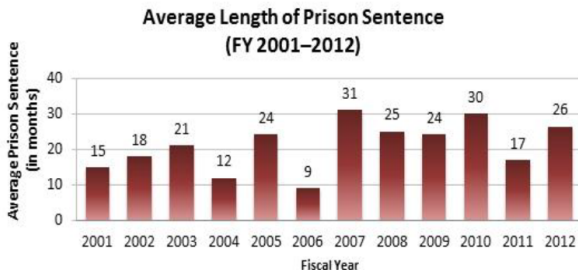
- Suspicions may come from industrial buyers or uninformed employees of the colluding firms (e.g., sales representatives)
- Korea (2002, 2005) - rewards of up to 1 billion Korean Won (approx. 700,000€)
- UK OFT (2008) - rewards of up to £100,000
- Hungary (2010) - at least 1% of government fine to a maximum of 50 million forints (approx. 165,000€)
- U.S. Dept of Justice is wary because of the "threat to witness credibility."

# State of Competition Policy

## Policy Directions: Criminalization

### U.S. Department of Justice, Antitrust Division

- 1998 - 2004: 44% of defendants were sentenced to jail.
- 2004 - 2010: 74% of defendants were sentenced to jail.
- LCD cartel - DOJ argued for a 10 year sentence for President and Executive Vice President of AU Optronics. Judge gave 3 years.



# State of Competition Policy

## Policy Directions: Criminalization

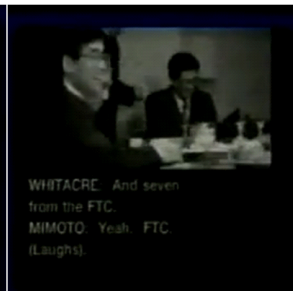
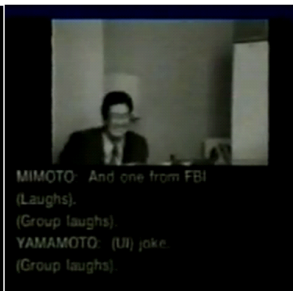
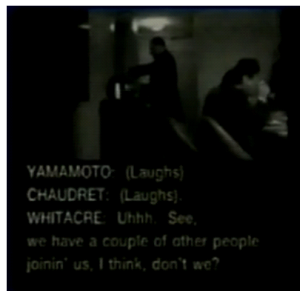
Country	Maximum sentence (years)
Brazil	5
France	4
Ireland	5
Israel	5
Republic of Korea	3
Japan	3
Russia	7
United States	10
United Kingdom	5

# INTERMISSION

## METEDURAS DE PATA POR CARTELES

# Cartel Bloopers

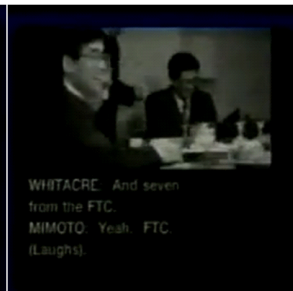
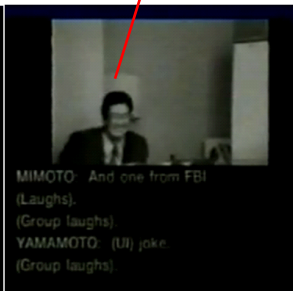
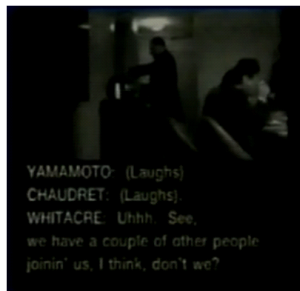
## Meeting of the Lysine Cartel January 18, 1995 - Atlanta, Georgia USA



# Cartel Bloopers

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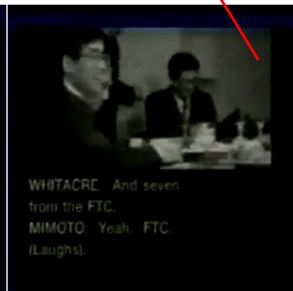
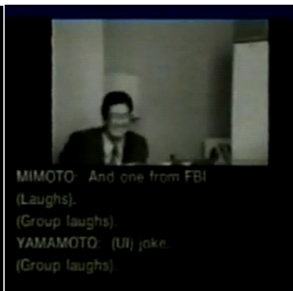
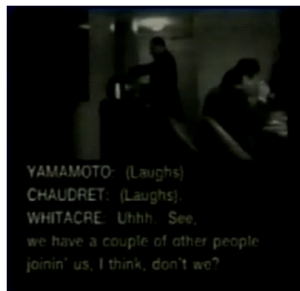
And one for  
the FBI



# Cartel Bloopers

Meeting of the Lysine Cartel  
January 18, 1995 - Atlanta, Georgia USA

And seven for  
the FTC



# Cartel Bloopers

Hasbro (UK Office of Fair Trading, 2003)

- Toy manufacturer Hasbro organized a price-fixing agreement between retailers Argos and Littlewoods with respect to Hasbro's products.



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- Email from Hasbro Sales Director Mike Brighty to Neil Wilson and Ian Thomson (19 May 2000):
- 

'Ian ... This is a great initiative that you and Neil have instigated!!!!!!!!!!!! However, a word to the wise, never ever put anything in writing, its highly illegal and it could bite you right in the arse!!!! suggest you phone Lesley and tell her to trash? Talk to Dave. Mike'

# Cartel Bloopers

Feb 1982: Phone call between Robert Crandall (CEO, American Airlines) and Howard Putnam (CEO, Braniff Airlines)



# Cartel Bloopers

- **Crandall:** I think it's dumb as hell for Christ's sake, all right, to sit here and pound the \*\*\*\* out of each other and neither one of us making a \*\*\*\*ing dime.

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- **Crandall:** I think it's dumb as hell for Christ's sake, all right, to sit here and pound the \*\*\*\* out of each other and neither one of us making a \*\*\*\*ing dime.
- **Putnam:** Do you have a suggestion for me?

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- **Crandall:** I think it's dumb as hell for Christ's sake, all right, to sit here and pound the \*\*\*\* out of each other and neither one of us making a \*\*\*\*ing dime.
- **Putnam:** Do you have a suggestion for me?
- **Crandall:** Yes. I have a suggestion for you. Raise your goddamn fares twenty percent. I'll raise mine the next morning. You'll make more money and I will too.

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- **Putnam:** We can't talk about pricing.
- **Crandall:** Oh bull \*\*\*\*, Howard. We can talk about any goddamn thing we want to talk about.



# Defining the Boundaries of Unlawful Collusion

FBI video tape of a meeting of the lysine cartel  
March 1994 - Maui, Hawaii



# Defining the Boundaries of Unlawful Collusion

## Spectrum Auctions (Germany, 1999)

- German government auction of ten blocks of spectrum.
- Bidding rule: any bid must be at least 10% higher than the current high bid.
- Mannesman's initial bids:
  - Blocks 1-5: 20 million DM/megahertz
  - Blocks 6-10: 18.18 million DM/megahertz
- Why 18.18? Adding 10% to 18.18 is 20.
- Was Mannesman signaling to T-Mobil that each should win 5 blocks at 20 million?
- In the next round, T-Mobil bid 20 million on blocks 6-10. There were no subsequent bids.

# Defining the Boundaries of Unlawful Collusion

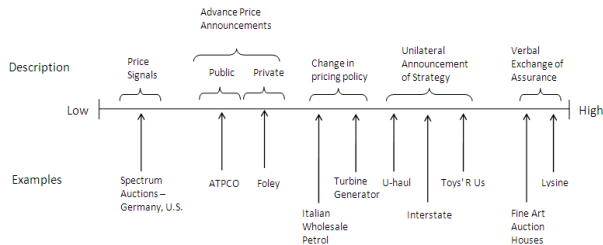
## Spectrum Auctions (Germany, 1999)

- This is tacit collusion and it is lawful.
- If Mannesman and T-Mobile had spoken to each other and exchanged assurances that each would buy 5 blocks for 20M then that is explicit collusion and is unlawful.
- Welfare effects are the same.

# Defining the Boundaries of Unlawful Collusion

The more direct is a method of communication,

- the more effective it is at producing coordination
- the more likely it is to result in prosecution.



- Most of these collusive practices are
  - untouched by recent advances including leniency programs
  - likely to be increasingly deployed given that enforcement against explicit collusion has become more effective

# Defining the Boundaries of Unlawful Collusion

## Overview

- 1 Current definition of "unlawful collusion"
- 2 Critique of current legal practice
- 3 Developing a socially optimal definition of unlawful collusion

# Defining the Boundaries of Unlawful Collusion

## Existing Law: Definition

- U.S.: "Every contract, combination, ... or conspiracy in restraint of trade ... is declared to be illegal." [Section 1 of the Sherman Act (1890)]
  - U.S. Supreme Court has developed the doctrine that an *agreement* to restrain trade is unlawful.
- European Union: "incompatible with the common market [are] all agreements between undertakings ... which have as their object or effect the prevention, restriction or distortion of competition." [Article 101 (1) TFEU (1999)]
- Chile: "any act, agreement or convention ... which hinders, restricts or impedes free competition, or which tends to produce such effects [is unlawful]" [Decree No. 211, Competition Act of 1973 as amended by Law No. 20.361 (2009)]

# Defining the Boundaries of Unlawful Collusion

## Existing Law: Definition

- U.S. Supreme Court has defined an agreement as
  - a "unity of purpose or a common design and understanding, or a meeting of minds" (*American Tobacco Co. v. United States*, 1946)
  - "a conscious commitment to a common scheme designed to achieve an unlawful objective" (*Monsanto Co. v. Spray-Rite Serv. Corp.*, 1984)
- EU General Court has defined an agreement as or as requiring
  - "joint intention" (*ACF Chemiefarma*, 1970)
  - "concurrence of wills" (*Bayer v. Commission*, 2000)
- Unlawful collusion is "mutual understanding to suppress competition."

# Defining the Boundaries of Unlawful Collusion

## Existing Law: Disagreement

### Survey of Legal Scholars: June 2012

**Question:** Is the verbal exchange of assurances between firms evidence of an agreement or is it, in and of itself, an agreement?

- George Hay (Cornell University, School of Law): *I think that the plaintiff in your case would say simply that the exchange constitutes an agreement.*
- Keith Hylton (Boston University, School of Law): *A verbal exchange of assurances would constitute an agreement, and not merely acts that facilitate an agreement.*



# Defining the Boundaries of Unlawful Collusion

## Existing Law: Disagreement

**Question:** Is the verbal exchange of assurances between firms evidence of an agreement or is, in and of itself, an agreement?

- William Page (U. of Florida, School of Law): *That is definitely an agreement, if by "exchange of assurances" you mean an exchange of conditional promises about future prices. That's close to the common law definition of a contract.*
- William Kovacic (George Washington University, School of Law; former Chairman, Federal Trade Commission): *The bell of agreement rings at the moment [assurances] have been exchanged (either by words or conduct). This idea borrows heavily, it seems, from ideas developed in contract law.*

# Defining the Boundaries of Unlawful Collusion

## Existing Law: Disagreement

**Question:** Is the verbal exchange of assurances between firms evidence of an agreement or is, in and of itself, an agreement?

- Jonathan Baker (American University, School of Law): *I will assume that the firms have in mind the same terms of coordination when they assure each other that they will implement those terms. Under such circumstances, the exchange of assurances is evidence of an agreement.*
- Gregory Werden (U.S. Department of Justice, Antitrust Division): *The exchange of spoken assurances is very strong evidence of the agreement. It is always possible for either or both parties to say that they did not mean what they said in the exchange, and if the court can be convinced of that, there was no agreement.*

# Defining the Boundaries of Unlawful Collusion

Existing Law: Disagreement

**Question:** Is the verbal exchange of assurances between firms evidence of an agreement or is, in and of itself, an agreement?

Louis Kaplow (Harvard School of Law):  
*I've wrestled with precisely your question endlessly. I'm firmly of the view that (A) all courts and commentators would deem a verbal exchange of assurances as an agreement, (B) but they have no consistent definition of agreement and probably couldn't explain why they believe (A).*



# Defining the Boundaries of Unlawful Collusion

## Existing Law: Confusion

Scholars are of mixed views because the U.S. judicial system is confused.

- U.S. Supreme Court: Communication devoid of mutual understanding can be an agreement.
  - The Court views an express exchange of assurances to raise price as an agreement even if subsequent behavior is inconsistent with the presence of mutual understanding.
- U.S. Supreme Court: Mutual understanding devoid of communication is not an agreement
  - Conscious parallelism is lawful (it is even a defense), while recognized by the Court as the same as unlawful collusion in terms of effect.

# Defining the Boundaries of Unlawful Collusion

## Existing Law: Objective vs. Subjective Definitions

Currently, two competing definitions of an agreement.

- Subjective Definition: An agreement is *mutual understanding* to restrain trade.
- Objective Definition: An agreement is *communication* with the intent to restrain trade.

# Defining the Boundaries of Unlawful Collusion

## Existing Law: Objective vs. Subjective Definitions

### Pricebot Conundrum

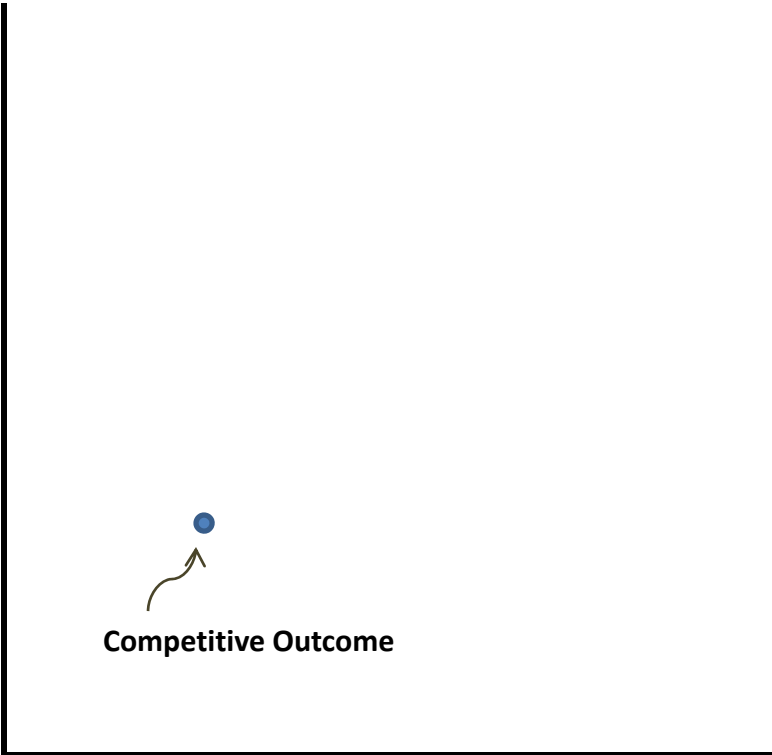
- A *pricebot* is an automated price-setting algorithm intended to maximize profit.
- Suppose two competitors independently deploy a pricebot to set prices.
- The output of a pricebot is unpredictable to managers.
- Unbeknownst to managers, pricebots have adapted to collusive pricing rules and generate high profits.

# Defining the Boundaries of Unlawful Collusion

## Existing Law: Objective vs. Subjective Definitions

- Is the outcome supracompetitive? Yes
- Can economists determine there is (economic) collusion? Yes
- Is it unlawful collusion? No
  - Objective: No communication
  - Subjective: No mutual understanding
    - Managers do not know how price was set.
    - Software programs do not "understand" (see philosopher John Searle's Chinese room argument)

Price of firm 2

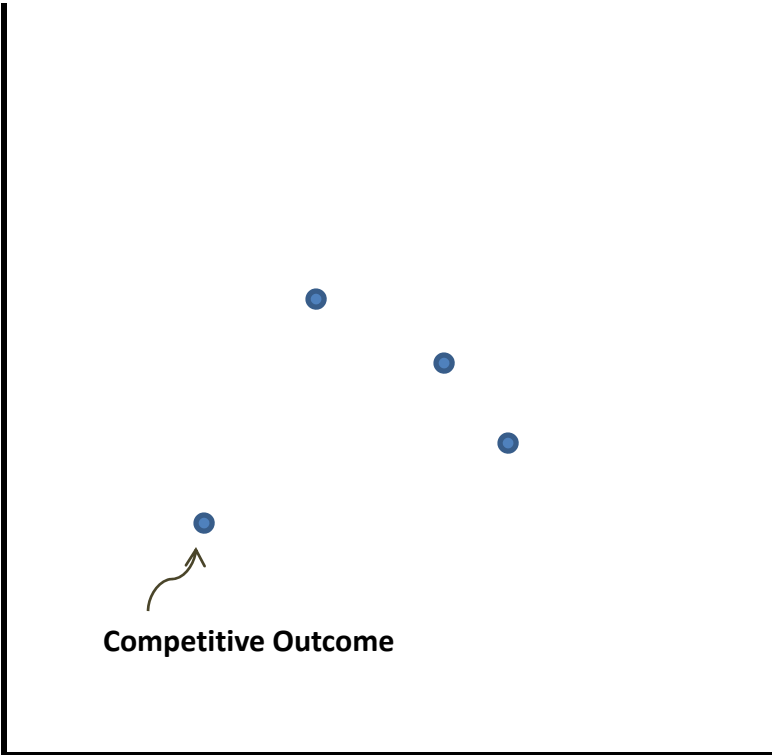


Competitive Outcome

Price of firm 1



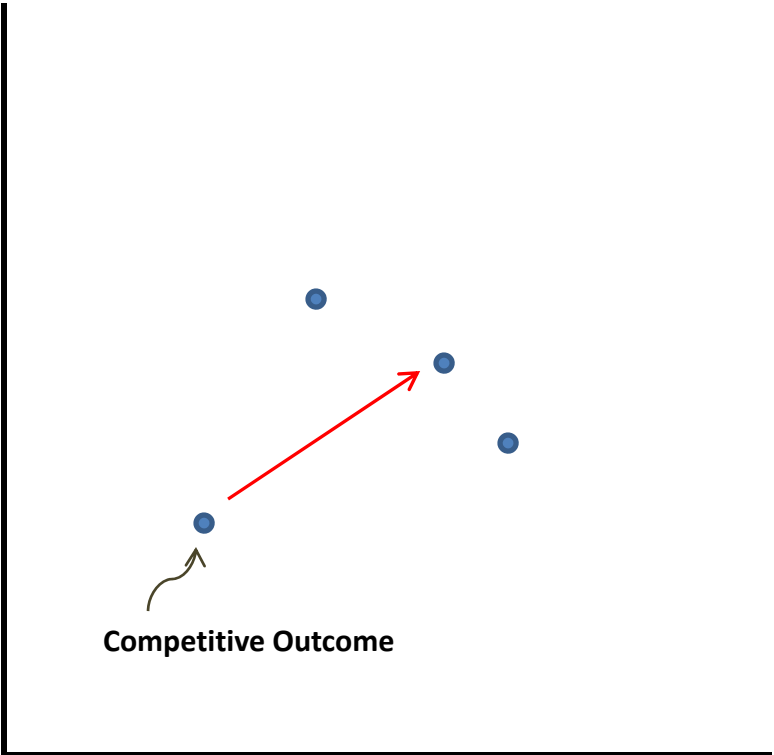
Price of firm 2



Competitive Outcome

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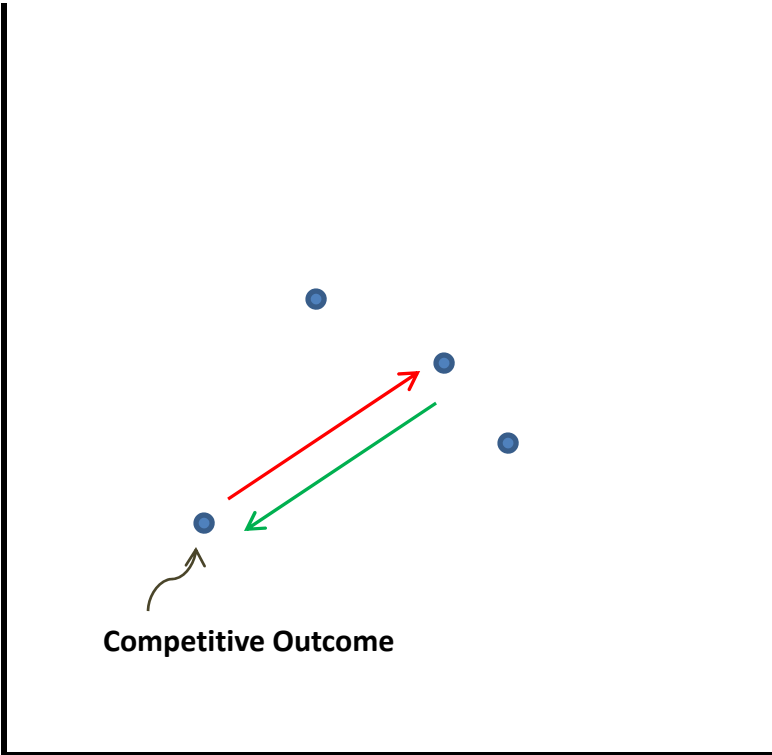
Price of firm 2



Competitive Outcome

Price of firm 1

Price of firm 2



Competitive Outcome

Price of firm 1

# Defining the Boundaries of Unlawful Collusion

## Game-Theoretic Framework

Proposed desiderata for a law prohibiting collusion.

- 1 It is *beneficial* in that, if properly implemented, the law raises welfare.
- 2 It is *implementable* in that it is reasonable to expect
  - firms to know when they are violating the law (predictability, not remedy, is what matters).
  - the government to know when the law has been violated.
- 3 It is *equilibrium-consistent* in that there exists an equilibrium in which behavior is lawful.

# Defining the Boundaries of Unlawful Collusion

## Game-Theoretic Framework

Candidates:

- 1 Outcomes
- 2 Strategy profiles (or equilibria)
- 3 Change in strategy profiles (or equilibria)

# Defining the Boundaries of Unlawful Collusion

## Game-Theoretic Framework

### Can an outcome be unlawful?

Proposal: It is unlawful to set excessive prices.

- It is not implementable: How is a firm to know when its price is excessive?

# Defining the Boundaries of Unlawful Collusion

## Game-Theoretic Framework

### Can a strategy profile (or equilibrium) be unlawful?

- Canonical collusive strategy profile:
  - A firm prices at  $\hat{p}$  ( $>$  static NE price) if all firms have priced at  $\hat{p}$  in the past.
  - Otherwise, a firm prices at the static NE price.
- A supracompetitive price is individually rational by the threat that the future path will be punitive.
- U.S. Supreme Court
  - An unlawful agreement is "a conscious commitment to a common scheme designed to achieve an unlawful objective"
  - This sounds like a collusive equilibrium
  - At the same time, the Court has said there must be evidence of communication.

# Defining the Boundaries of Unlawful Collusion

## Game-Theoretic Framework

Proposal: It is unlawful for firms to use the threat of a future punitive response to influence current prices.

- Takes care of the pricebot conundrum.
- Has parallels to the legal interpretation of predation
  - Predation: It is unlawful to threaten future aggressive pricing if a rival firm does not exit.
  - Collusion: It is unlawful to threaten future aggressive pricing if a rival firm does not set a high price.
    - The threat could be to act in a lawful manner (static NE).



# Defining the Boundaries of Unlawful Collusion

## Game-Theoretic Framework

Is it implementable?

- Will firms know when they are violating the law?
  - Is the threat of punitive response (punishment) always "conscious"?
- Are economic methods up to determining whether observed behavior is the product of such a strategy?
  - Punitive response may never be observed.
  - Even if observed, difficult to control for demand and cost factors.

# Defining the Boundaries of Unlawful Collusion

## Game-Theoretic Framework

Is it equilibrium-consistent? Is there always an equilibrium for which behavior is lawful?

- Consider a price game with homogeneous goods and a constant marginal cost (MC).
- Assume firms simultaneously choose price and there is a fixed cost.
  - After period's fixed cost is incurred, static NE price =  $MC < AC$ .
  - Only equilibria may involve price  $> MC$  which is sustained by a punitive threat.

# Defining the Boundaries of Unlawful Collusion

## Game-Theoretic Framework

### Can a movement to a strategy profile (or equilibrium) be unlawful?

- Proposal: It is unlawful for firms to change the strategy profile to one that results in lower welfare.
- Movement between equilibria is well-defined "coordinated behavior."
  - All equilibria involve unilaterally optimal behavior so it is not sensible to say that a dynamic equilibrium is "coordinated" and a static equilibrium is not.
- It seems implementable
  - Firms are consciously engaging in an unlawful act.
  - They know there is another equilibrium with lower prices.
- It is equilibrium-consistent as every equilibrium is lawful.

# Concluding Remarks

- Significant progress has been made in understanding, discovering, convicting, and penalizing explicit collusion.
  - Current policies: leniency programs, higher government fines, more aggressive enforcement
  - Future policies: screening, whistleblower rewards, criminalization, private customer damages.
- There has not been comparable progress in understanding and fighting non-explicit forms of collusion
  - Tacit collusion is likely to increase in importance given the more aggressive pursuit of explicit collusion.
  - Need to develop a logically consistent and practical definition of "unlawful collusion"