

Game-Theoretic Ruminations on Section 1 of the Sherman Act

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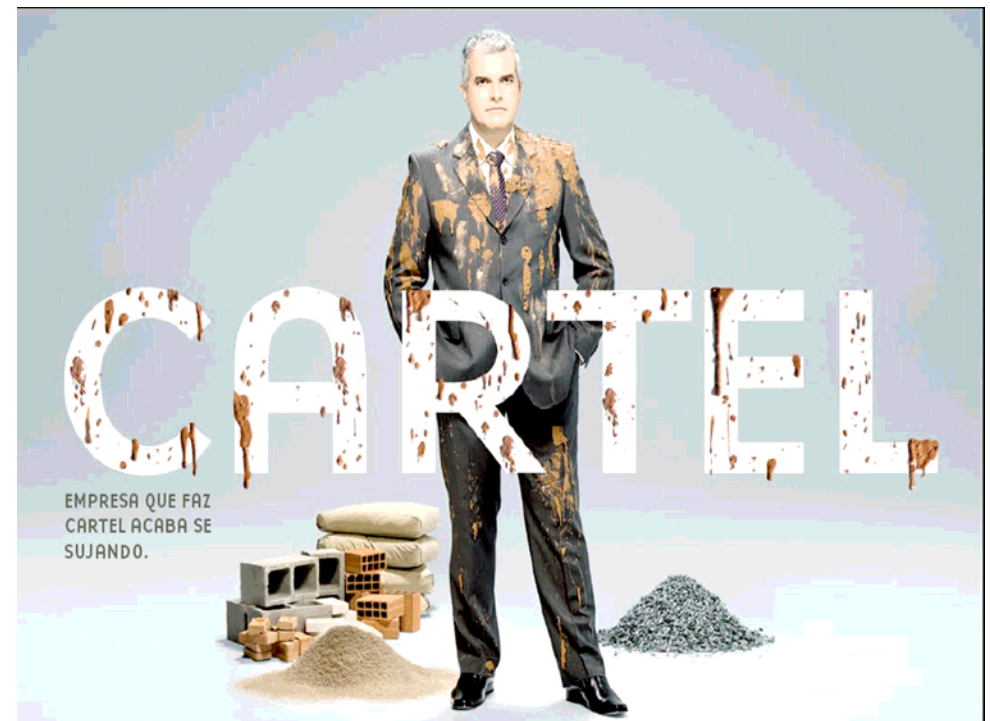
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What is Collusion?

- Collusion is when firms coordinate price increases and supply reductions.
- Section 1 of the Sherman Act (1890): *Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several States, or with foreign nations, is declared to be illegal.*
- "... negotiation between competitors may facilitate the **supreme evil of antitrust: collusion.**" [Justice Antonin Scalia, *Verizon Communications, Inc. v. Law Offices of Curtis V. Trinko LLP*, 2004]
- "**Cartels are cancers** on the open market economy ..." [Mario Monti, European Commissioner for Competition, 2000]

Nationwide marketing campaigns (airports, weekly magazines & postal cards)

“Companies that participate in cartel get dirty”



What is Collusion?

- Effective collusion requires
 - **coordination** on a collusive outcome
 - **implementation** of that collusive outcome
- Coordination
 - Communication
 - Express
 - Non-express - public announcement of intentions, price signals, etc.
 - Bargaining
- Implementation
 - Collusive scheme to implement an outcome
 - Monitoring of compliance
 - Punishment for non-compliance
 - Outcome: higher price, market allocation, refusal to bid, transfers, etc.

What is Collusion?

- The Law focuses more on **coordination** than implementation

"[A]ntitrust law clarified that the idea of an agreement describes a process that firms engage in, not merely the outcome that they reach. Not every parallel pricing outcome constitutes an agreement because not every such outcome was reached through the process to which the law objects: a negotiation that concludes when the firms convey mutual assurances that the understanding they reached will be carried out." (J. Baker, Antitrust Bulletin, 1993)

Type	Unlawful?	Harmful?
Explicit collusion	Yes	Yes
Concerted action	Probably	Yes
Tacit collusion	No	Yes

What is Collusion?

- Economics focuses more on **implementation** than coordination.
 - What is implemented?
 - How is it implemented?
- Economic theories of collusion *assume* mutual understanding among firms as to their strategies (e.g., pricing rules).

What is Collusion?

- Economists' criticism of the law: Tacit collusion can be just as detrimental as explicit collusion.
- Lawyers' criticism of economics: Economists do not distinguish between (unlawful) explicit collusion and (lawful) tacit collusion.
- "On the ultimate issue of whether behavior is the result of a contract, combination, or conspiracy, ... courts routinely prevent economists from offering an opinion, because economics has surprisingly little to say about this issue." [W. Page, *Loyola University Chicago Law Journal*, 2007]

What is Collusion?

Objective: Examine the game-theoretic and economic foundations to Section 1.

- 1 What are appropriate evidentiary standards?
- 2 Why is tacit collusion/conscious parallelism lawful?
- 3 Is "agreement" a sound foundation for Section 1?

Caveat Auditor

"I think part of the advantage I have is that I'm not a lawyer. And so as historian, I look at the context of the judiciary and the Constitution in terms of American history." - Newt Gingrich



Caveat Auditor

“The advantage of not being a lawyer is the ability to look outside the box. The disadvantage is to be so woefully ignorant of what’s inside the box.” - Laurence Tribe



The Agreement-Based Approach

Defining an Agreement

An unlawful agreement is when there is

- "unity of purpose or a common design and understanding, or a meeting of minds."
- "direct or circumstantial evidence that reasonably tends to prove that [the parties] had a conscious commitment to a common scheme designed to achieve an unlawful objective."





The Agreement-Based Approach

Defining an Agreement

- Game theoretic concept of an equilibrium
 - A *strategy* is a rule for making choices.
 - In a game, an *equilibrium* is a strategy for each player that satisfies:
 - **rationality** - a player's strategy is optimal given beliefs as to other players' strategies.
 - **mutual understanding** - each player's beliefs as to other players' strategies are accurate.
- An *equilibrium* is an agreement in that it embodies a "meeting of the minds" through mutual understanding.
 - D. Yao and S. DeSanti (*Antitrust Bulletin*, 1993); G. Werden (*Antitrust Law Review*, 2004); L. Kaplow (*California Law Review*, 2011).
- A *collusive equilibrium* is an agreement with regards to an unreasonable restraint of trade.

The Agreement-Based Approach

Defining an Agreement

Fine Arts Auction Houses Cartel			
Sotheby's		Christie's	
CEO	Chairman	CEO	Chairman
Dede Brooks	Alfred Taubman	Christopher Davidge	Anthony Tennant
			
Pled guilty	Convicted	Received leniency	Indicted
1000 hours of service	9 months in prison	\$8,000,000 severance	Not extradited
\$350,000 fine	\$7,500,000 fine		Died a fugitive, 2011

The Agreement-Based Approach

Defining an Agreement

		Sotheby's		
		2%	4%	6%
Christie's	2%	50,50	90,70	150,30
	4%	70,90	100,100	300,60
	6%	30,150	60,300	230,230

What is a competitive equilibrium?

The Agreement-Based Approach

Defining an Agreement

		Sotheby's		
		2%	4%	6%
Christie's	2%	50,50	90,70	150,30
	4%	70,90	100,100	300,60
	6%	30,150	60,300	230,230

Competitive equilibrium: Both auction houses choose 4%.

The Agreement-Based Approach

Defining an Agreement

		Sotheby's		
		2%	4%	6%
Christie's	2%	50,50	90,70	150,30
	4%	70,90	100,100	300,60
	6%	30,150	60,300	230,230

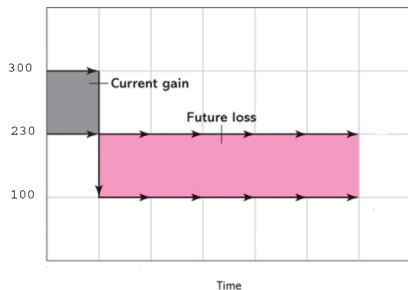
Collusive outcome: Both auction houses choose 6%.

The Agreement-Based Approach

Defining an Agreement

In a repeated setting, collusive equilibrium strategy is a reward-punishment scheme.

- In the initial period, an auction house charges 6%.
- In any future period, an auction house charges
 - 6%, if both auction houses charged 6% in the previous period
 - 4%, otherwise.



The Agreement-Based Approach

Evidentiary Standards

- *United States v. American Airlines*, (5th Cir. 1984)
- Feb 1982: Phone call between Robert Crandall (CEO, American Airlines) and Howard Putnam (CEO, Braniff Airlines)



The Agreement-Based Approach

Evidentiary Standards

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.

Putnam: We can't talk about pricing.

Crandall: Oh bull ****, Howard. We can talk about any goddamn thing we want to talk about.

The Agreement-Based Approach

Evidentiary Standards

Scenario A

- Crandall: "Raise your goddamn fares twenty percent. I'll raise mine the next morning."
- Putnam: "We can't talk about pricing."
- No fare increase.

	Braniff's response	AA's price rise	Braniff's price rise	Meeting of the minds?	Harmful?	Unlawful under §1?
A	no	0%	0%	yes	no	no

The Agreement-Based Approach

Evidentiary Standards

Scenario B

- Crandall: "Raise your goddamn fares twenty percent. I'll raise mine the next morning."
- Putnam: "Do you think I have **** for brains? How about you go first and I'll follow."
- Crandall raises fares 20% and Putnam "cheats" by raising fares 10%.

	Braniff's response	AA's price rise	Braniff's price rise	Meeting of the minds?	Harmful?	Unlawful under §1?
A	no	0%	0%	yes	no	no
B	yes	20%	10%	no	yes	yes

The Agreement-Based Approach

Evidentiary Standards

Scenario C

- Crandall: "Raise your goddamn fares twenty percent. I'll raise mine the next morning."
- Putnam: "We can't talk about pricing." (or hangs up)
- Putnam raises fares by 20% and Crandall matches it.

	Braniff's response	AA's price rise	Braniff's price rise	Meeting of the minds?	Harmful?	Unlawful under §1?
A	no	0%	0%	yes	no	no
B	yes	20%	10%	no	yes	yes
C	no	20%	20%	yes	yes	probably

The Agreement-Based Approach

Evidentiary Standards

Scenario D

- Crandall: "Raise your goddamn fares twenty percent. I'll raise mine the next morning."
- Putnam: "Hell, ****ing yeah, Robert!"
- Putnam raises fares by 20% and Crandall matches it.

	Braniff's response	AA's price rise	Braniff's price rise	Meeting of the minds?	Harmful?	Unlawful under §1?
A	no	0%	0%	yes	no	no
B	yes	20%	10%	no	yes	yes
C	no	20%	20%	yes	yes	probably
D	yes	20%	20%	yes	yes	yes

The Agreement-Based Approach

Evidentiary Standards

- An agreement ("meeting of the minds") is unobservable.
- Exchange of assurances is *not* an agreement.
- Exchange of assurances *facilitates* an agreement.



Communication between two members of the lysine cartel

The Agreement-Based Approach

Evidentiary Standards

- What *is* observable are
 - actions taken by firms to produce an agreement (coordination).
 - actions (higher prices, refusal to bid, etc.) that are the product of an agreement (implementation).
- Evidence
 - of coordination: actions that facilitate a "meeting of the minds".
 - of implementation: outcomes that there is a (full or partial) "meeting of the minds".

The Agreement-Based Approach

Evidence of Implementation

- Judge Richard Posner (*High Fructose Corn Syrup*, 2002):

"The statutory language [of Section 1] is broad enough ... to encompass a purely tacit agreement to fix prices ... If a firm raises price in the expectation that its competitors will do likewise, and they do, the firm's behavior can be conceptualized as the offer of a unilateral contract that the offerees accept by raising their prices."

- Is this really an agreement?

The Agreement-Based Approach

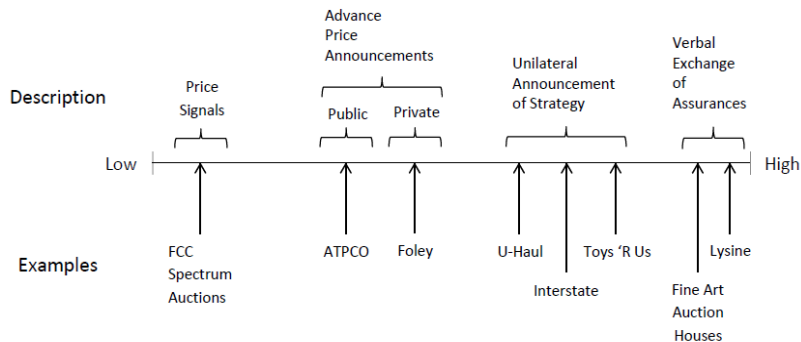
Evidence of Implementation

- Written enforceable (binding) agreement delivers:
 - *mutual understanding* as to what the parties are supposed to do.
 - *commitment* that parties will do what they are supposed to do.
- Exchange of assurances
 - may deliver mutual understanding.
 - does not address what are the penalties associated with non-compliance.
 - does not address the *credibility* of those penalties.
- Evidence of a *self-enforcing* agreement requires ex post behavior (prices, quantities, etc.) consistent with the presence of an agreement.

The Agreement-Based Approach

Evidence of Coordination

How effective are various methods of communication at achieving coordination?



The Agreement-Based Approach

Evidence of Coordination

“Talk is cheap, it don’t cost nothin’ but breath.” [Sam Slick in England, 1843]

Two-dimensional description of the informativeness of communication.

- *Clarity*
 - How clear is the intended meaning?
- *Veracity*
 - For a given intended meaning, how accurate is it as to the sender’s true purpose?
- A receiver may have incorrect beliefs either because of
 - misinterpreting the intent of the sender’s message.
 - misattributing the sender’s objective to that intent.

The Agreement-Based Approach

Evidence of Coordination

- Words can have
 - high clarity - literal meaning is focal.
 - low veracity - being costless, they are easy to say regardless of intent.
 - Informativeness of costless messages depends on the coincidence of interests of the sender and receiver (V. Crawford and J. Sobel, *Econometrica*, 1982).
- Non-linguistic actions can have
 - low clarity - no focal meaning.
 - high veracity - costliness focuses attention on those meanings which make the action profitable.

The Agreement-Based Approach

Evidence of Coordination

Adoption of posted pricing (J. Harrington, *J. of Competition Law and Economics*, 2011)

- Turbine generator market
 - High expenditure custom-ordered equipment commonly purchased by power generating companies.
 - Suppliers: General Electric, Westinghouse
- Events in May 1963
 - GE announced it would set fixed prices and no longer offer discounts
 - Westinghouse followed with the same policy and prices.

The Agreement-Based Approach

Evidence of Coordination

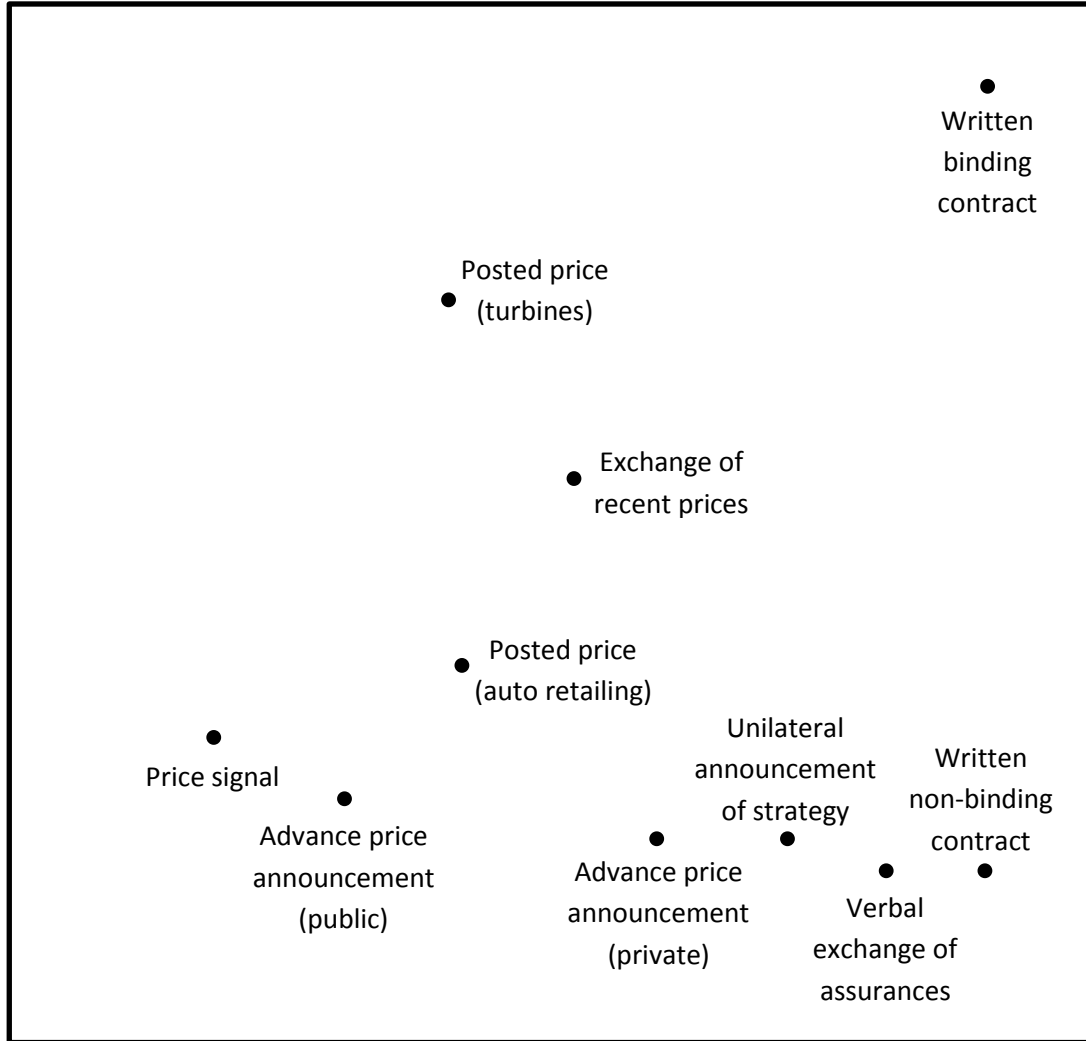
Adoption of posted pricing

- Candidate interpretations of GE's decision to adopt posted pricing
 - If GE is intending to compete, posted pricing is unprofitable.
 - If GE is intending to collude, posting pricing is profitable.
- Communication
 - By adopting posted pricing, GE was inviting Westinghouse to collude.
 - By responding with posted pricing, Westinghouse was indicating its acceptance of that proposal.
- Outcome: For 12 years, GE and Westinghouse had near-identical supracompetitive prices.

Veracity

High

Low



Low

High

Clarity

The Agreement-Based Approach

Summary

- Collusive agreements are self-enforcing contracts that depend on unobserved "meeting of the minds".
- Evidence of *ex ante* communication (coordination) is *not* sufficient to infer a collusive agreement.
 - Exchange of assurances facilitates an agreement but is not an agreement.
 - Words need not be transparent, and non-linguistic actions need not be opaque.
- Evidence of *ex post* behavior (implementation) is
 - required to infer a collusive agreement.
 - can be sufficient to infer a collusive agreement (e.g., unnatural parallelism).

The Conscious Parallelism Loophole

Construction industry attitude



“First of all: I didn’t do anything, and secondly: everybody did the same!”

The Conscious Parallelism Loophole



"I have never seen an example of tacit collusion. I think it is one of those things that flows out of conventional oligopoly theory, which is now in the process of disintegrating before our eyes." Robert Bork, 1977.

The Conscious Parallelism Loophole

Yes, Virginia, there is tacit collusion.

- Turbine generators
- FCC spectrum auction
- Interest rates on credit cards
- Text messages
- Experimental evidence

The Conscious Parallelism Loophole

"Tacit collusion ... describes the process, not in itself unlawful, by which firms in a concentrated market might in effect share monopoly power, setting their prices at a profit-maximizing, supracompetitive level by recognizing their shared economic interests and their interdependence with respect to price and output decisions.." [Brooke Group Ltd. v. Brown & Williamson Tobacco Corp., 1993]

The Conscious Parallelism Loophole

Why is conscious parallelism lawful?

Claim 1: Conscious parallelism is not an agreement.

- But it does involve a "meeting of the minds".
- Conscious parallelism is a game-theoretic collusive equilibrium, and thus is an agreement.

The Conscious Parallelism Loophole

- Claim 2: Conscious parallelism is an agreement but, even if evidence is found of it, there is no remedy.

"Courts have noted that the Sherman Act prohibits agreements, and they have almost uniformly held, at least in the pricing area, that such individual pricing decisions (even when each firm rests its own decisions upon its belief that competitors do the same) do not constitute an unlawful agreement ... [T]hat is not because such pricing is desirable (it is not), but because it is close to impossible to devise a judicially enforceable remedy for 'interdependent' pricing. How does one order a firm to set its prices without regard to the likely reactions of its competitors?"
[Judge Stephen Breyer, Clamp-All Corp., 1988]

The Conscious Parallelism Loophole

- Is a remedy required?
- Remedies are not always available.
 - In the turbine generator case, a remedy is the prohibition of posted pricing.
 - In many explicit cartels, there is no remedy.
- What is required is deterrence by the threat of detection and punishment.

The Conscious Parallelism Loophole

Claim 3: Conscious parallelism is an agreement but, in practice, it is too difficult to distinguish from competition.

- Deterrence requires predictability on the part of firms as to when they have violated the law.
- The probability of mistakes is sufficiently high to have chilling effects on competition.
- That probability depends on the state of economic theoretical and empirical methods.

The Conscious Parallelism Loophole

- Challenge to eliminating the "conscious parallelism loophole" is developing an operational definition of collusion that
 - allows experts to confidently determine the presence of collusion.
 - can be conveyed in laymen's terms so that individuals know when they are violating the law.
- Conscious parallelism should not be a defense.
 - Conscious parallelism *is* an unlawful agreement as the courts have defined it: meeting of the minds, conscious commitment to a common scheme, etc.

Agreeing to Disagree that Agreement is a Sound Foundation

- The legality of some forms of collusion is due to the lack of
 - non-economic evidence that firms agreed not to compete.
 - economic methods to provide sufficiently compelling evidence that firms are not competing.
- Current legal opinion: Economic evidence, by itself, is not sufficiently conclusive to prove the presence of an "unreasonable restraint of trade."
- Claim: The problem is not just with economics, but with the law.
- Example
 - Collusion is conclusively proven based on economic evidence.
 - Collusion is lawful.

Agreeing to Disagree that Agreement is a Sound Foundation

Scenario

- A *pricebot* is a software program that adaptively sets price in order to yield higher profit.
- Two competitors each deploy a pricebot to set prices.
- Pricebots are very complex and thereby unpredictable from the perspective of managers.
- Managers observe that the pricebots result in high profits.
- Pricebots have developed collusive pricing rules.

Agreeing to Disagree that Agreement is a Sound Foundation

- Is there collusion? Yes.
- Can economists determine there is collusion? Yes.
- Is it unlawful collusion? No.
 - No meeting of the minds.
 - No conscious commitment to a common scheme.
 - Managers know nothing about how price was set.
 - Software programs do not "understand". (John Searle)

Agreeing to Disagree that Agreement is a Sound Foundation



Concluding Remarks

- *Agreement-centric* approach focuses on the presence of *unobserved* "meeting of the minds" which creates
 - problems with evidentiary standards
 - loopholes (conscious parallelism, pricebots)
- *Behavior-centric* approach would focus on
 - coordination: ex ante behavior facilitating collusion.
 - implementation: ex post behavior that is the product of collusion.