

Recent developments in screening tests for collusion

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Monitoring Collusion Risk

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Often firms are under tremendous pressure to price near cost, thus collusion can emerge as an attempt to increase profits

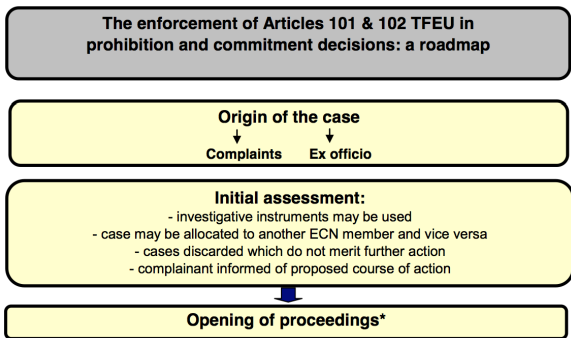
Competition policy must monitor all agreements between companies that can restrict competition

This monitoring activity entails following at least three (complementary) strategies:

- Enhance leniency programs
- Encourage buyers/suppliers to signal suspicious cases
- Exploit data availability to perform “screening tests”

Screens for Collusion as a Competition Policy Tool

- “Screening tests:” statistical tests to identify competition problems concerning **cartels**
- “Cartels” → agreements between undertakings, decisions by associations of undertakings and concerted practices (art. 101)



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Screening tests can be classified into two groups:

- **Structural tests:** look for the presence of structural features in the environment that make collusion easier
- **Behavioral tests:** look for suspicious behavior in choices taken or outcomes produced

Behavioral tests can be further subdivided into tests on:

- Price vs. quantity
- Low probability events vs departure from control group
- Bidding markets

Application to Bidding Markets

Auctions/procurements are particularly well suited for screens

- Bid rigging: collusion between bidders in auctions is a commonly observed form of price fixing
 - About half private antitrust price fixing cases of US DOJ
 - Wide range of economic sectors/auction procedures
- Sheer size of the economy: almost all public procurement

In the [context of EU public procurement](#):

- Economic value (15 percent of GDP)
- Lack of complaints from public buyers
- Often no leniency option
- Growing availability of data (EU 24/2014)
- Cross-border procurement

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Structural Tests

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Four key red flags:

- 1 Limited and known set of firms
- 2 Standardization
- 3 Transparency
- 4 Predictable demand

Structural Tests for Procurement Auctions

Procurement auction markets tend to score high. Example: roadwork contracts (Porter and Zona, 1993)

- 1 Bids are often evaluated **only along the price dimension** and so product differentiation is not possible;
- 2 Firms are relatively homogeneous because they use **similar technology and inputs**;
- 3 Every year there are **many auctions and they take place quite regularly**;
- 4 Bidders are experienced at coordinating their actions because **joint bidding is often allowed** and indeed used;
- 5 The **same firms repeatedly interact** because they participate in many auctions against the same competitors,
- 6 After the auction ends the **auctioneer discloses the identities and bids** of all bidders.

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Structural Tests for Procurement Auctions

Overall, my view is that these tests are **useful in procurement auctions** to isolate features increasing collusion risks:

- **products**, characterized by low differentiation
- **firms**, homogenous and repeatedly interacting
- **procurement formats**
 - pre-bidding stage: joint bidding; restricted lists of qualified bidders; use of third party guarantees releasable by few intermediaries; lot-splitting
 - awarding stage: average bid (endogenous) winner selection, price-only criterion, multi-stage & transparency
 - post awarding-stage: subcontracting (or any other form of resell)

Likely best results by combining together markets where firms, products and auction rules are all inductive to collusive behavior

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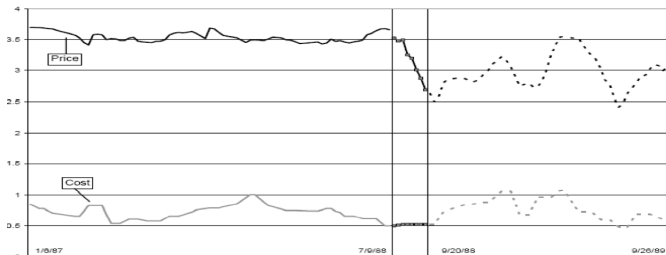
- Price vs. quantity (Harrington, 2008)
- Low probability events vs departure from control group
- Bidding markets

Price vs. Quantity Tests: Generic Market

Well known and widely applied due to simplicity/effectiveness:

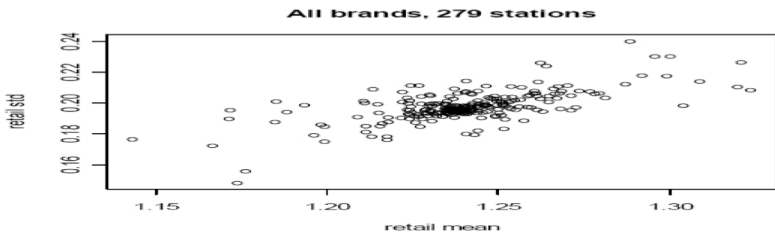
- Price tests:
 - low variance
 - high mean and low variance
- Quantity tests:
 - market share stability
 - negative correlation of firms' market shares over time

Frozen Perch Prices and Costs: 1/6/87 - 9/26/89



High Mean/Low Variance Screen for Collusion

- Abrantes-Metz, Froeb, Geweke and Taylor (IJIO, 2008) describe the strategy FTC uses for collusion in retail gasoline markets
- Searched for a group of stations with high mean prices and low variances among 279 gas stations in Louisville, KY.
No such group was found



Price vs. Quantity Tests for Procurement Auctions

Quantity tests:

- Not easy to apply if the auction data observed do not allow to reconstruct the overall market size of the bidders
- But of potentially great relevance in specific cases: one major tender divided in lots (recent ICA case), one major buyer (cartel in Turin's road repair procurement auctions)

Price tests:

- Both low variance tests and high mean/low variance are easy applicable with data from multiple auctions
- Useful, but not strictly needed access to losing bids
- More useful to have final price, post renegotiations
- Use of this type of test by Swiss competition agency
- Other: price war episodes (Japan case), etc.

Types of Screening Tests

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Behavioral tests can be further subdivided into tests on:

- Price vs. quantity
- Low probability events vs departure from control group (Abrantes-Metz and Bajari, 2009)
- Big data vs. small data
- Easily applicable vs. involved

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Low Probability Test for Procurement Auctions

This kind of test is applicable even with one single auction

- The October 1999 spectrum auction for GSM licenses in Germany (Grimm, Riedel and Wolfstetter, 2003)
- Simultaneous ascending-bid auction used to sell 10 licenses (portions of spectrum) to 4 firms

| | Frequency # | | | | | | | | | |
|---|-------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 | 36.36 M | 36.36 M | 36.36 M | 36.36 M | 36.36 M | 40.00 M | 40.00 M | 40.00 M | 40.00 M | 56.00 M |
| 2 | 40.01 T | 40.01 T | 40.01 T | 40.01 T | 40.01 T | 40.00 M | 40.00 M | 40.00 M | 40.00 M | 56.00 M |
| 3 | 40.01 T | 40.01 T | 40.01 T | 40.01 T | 40.01 T | 40.00 M | 40.00 M | 40.00 M | 40.00 M | 56.00 M |

Table 1: The GSM Spectrum Auction in Germany, October 1999. (Frequencies 1-9 were endowed with a bandwidth of 2×1 , frequency 10 with 2×1.4 MHz.)

Control Group/benchmark Screens

Can be implemented in two ways:

- When there is a **similar but competitive market**
 - different time/geographical area/auction formats/etc.
- When a **theoretical benchmark** can be formulated
 - same type of exercise of a “merger simulation”
 - example:
 - If market arrangement is “posted price”
 - Suppose demand price elasticity estimates available
 - Plug-in (observed) prices and (estimated) elasticities into condition for profit maximizing pricing behavior
 - $P = \text{Marginal Cost} + \text{Strategic Markup}$
 - Simulate prices for atomistic competition vs. monopoly ownership and compare to observed prices

Both approaches entail statistical (and behavioral) assumptions

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- **Bidding markets**
 - By number of auctions
 - By auction formats

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Screens by number of auctions

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Two main data structures:

- Multiple and nearly identical auctions (typical case for theoretical-benchmark based tests, like Bajari and Ye, 2003)
- Single auction event with:
 - multiple lots (school cleaning example next)
 - multiple rounds (US incentive auction)

Italy: Schools Cleaning Services (1/2)

Italy Competition Authority (ICA): case I/785 (“Consp, schools cleaning’)

- public call for tenders opened on July 11, 2012
- €1.6 billion; divided into 13 lots for geographical areas
- maximum of 3 lots for the same firm
- most economically advantageous tender (40% price; 60% technical offer)

| Lot | Geographical Area | Reserve Price (Milion) | Discount by CNS (%) | Discount by Manutencoop (%) |
|-----|--------------------------|------------------------|---------------------|-----------------------------|
| 1 | V.Aosta,Piemonte Liguria | 111 | 42,8 | |
| 2 | Emilia Romagna | 95 | | 48,8 |
| 3 | Toscana | 84 | 39,7 | 48,8 |
| 4 | Sardegna,Lazio | 192 | 46,1 | |
| 5 | Lazio | 95 | 46,1 | |
| 8 | Lombardia,Trentino | 105 | | 48,8 |
| 9 | Friuli, Veneto | 94 | 39,7 | 48,8 |
| 10 | Umbria,Marche,Abruzzo | 113 | 53,5 | |

Italy: Schools Cleaning Services (2/2)

Data inspection revealed three concerns:

- 1 the two major players (Manutencoop and a TJV lead by CNS) bid on the same lot only twice
- 2 when they bid on the same lot, CNS' discount is lower
- 3 Manutencoop and CNS have ownership linkages

This led to an in-depth investigation revealing:

- 1 exchange of subcontracts between Manutencoop and CNS
- 2 exchange of emails/documents on agreements between CNS and Roma Multiservizi (owned by Manutencoop)
- 3 lack of plausible alternative explanation for the unusual participation and bidding patterns

Outcome: sanction by the ICA, confirmed by courts (TAR Lazio and State Council). Important case both for method (data-driven) and court sentences (holistic approach)

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 - By **auction formats**

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Screens by Auction Formats

The combination of what laws and regulations (like EU 24 and 25/2014) call contract awarding **procedures** and **criteria** forms what economists call **auction formats**

- **First price auction**
 - When all bids observed: “missing bids” (Swiss competition authority; Chassang, Kawai, Nakabyashi and Ortner, 2017)
 - When at least winning bid/bidder and the number of bids observed: exploit (exogenous) variations in the number of bidders (Schurter, 2017)
- **Average bid auction** (i.e., “endogenous scoring,” “abnormally low tenders”)
 - Price-only awarding rule: permutation test of coordinated bids to assess if a group “pilots” the relevant statistic and/or coordinates entry (Conley and Decarolis, 2016)
 - MEAT awarding rule: the ICA case discussed above
- Other examples: **negotiations**, **dynamic rules**, **second price**, etc.

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1. Both **structural** and **behavioral** tests are potentially useful to detect collusion in procurement auctions, subject to the usual **false positive and negative problem** of every statistical tests
2. There are **peculiarities to be exploited in the application of screening tests to procurement data**, especially with regard to participation choices and auction format peculiarities
3. No screen is guaranteed to always work, but those screens whose **elusion would be more costly** for the colluders are likely the most useful (and less problematic if disclosed)
4. The trend in the current academic literature is to develop **fairly complex** models that might be **too time consuming** for an antitrust agency to use as screening tests, but some of the **underlying ideas are easy to use**

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