



# Screening Devices for Detecting Collusion

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Prepared for  
Austrian Federal Competition Authority

October 2010

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## What is a Screen?

- **A screen is a statistical test designed to identify:**
  - If collusion exists in a particular market
  - Which firms are involved
- **Screens use commonly available data such as prices, bids or costs**



## Uses of Screens in Competition Policy

- **Detection by competition authorities and market regulators**
- **Litigation**
  - Effects analysis: evidence of collusion (or lack thereof)
  - Motions to dismiss
  - Class certification
  - Damages estimation
- **Pre-Litigation**
  - Leniency application decision
- **Commodities and financial markets manipulation**
- **Corporate counsel**
  - For internal monitoring and increased compliance robustness



## Experience with Conspiracies and Manipulations

- **I have worked on and developed empirical screens for several types of conspiracies and manipulations cases, including:**
  - Cartels involving bid-rigging, price-fixing, market allocation
  - Manipulations of inside spreads in major trading exchanges
  - Manipulations of stock prices
  - Accounting manipulations (e.g., revenue management)
  - Conspiracies among dealers and brokers of large financial institutions
  - Manipulations of commodities indices (e.g., Platts, NYMEX)
  - Manipulations of gold, platinum and palladium, silver, and oil futures contracts prices
  - Conspiracies among business partners of major institutions
  - Manipulations of hedge funds accounts
  - Manipulations of interest rates



## Presentation Outline

- Screening Strategies & Properties of a Good Screen
- Types of Screens and Most Common Screens
- Using Screens for Detection
- The Power of Screens to Detect Explicit Collusion
- Economic Analyses, Screening and Leniency Programs



# Screening Strategies

## 1. Improbable events

- Similar to a casino looking for cheats:
  - Highly unlikely to win 20 red/black roulette bets in a row
  - Probability less than 1 in 1,000,000
- Classic Example: Tennessee Valley Authority price-fixing conspiracy:
  - Seven companies submitted identical “sealed” bids of \$198,438.24 for conductor cable services

## 2. Control group

- Benchmark a firm’s behavior against others in the same or related markets
- Compare prices, quantities, market shares to other firms and markets
- Search for anomalous patterns- e.g. concrete prices in New York in 1980’s, 70 percent higher than other markets



## Properties of a Good Screen

1. Low false positives and negatives
2. Easy to implement
3. Costly to avoid
4. Empirical and/or theoretical support

### NOTE

- A screen is not a proof of existence neither absence of collusion
- False positives and negatives are possible (similar to medical screens)



## Most Common Screens: Price-Fixing & Bid-Rigging

### ■ Relationships between auction's bids

- Screens for phony or “complementary” bids (Porter and Zona (1993))
- Screens for patterns of bidding across auctions indicative of bid suppression, bid rotation, or the use of side payments to reward losing conspiracy members for not competing aggressively (Bajari and Ye (2003))

### ■ High average price

- Screens on price levels: a cartel is estimated to raise prices by about 25% on average with respect to the but-for competitive price level (Connor (2008))

### ■ Low price variance

- Recent screen suggests searching for lower price volatility during collusion (Abrantes-Metz, Froeb, Geweke and Taylor (2006))





## Other Examples of Screens

- Existence of a structural break at the beginning and/or at the end of the cartel
- Low pass-through rate from costs to prices
- Market shares stability within alleged cartel members
- Negative serial correlation of market shares for alleged cartel members
- Price distributions violating mathematical laws (e.g., Benford's Law)



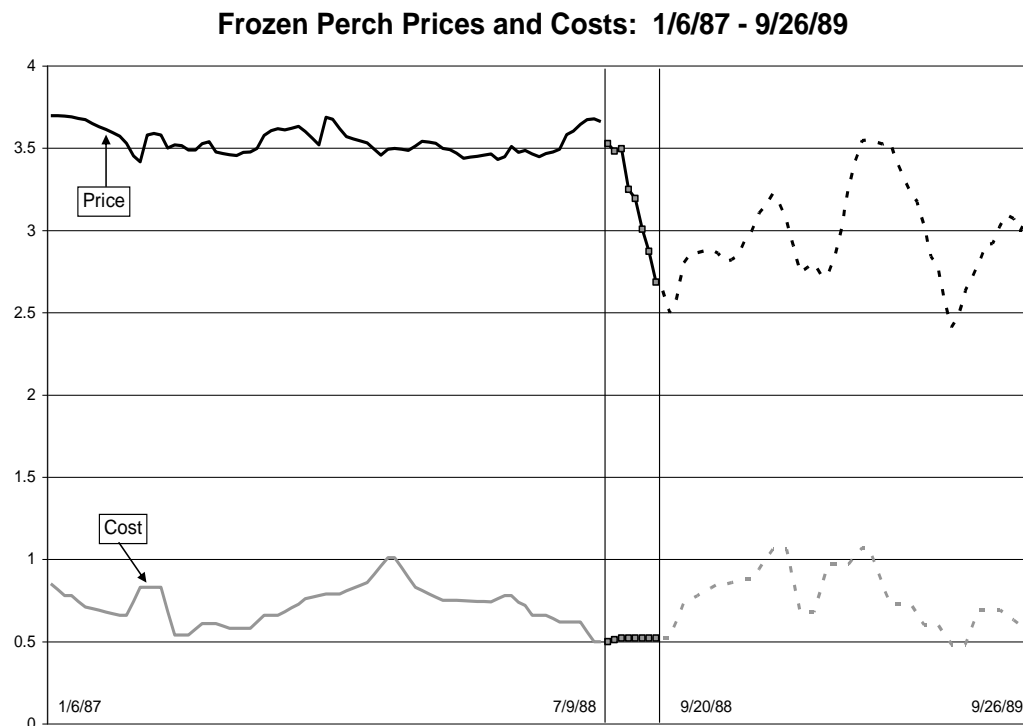
## Screening for Price-Fixing

- Abrantes-Metz, Froeb, Geweke and Taylor (2006) screen for low price variance during collusion
- Empirical evidence is based on the collapse of a bid-rigging conspiracy in 1998. The availability of good cost data allowed to show that prices are more stable during collusion, even after controlling for changes in costs
- A cartel can be thought of as a filter that attenuates cost shocks, thereby reducing price variance:
  - Cost associated with getting firms to reveal their costs and set equilibrium prices
  - Difficulty in having prices highly responsive to costs when cartel members need to meet to discuss and agree on price changes

# Screening for Price-Fixing

## A Variance Screen for Collusion: Evidence

- 4 Features of Collusion vs. Competition
  1. More stable prices under collusion
  2. Structural break when the cartel collapsed, marked by a sudden drop in prices
  3. Higher average price under collusion
  4. Prices followed costs movements more closely under competition

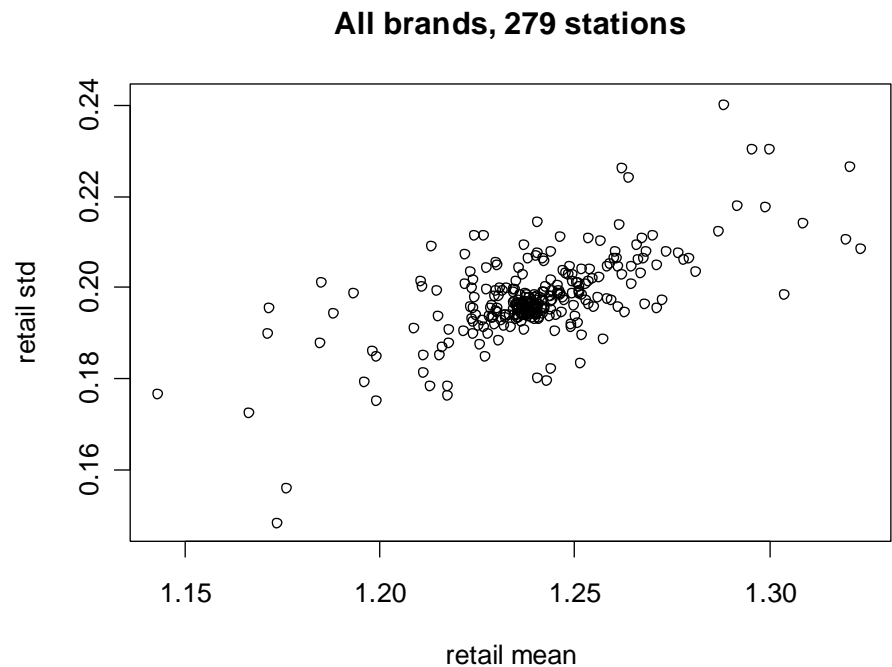


(Abrantes-Metz, Froeb, Geweke and Taylor (2006))

# Screening for Price-Fixing

## A Variance Screen for Collusion: Detection

- Use for detection of collusive behavior among retail gasoline stations
  - 279 gasoline stations studied in Louisville, KY
  - Searched for a group of stations in the lower right-hand-side corner of the figure (high mean and low price variance), consistent with possible collusive behavior
  - No such group was found



(Abrantes-Metz, Froeb, Geweke and Taylor (2006))



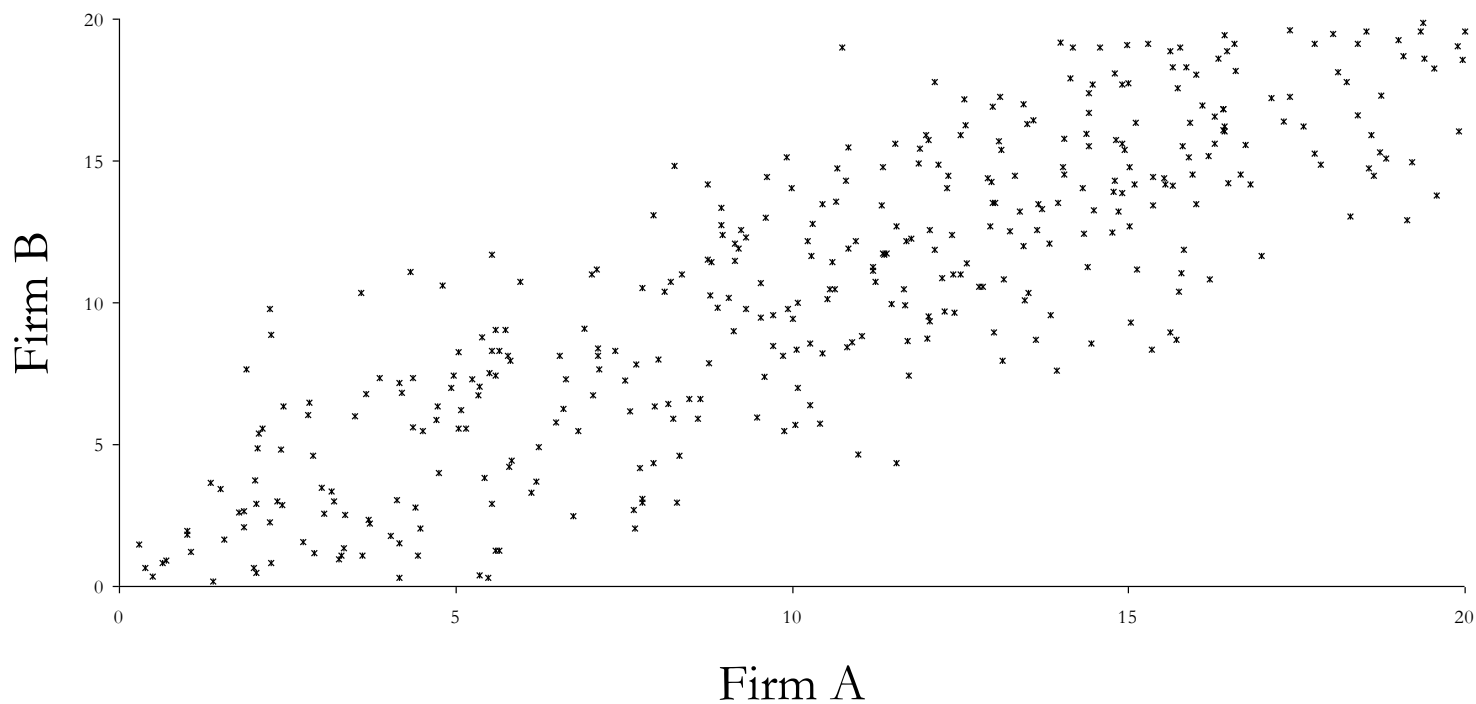
## Screening for Bid-Rigging

- **Bid-rigging is one of the most commonly observed forms of collusion**
- **Economic models of competitive bidding have two robust predictions:**
  - **Non-collusive bids should be independent**
    - Non-collusive bidding implies that firms are ignorant of competitors bids
    - Bids should be independent after accounting for cost and competitive factors
    - When bids are rigged, bid levels and entry decisions are no longer independent
    - Strong correlation in cartel members bids observed in known cases of collusion
  - **Bids should reflect costs**
    - In many markets, bids are closely related to costs
    - Cost factors are often measurable (e.g. inputs, costs estimates, distance to project, etc...)
    - In collusive arrangements, firms may submit phony bids to give the appearance of competition
    - The link between bids and costs is typically broken in such schemes

# Screening for Bid-Rigging

Collusive bids are highly correlated

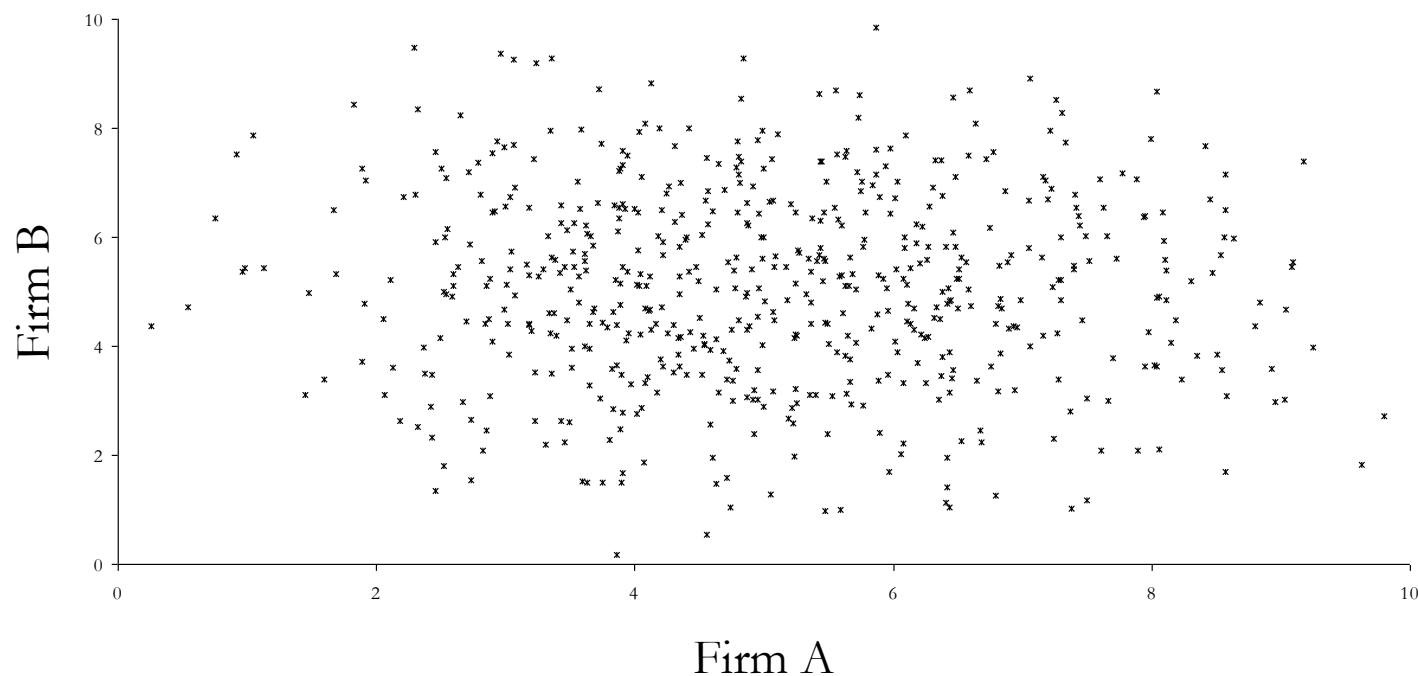
## Panel A: Bids for Firms A and B



# Screening for Bid-Rigging

Non Collusive bids are not correlated

## Panel B: Bids for Firms A and B





## Using Screens for Detection

- Since many cartels are international by nature, it is important to have a general view of the empirical methods used by competition authorities across the globe to detect cartels.





## Using Screens for Detection: United States

### ■ Federal Trade Commission

- 1998 - Under the direction of FTC chief economist Jonathan Baker – Development and implementation of a new screen for collusion
  - Based on price movements around a business cycle
- 2002 - FTC's gasoline monitoring program
  - Identify “unusual” movements in prices (“high prices”)
- 2004 - While Luke Froeb was the chief economist at the FTC - Froeb, Abrantes-Metz, Geweke and Taylor proposed a new screen for collusion
  - Based on low price variance



## Using Screens for Detection: United States

### ■ Department of Justice

- 1970's - DOJ formed an “identical bids” unit, to investigate government procurement auctions in which identical bids were submitted
- 2006 – National Procurement Fraud Task Force
  - To promote prevention, early detection and prosecution of procurement fraud
- 2009 – DOJ's proactive efforts to protect stimulus funds provided for by the American Recovery and Reinvestment Act of 2009 from fraud, waste and abuse
  - DOJ is assisting federal, state and local agencies in preparing to prevent, detect and report fraudulent conduct to profit from the Recovery Act
  - DOJ offers training on “Red Flags for Collusion” in its partnership with these agencies and in establishing “best practices” for fraud detection



## Using Screens for Detection: Europe

### ■ **European Commission**

- 2007 - EC proposes a two-step industry-level approach to monitor markets:
  - (1) Identify industries at risk of collusion, using characteristics like a small number of firms, more homogeneous products, and more stable demand
  - (2) Investigate these industries more thoroughly, by establishing a theory of harm and an in-depth analysis to test the theory using empirical screening approaches (Friedeiszick and Maier-Rigaud (2008), and EC Market Monitoring Official Documents)

### ■ **Office of Fair Trading, Great Britain**

- 2005 - Grout and Sonderegger empirically identify industry-level variables that predict the incidence of cartels, such as industry turnover, cost measures, entry barriers, among others

### ■ **Other National Competition Authorities**

- Have either started to use screens for bid-rigging, and high and more stable prices, or are starting to develop efforts in that direction:
  - The Netherlands, Austria, Italy, Turkey, Ireland



## Using Screens for Detection: Canada, Brazil and Others

### ■ Canada

- Recent program on bid-rigging detection
- Example:
  - List et. al (2006) found that bids from Canadian timber producers appear collusive - not appropriately reflecting cost factors, competitive conditions and variables which should influence the values of the firms
  - Identified a set of possible conspirators, noting that this market is widely believed to be collusive

### ■ Brazil

- 2006 – Proposal for an agenda to detect collusion in gasoline markets (Ragazzo and Silva)
  - Empirical screens such as high average prices with low variance are suggested

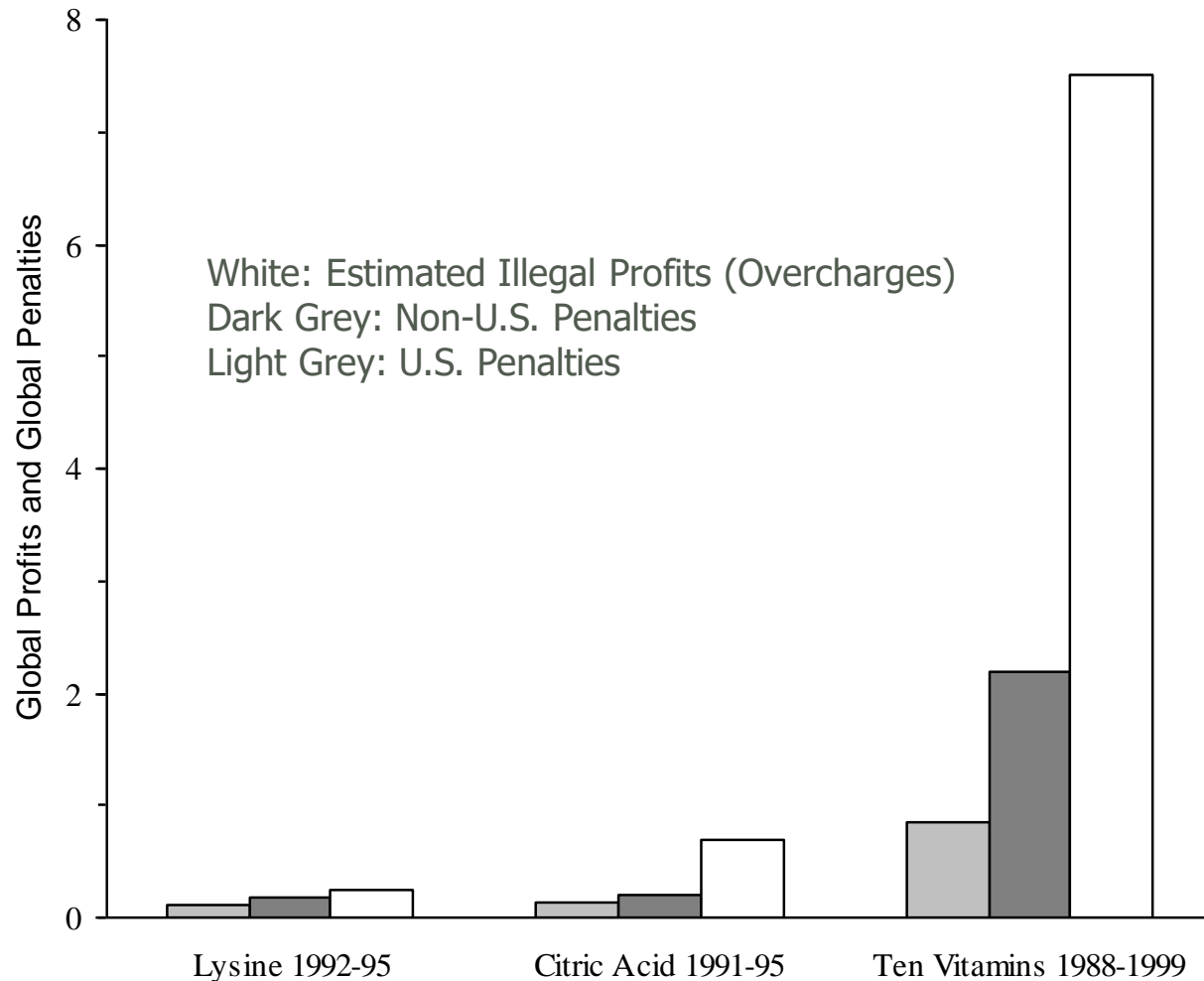
### ■ India, Japan



## Power of Screens to Detect Explicit Collusion

- **Esposito and Ferrero (2006)** – From the Italian Competition Authority have tested the power of the Variance Screen to detect two well-known cartel cases, with success:
  - Tested the Variance Screen in two markets: (1) motor fuel (gasoline and diesel) and (2) personal care and baby milk sold in pharmacies
  - Among all market participants, in both cases the authors found that the Variance Screen would have correctly identified those participants and regions belonging to the known conspiracies.
- **On going testing**
  - Abrantes-Metz, Judge and Villas-Boas are currently testing the power of Benford's Law to detect conspiracies and manipulations of various types, with success
  - Abrantes-Metz and Bajari are testing the power of bid-rigging screens to correctly identify bid-rigging conspiracies

## Does Collusion Pay Off?





## Economic Analysis & Screening

- **Economic analysis and screening can play an important role in cartel detection**
- **OECD Roundtable Conference (2006) –Two reasons for an increasing role of circumstantial evidence, and in particular economic evidence:**
  - Increasingly difficult to find direct evidence – need for circumstantial evidence
  - Economic evidence is important to trigger investigations
- **Some countries have triggered investigations based exclusively on economic indicators:**
  - Italian baby milk (cross-country price benchmarking)
  - Dutch shrimp (structural indicators)
  - Economic criteria to prioritize complaints in the Brazilian gasoline retail market (margin increase& reduction of price dispersion& regions)
  - Alleged NASDAQ conspiracy among dealers (screen on inside spreads)
  - Stock Options backdating cases in the US (correlation between stock excess returns and the execution of stock options)



## Leniency Programs

- **Leniency Programs in the US and in Europe have been extremely successful in detecting cartels:**
  - From 1997 to 2004, well over \$2 billion dollars in fines have been assessed in the U.S. alone
- **Incentive constraint for cartel members:**
  - $E[\text{profit}(\text{collusion})] > E[\text{profit}(\text{deviation})]$
- **Likely bias in Leniency Programs – cases based on leniency are likely to be cartels close to the break-up point**
  - Cartels with low consumer benefits linked to detection
- **Cartels with incentive constraint far from binding are less likely to be detected by leniency**
  - Cartels with high consumer benefits linked to detection
  - Will need a proactive detection policy – a market screening program





## Leniency and Screens

- While leniency programs have been an unqualified success for antitrust agencies, some collusion remains undetected:
  - Competition authorities have searched for alternative approaches to detecting conspiracies, including *screening*
- The implementation of empirical screens by competition authorities will act as a deterrence tool
- Empirical screens and leniency programs exhibit strong complementarities with respect to cartel deterrence



## The Importance of a Screening Expert

- While screens are extremely useful tools, the standard “garbage in-garbage out” caveat applies
- It is important to understand the data, details of the industry and properties of the screens
- The inappropriate use of a screen can lead to increased false positives or negatives



## Conclusion

- Empirical screens for conspiracies have started being used as detection tools, and their popularity and adoption is increasing
- They have also been used by both plaintiffs and defendants at various stages of litigation, as well as in internal monitoring



**Thank you very much!**

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## Rosa M. Abrantes-Metz, Ph.D.

- Rosa M. Abrantes-Metz is a principal with LECG's antitrust, securities and international arbitration practices based in New York City, and a visiting scholar at Leonard N. Stern School of Business, New York University, where she has previously taught industrial organization.
- Prior to consulting, Rosa was a staff economist at the Federal Trade Commission, and she has also taught at the University of Chicago and at Universidade Católica Portuguesa in Lisbon, Portugal. She has published in both peer-reviewed journals as well as trade publications.
- Both at the FTC and as a consultant, Rosa has worked on a variety of cases, with a major focus on alleged conspiracies and manipulations including bid-rigging and price-fixing cartels, commodities and stock prices manipulations, major prices index manipulations and revenue management, among others. She has co-developed and published several empirical screens to detect such anti-competitive behavior and has used them on behalf of both antitrust agencies and defendants. Some of her screens have started to be used by competition authorities worldwide. Rosa is a co-drafter of the chapter on the role of the economic expert in conspiracy cases, included in the American Bar Association Volume titled “Proof of Conspiracy under Antitrust Federal Law.”
- Rosa is a co-author of a popular econometric model studying the effects of various drug characteristics on the probability of success and duration of pharmaceuticals in the FDA approval process, a model which has become one of the two most used by industry analysts to value pharmaceutical pipelines. Her research on pharmaceuticals and conspiracies has been discussed in books on how to value pharmaceutical and biotech companies, and on publications pertaining to cartels. Rosa is also active in securities and international arbitration matters. She received her PhD in Economics from the University of Chicago.