Regional Workshop On

ECONOMIC ANAYSIS FOR COMPETITION LAW ENFORCEMENT

ECONOMIC ANALYSIS IN PUBLIC PROCUREMENT

2 June 2016 | Putrajaya, Malaysia

AGENDA

1) Factors facilitating collusion
2) Standard auctions
3) Auctions and collusion
4) Legal aspects allowing to reduce the incentives for bid-rigging
5) Heuristic approaches for detecting bid-rigging
6) An example for a well-developed system: e-Procurement in Georgia
7) Econometric models for detecting bid-rigging

1. Factors facilitating collusion

The relevant structural factors are similar to those for collusive behavior in markets:

- The number of firms is small;
- Firms are symmetric;
- There is repeated interaction between firms, and demand conditions are likely to be stable;
- Side payments can easily be designed (multi-market connections; future auctions);
- The competitive threat from outsiders is low.

Identifying structural factors that are likely to facilitate collusion is important in order to find out if a closer investigation may be worthwhile.

2. Standard auctions

Open auctions

- Ascending auction (English auction): The price is raised until only one bidder remains. The highest bid is the final price.

- Descending auction (Dutch auction): The price is lowered until a bidder cries out and that is the final price.

Sealed-bid auctions

- First-price sealed-bid auction: Each bidder submits a single bid without knowing the other bids; the highest bidder wins and pays his bid.

- Second-price sealed-bid auction: Each bidder submits a single bid without knowing the other bids; the highest bidder wins but pays the amount of the second-highest bid.

3. Auctions and collusion

- From an incentive point of view, the English auction and the second-price sealed-bid auction are favorable as they ensure that the bidder with the lowest costs (the highest utility from the procurement) wins the auction.

- In practice, however, the English auction and the first-price sealed-bid auction are usually applied. Sometimes, combined methods (English auction followed by a first-price sealed-bid auction of the two last bidders) are applied.

- Open auctions considerably facilitate collusion as they allow to observe the bidds of other participants.

However, there may be a trade-off with the issue of corruption.

3. Auctions and collusion

Besides the factors on industry structure discussed above, collusion among bidders is facilitated by

Transparency on competitors and on expected prices

(basically anything that can serve as a coordination device)

The Possibility of exchanging information

A low number of bidders

Consequently, we discuss each of these factors with respect to the auction design.

3. 1 Transparency

Some procurement authorities publish “reserve prices”, i.e. maximum prices the authority is willing to pay. These “reserve prices” have three disadvantages:

- They can serve as focal points for collusion;
- They are likely to increase prices in thin markets with heterogenous bidders even without collusion;
- They make it more difficult to detect collusion as bidding close to the reserve price may be a rational strategy even with competitive bidding.

Reserve prices should in fact be calculated in advance (also to get information on potential collusion), but they should be published only under exceptional circumstances.

3. 2 Information exchange

The superiority of sealed-bid auctions:

- Obviously, the possibility of exchanging information is easiest in open auctions;
- This is reinforced if there are more rounds where firms can exchange information even without communicating directly. In other words, they can exchange information in a perfectly legal way;
- Furthermore, the problem becomes more serious when the number of firms is small;

Consequently, sealed-bid auctions are usually superior: "*Where there are concerns about collusion due to the characteristics of the market or product, if possible, use a first-price sealed bid auction rather than a reverse auction.*" (OECD guidelines)

3. 2 Information exchange

There are two kinds of countervailing arguments, though:

- Under certain circumstances, the exchange of information may help reducing inefficiencies. This holds, for instance, in multi-unit auctions where the optimal allocation depends on the whole product space, and in cases of high uncertainty;

- Open auctions increase the information between firms, and firms may hence "monitor" each other in order to reduce the risk of corruption (i.e. "collusion" between the agency and firms). Hence, open auctions may be chosen when the main concern is corruption rather than collusion.

3.3 Number of bidders

In order to increase the number of firms (thereby increasing efficiency in a competitive market and reducing the risk of collusion at the same time), the following measures could be taken into account:

- Regulatory barriers to entry should be as low as possible. For instance, the number, size or nature of firms which may submit bids is often regulated;

- Often, regulatory agencies using scoring systems do not only include prices and the quality of the offer, but also “the quality of the firms”. This increases the possibility of corruption and reduces competition. Hence, quality should only refer to the offers, and not to the firms themselves (there are countervailing arguments, though);

3.3 Number of bidders

- Sunk costs as a barrier to entry may be tackled directly. For example, when a specialised piece of equipment is required, the procurer could purchase the equipment and lease it to the successful bidder; thereby reducing the sunk costs of entry.

- Standardising tendering procedures can reduce the costs of participation, and can thereby increase the number of firms;

- Splitting objects into several smaller parts may allow SME's to participate;

3.3 Number of bidders

- The time between announcing the auction and preparing and submitting bids needs to be appropriate;
- Importantly, an electronic bidding system can reduce the cost of tendering (very positive experience in Korea, for instance).

4. Legal aspects that allow reducing the incentives for bid-rigging

As usual, all factors which increase expected damages from bid-rigging reduce the incentives for collusive behavior. The OECD emphasizes the following legal aspects:

- Increased incentives for whistle-blowers who help uncover a bid rigging practice (at least full immunity, but maybe also bounty systems);

- Increased fines (or limited reductions of fines) for ring leaders and/or other active members of the ring;

4. Legal aspects that allow reducing the incentives for bid-rigging

- Enhanced effectiveness of private actions against bid-rigging by increasing expected damages (e.g. class actions, lower standard of proof);

- Criminal prosecution of ring members, also in countries where antitrust infringements are not a criminal offence.

Hence, in many countries, competition agencies are involved in the design of procurement auctions: Korea has implemented an electronic system for identifying suspicious behavior, and in Germany anyone believing that something illegal had happened can contact the Bundeskartellamt.

5. Heuristic approaches for detecting bid-rigging

A number of countries (such as Canada, Switzerland, Sweden and the U.S.) have developed check lists to help procurement agencies spot instances of possible collusion. Some countries (Korea, Georgia, etc.) have implemented electronic systems for identifying suspicious factors.

In the following, we discuss the most important factors; our list is based on the U.S. Guidelines to Procurement Officials, on OECD guidelines, and on own considerations.

5. Heuristic approaches for detecting bid-rigging

Of course, none of these factors can be seen as hard evidence, in particular since bid-rigging strategies can take very different forms:

- Bid-suppression schemes involving agreements among competitors in which one or more companies agree to refrain from bidding;
- Bid-rotation schemes, in which conspiring firms continue to bid, but they agree to take turns being the winning bidder;
- Cover bidding where prices above the winning price are agreed upon.

5. Heuristic approaches for detecting bid-rigging

In any case, suspicious factors include:

- Many companies take part in the bidding process, but the same company always wins a particular procurement;
- Some bids are much higher than published price lists, previous bids by the same firms, or engineering cost estimates;
- Fewer than the normal number of competitors submit bids;
- A company appears to be bidding substantially higher on some bids than on other bids, with no apparent cost differences to account for the disparity;

5. Heuristic approaches for detecting bid-rigging

- Bid prices drop whenever a new or infrequent bidder submits a bid;
- A successful bidder subcontracts work to competitors that submitted unsuccessful bids on the same project;
- Some firms submit identical bids;
- The proposals or bid forms submitted by different vendors contain irregularities (such as identical calculations or spelling errors) or similar handwriting, typeface, or stationery. This may indicate that the designated low bidder may have prepared some or all of the losing vendor's bid;

5. Heuristic approaches for detecting bid-rigging

- A company submits a bid when it is incapable of successfully performing the contract (likely to be a cover bid);

- Winning bids of companies differ largely from loosing bids without economic reason. In a competitive market, winning and loosing bids should follow a similar logic, since one doesn't know in advance if one wins or not. Simple regression analysis can here mark a move from "heuristics" to "econometrics".

6. An example for a well-developed system: e-Procurement in Georgia

The Georgian public procurement system has been transformed, from one that was labelled “high-risk” in 2009, to one that achieved the highest rating a few years later (see also www.procurement.gov.ge).

Before the reforms	Nowadays
100% paper based tenders	100% electronic tenders
Lack of transparency	Everyone sees everything
Restricted competition	Equal access of tenders
Non-reliable data	Smart system preventing mistakes
Geographical inequality	Business intelligence system
High risk of corruption	Messaging system/SMS notifications
	Transparent Dispute Resolution Board

6. An example for a well-developed system: e-Procurement in Georgia

Some facts about the system:

- Procurement methods:
  - Electronic reverse English Auction
  - Open electronic procedure with evaluation based on the lowest price or the best price/quality ratio whenever quality proxies can be formulated
  - Otherwise, open electronic procedure based on the Two-envelope-principle (for so-called non-specifiable services) and scoring systems
  - Evaluation of the proposals through automatic ranking system (using the Cobb-Douglas Function, which is integrated in the System)

6. An example for a well-developed system: e-Procurement in Georgia

Some facts about the system:

- Estimated value of contract is disclosed (corruption vs. collusion…)
- Evaluation criteria are disclosed – criteria are objective and quantifiable
- Risk based bid rigging methodology (electronic benchmarking system; rather sophisticated and based on previous econometric research)
- Data is centralized – Business Intelligence System – 70 real-time reports

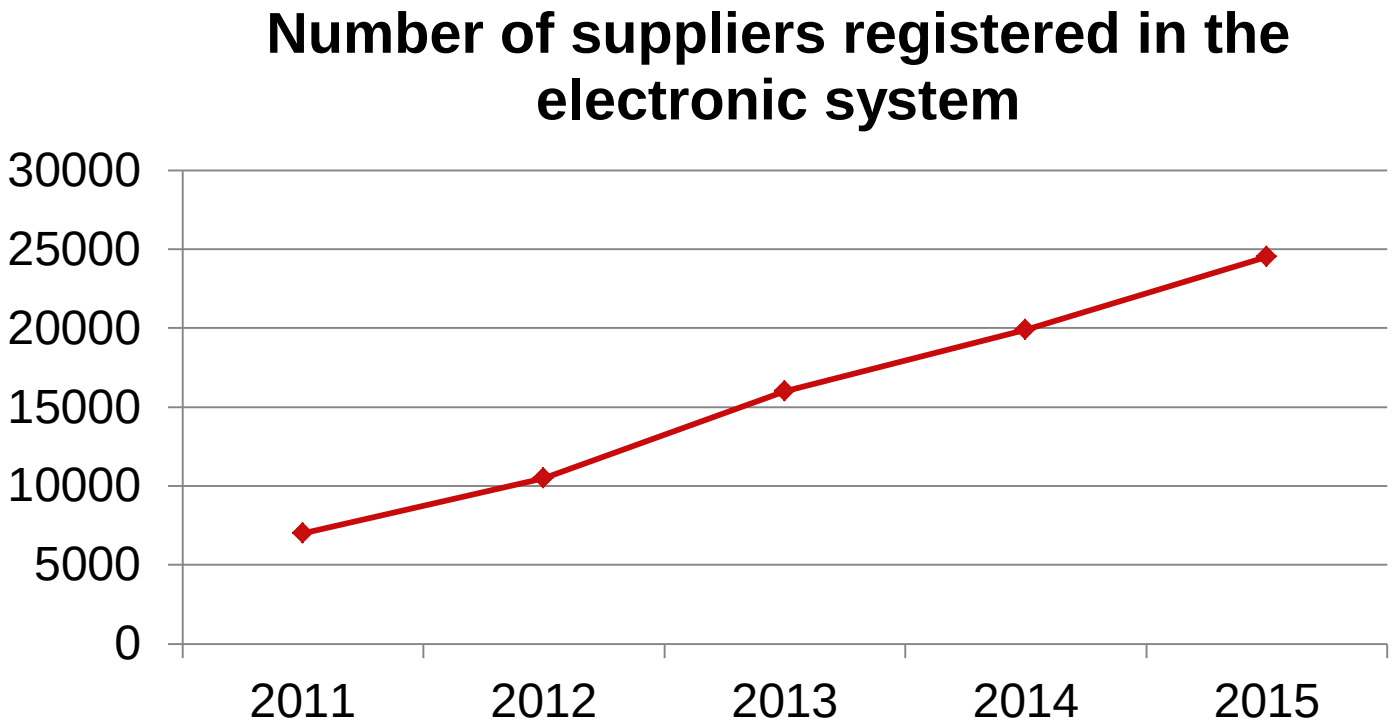
6. An example for a well-developed system: e-Procurement in Georgia

Some facts about the system:

- Number of decentralized acting contracting authorities: 4386
- Annual amount of public procurement contracts: 3 billion GEL, approximately 10% of GDP
- Number of open tenders per year: 30.000
- Price reduction: 14% of the estimated value, 820 Million GEL since 2010

6. An example for a well-developed system: e-Procurement in Georgia

Some facts about the system:



6. An example for a well-developed system: e-Procurement in Georgia

Aggregation of the data and analysis:

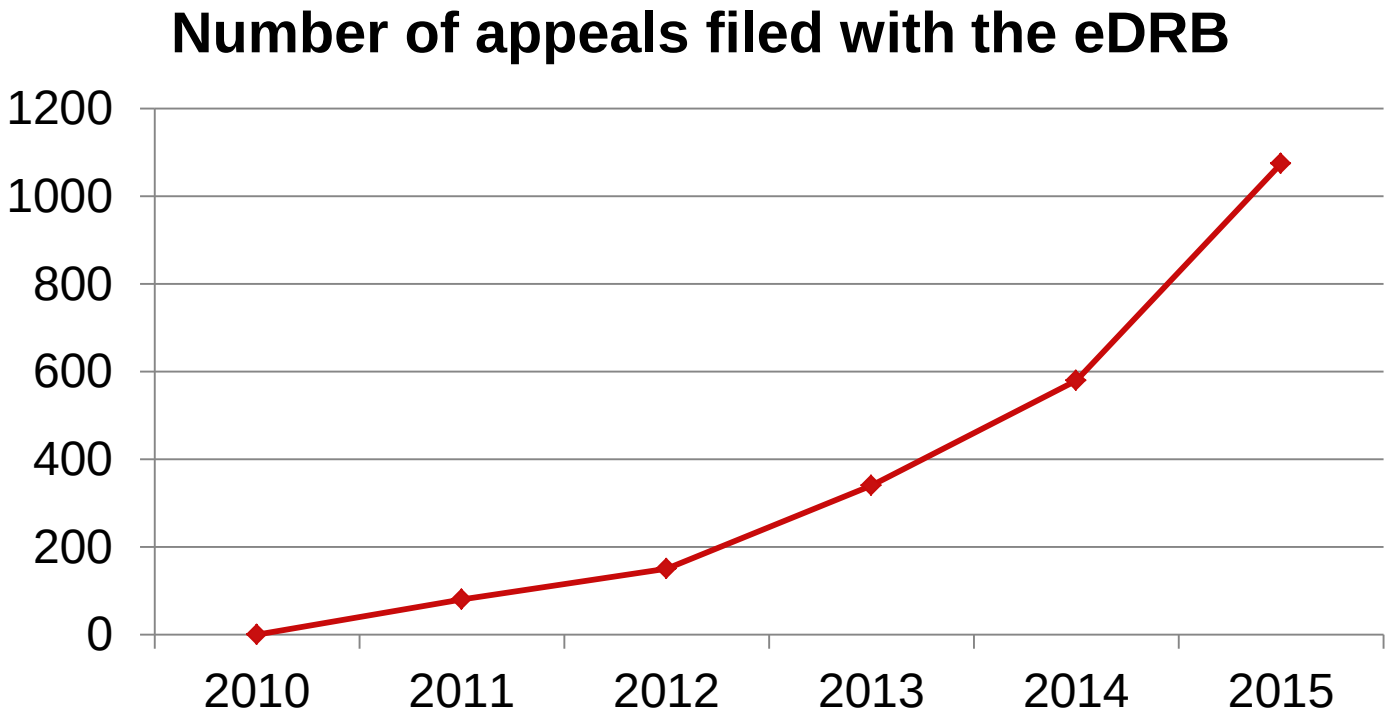
- Problem: The data is scattered over thousands of procedures

→ Solution: Business Intelligence System (BIS)

- Data aggregation:
  - Standardized 70 real-time-repots (descriptive statistics)
  - Possibility to generate statistical reports as requested
  - Possibility to analyze behavior of procuring entities/suppliers
  - It is possible to track every transaction, every procuring officer, every supplier, look for behavioral patterns

6. An example for a well-developed system: e-Procurement in Georgia

Fight against corruption: Dispute Resolution Board



6. An example for a well-developed system: e-Procurement in Georgia

Fight against corruption: Risk-based approach

- Search for deviations from “normal data”, described by endogenous variables and giving first indications about corruption

- Example:
  - Normal Case: Competitive tender documentation
    - On average three suppliers, 15% price reduction, different suppliers …
  - Bad practice: Adjusted tender documentation on specific supplier
    - One supplier, 0% price reduction, single supplier…

Result: Guidelines on best practice, training sessions, at least 10 cases with clear suspicion of corruption forwarded to the prosecution office

7. Econometric models for detecting bid-rigging

The case: Bidding for waste disposal in about 500 different regions

- In small regions, there is a lot of competition, while only the 5-8 largest firms could bid in large regions due to capacity constraints of small firms
- In large regions, bids per capita were considerably higher than reference prices estimated by a consultancy firm
- Bids per capita of large companies were higher in large regions
- Bids per capita of large companies varied substantially without clear reason

7. Econometric models for detecting bid-rigging

Econometric Analysis:

- First insight: Analyses on the decision to submit bids does not lead that far due to cover bids;

- We hence focused on prices where the following methodologies are most promising:

  1. If one has both suspicious and non-suspicious firms, one can analyze if the bidding behavior is systematically different;

7. Econometric models for detecting bid-rigging

Econometric Analysis:

2. If one has information allowing to control for costs, one can analyze the impact of costs on bids. If this varies largely between different circumstances, it indicates collusion. The most important different circumstances are:

- Different auctions;
- Different firms (suspicious and non-suspicious)
- Most importantly, the same firms in different auctions.

3. Comparing the regression results for winning bids with those for all bids is very helpful. As mentioned above, the patterns should be quite similar in competitive markets.

7. Econometric models for detecting bid-rigging

Some stylized results:

Variable	State 1 (N=80)
Constant (C)	0.8*** (00.3)
Distance to center of contract region (U1)	1.3*** (0.001)
Incumbent firm (U2)	-0.524*** (0.000)
Reference price (G6)	0.839*** (0.002)
Suspicious firms (non-suspicious firms are reference category)	4.901** (0.048)
Suspicious firms *U1	-0.227*** (0.010)
Suspicious firms **G6	-0.670**(0.06)
Explained variance (adj R^2)	0.523
LR-p	0.000

7. Econometric models for detecting bid-rigging

Some stylized results: Comparison with own behaviour

Variable	Non-suspicious bids of S1 (N=48)
Constant (C)	1.038** (0.033)
Distance to center of contract region	0.354 (0.569)
Incumbent firm (U2)	-0.201 (0.365)
Reference price (G6)	0.675*** (0.001)
DefendantS1 (D1)	1.178 (0.065)
D1 x U1	-0.157 (0.105)
D1xU2	-0.335 (0.268)
D1xG6	-0.513** (0.048)
Explained variance (adj R^2)	0.689

Thank you for your attention!

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