Organisation for Economic Co-operation and Development

DAF/COMP/WP3/WD(2022)34

Unclassified

English - Or. English

3 November 2022

DIRECTORATE FOR FINANCIAL AND ENTERPRISE AFFAIRS
COMPETITION COMMITTEE

Working Party No. 3 on Co-operation and Enforcement

Data Screening Tools for Competition Investigations – Note by Switzerland

28 November 2022

This document reproduces a written contribution from Switzerland submitted for Item 3 of the 136th OECD Working Party 3 meeting on 28 November 2022.

More documents related to this discussion can be found at www.oecd.org/daf/competition/data-screening-tools-for-competition-investigations.htm

Ms Despina PACHNOU
[Email: Despina.PACHNOU@oecd.org]

JT03506567

Switzerland

1. Screening methods

1.1. The construction of a screening tool

1. Bid rigging in procurement auctions seems to be a pervasive problem for many competition agencies around the world and it costs governments and taxpayers' vast sums of money every year. Switzerland is no exception and the Swiss Competition Commission (hereafter: COMCO) acknowledged the priority of fighting such anti-competitive practices. COMCO regularly uncovers and condemns bid-rigging cartels, especially in the construction sector[1] but also in other sectors, such as the electricity sector.[2] For opening bid-rigging cases, COMCO usually depends on external information provided by whistleblowers, leniency programs and customer complaints. Whistleblowers are generally rare, whereas notifications from a third party (not involved in the cartel) might be insufficient to reach an appropriate level of evidence in order to open an investigation. Finally, firms apply leniency programs, however, in most cases as a reaction to the opening of an investigation. Considering the harm of bid rigging and the number of cases opened, COMCO therefore wanted to develop a more pro-active method to uncover and prosecute cartels. It initiated a long-term project in 2008 to fight bid-rigging cartels, which included developing a detection method or a so-called "screening" method.[3]

2. To be applied quickly, a detection method should require few data. Therefore, COMCO decided to focus only on publicly available data. This is necessary for at least two reasons. First, to have a high potential of deterrence any detection method should be applied at a large scale to minimize the costs for a competition agency. Second, the application of a detection method should be discrete so that it does not raise the cartel's attention. If the cartel is aware of the potential application of a detection method, its members might destroy most of the evidential materials and it would consequently impede the competition agency to condemn the cartel in court. In Switzerland, the official records of the bid opening (or bid summaries) are sometimes publicly available or might be available for COMCO upon request. Bid summaries entail information about the identity of the bidders, the submitted bids, the location of each bidder, the name of the project, the location of the project, the type of the contract, and sometimes the tendering procedure. COMCO was therefore constraint to rely only on this type of data in order to develop its method. Note that bid summaries are common in other jurisdiction and might be accessible for the respective competition agencies.

3. COMCO developed its detection method in a heuristic way by observing the past behavior of cartels. It thereby relied on a simple but major hypothesis: Bid rigging affects the distribution of bids in a tender. COMCO thus investigated the distribution of bids when a cartel is present compared to when firms compete by calculating descriptive statistics on the distribution of bids (based on the bid summaries). Those descriptive statistics are

[1] See the decisions of COMCO: Strassenbeläge Tessin, LPC 2008/1, pp. 85-112; Elektroinstallationsbetriebe Bern, LPC 2009/2, pp. 196-222; Wettbewerbsabreden im Strassen- und Tiefbau im Kanton Aargau, LPC 2012/2, pp. 270-425; Wettbewerbsabreden im Strassen- und Tiefbau im Kanton Zürich, LPC 2013/4, pp. 524-652.

[2] See the decisions of COMCO: Elektroinstallationsbetriebe Bern, LPC 2009/2, pp. 196-222;

[3] See for a recent review on screening methods: Joseph Harrington & David Imhof, *Cartel Screening and Machine Learning*, Standford Computational Antitrust (2022).

markers for collusion and COMCO used them as screens to flag potential cartel candidates. In previous investigations, COMCO found that bid-rigging first affects the distribution of bids by reducing the variance of the bids. The coefficient of variation is a suitable statistic to capture such a reduction in the variance of the bids.[4] Second, bid rigging increases the difference between the two lowest bids whereas reducing the spread between losing bids. The relative distance captures well this kind of bid manipulation.[5] Many statistics can be calculated for detecting a change in the distributional pattern of bids when firms rig bids in a tender.[6] Note that an odd pattern in a single tender is not sufficient to indicate an anticompetitive behavior. Suspicion of bid rigging only arises when the distribution of bids repeatedly deviates from the pattern observed in competition.

1.2. Successful implementation of the screening tool

4. COMCO applied the developed screening method on bidding data of the construction sector in the Canton of St. Gallen. In a first step, tenders were classified as suspicious when the statistical markers of the tender where above (relative distance) and below (coefficient of variation) a certain threshold value, respectively. The threshold values were deduced from bidding data of past investigations. In a second step, COMCO analyzed whether the suspicious tenders shared a common geographical region or stem from a cluster of firms commonly participating in tenders. The data indeed revealed such a cluster of firms in the same geographic region. This observation served COMCO as a first indication of a bid-rigging conspiracy. In a third step, COMCO investigated the bidding behavior of the suspect firms and the characteristics of the local market in depth to corroborate the suspicions further. The analysis of the firms' common bidding behavior indicated the presence of a rotation scheme. The regional market characteristics revealed neither alternative explanations for the observed bidding behavior nor other counter indications. The screening method therefore succeeded in flagging a bid-rigging cartel.[7]

5. Based on the indications delivered by the application of the screening method, COMCO opened an investigation in 2013 and sanctioned the involved firms in 2016. All firms identified by the screening method have been found guilty of bid-rigging conspiracy. Additionally, the investigation of the cartel revealed the participation of two additional firms. One of these firms never actually submitted a bid for a contract in the dataset used for screening. Therefore, COMCO could not identify this firm as potential cartel candidate. The other firm was a small firm who submitted too few bids to be associated as part of the cluster of firms participating in the suspicious tenders. Overall, the application of the screening method did not lead to false positives, i.e., it did not wrongly identify an innocent firm as a cartel participant. Moreover, false negatives, i.e., the fact that the screening method did not identify two members of the bid-rigging cartel, was not a serious concern, since COMCO could extend the investigation on these firms based on the corresponding new evidence.

[4] See David Imhof, Yavuz Karagök, & Samuel Rutz, *Screening for Bid Rigging – Does It Work?*, 14 J. Competition L. & Econ. 235 (2018); David Imhof, *Detecting Bid-Rigging Cartels with Descriptive Statistics*, 15 J. Competition L. & Econ. 427 (2019).

[5] See Imhof et al. (2018) and Imhof (2019) *supra* note 4.

[6] See Imhof et al. (2018) and Imhof (2019) *supra* note 4; see also Martin Huber, David Imhof, & Rieko Ishii, *Transnational Machine Learning with Screens for Flagging Bid-Rigging Cartels*, J. Royal Stat. Society Series A (2022); Hannes Wallimann, David Imhof, & Martin Huber, *A Machine Learning Approach for Flagging Incomplete Bid-Rigging Cartels*, Computational Economics (2022).

[7] See Imhof et al. (2018) *supra* note 4.

1.3. Improvement of the screening tool

6. The screening method developed by COMCO is reliable, easy to understand even for non-economists, parsimonious in its data requirement and can potentially be applied at a large scale. One of the key success factors in developing the screening method was to observe past bid-rigging behaviors and their effect on the distribution of the bids to form an understanding on collusive markers. Those collusive markers could be compared to benchmark values derived from previous investigations. Nevertheless, the threshold values should be treated as an imperfect approximation and applied with a careful "human" judgement. In addition, the derivation of benchmarks can be (and actually is) further improved by using machine learning and deep learning techniques.[8] In simple words: COMCO now has started to extend and replace rough benchmarks with predictive models improved by the machine.

7. This generalization of the screening method offered by machine learning allows automating the screening process and has, in some cases, led excellent detection rates. For example, some studies correctly classify 90% to 95% of tenders or coalitions of firms as collusive or competitive.[9] This high accuracy proves that screening methods based on machine learning algorithms are reliable. In some cases, such screening methods can provide sufficient indication to initiate an investigation, especially when combined with other tests or analyses made by law enforcement agencies.

1.4. Publication of the screening tool?

8. COMCO decided to inform the public on its use of a screening tool and, to a larger extent, on how the tool functions. In that decision, COMCO weighted the positive aspect of increased deterrence against the adverse effect of an intelligent cartel trying to evade the detection by the screening method.

9. The public knowledge of the screening tool increases deterrence in two ways. First, bid riggers who become aware of the data driven detection perceive an increased risk of detection and prosecution by the authority. Second, public information on screening methods can lead procurement authorities to apply screening methods themselves, which further increases the risk of detection. COMCO recently observed that some cantonal procurement authorities started using screening methods.[10]

10. On the other hand, cartelists who are aware of the screening method might change their biding behavior to evade detection. In the opinion of COMCO, this risk weights less than the advantage of increased deterrence. First, making the screening method public allows for further development of screening method, e.g., by researchers. Second, recent

[8] See Martin Huber & David Imhof, *Machine Learning with Screens for Detecting Bid-Rigging Cartels*, 65 Int'l J. Indus. Org. 277 (2019); Martin Huber & David Imhof, *Deep learning for detecting bid rigging: Flagging cartel participants based on convolutional neural networks*, (Working Paper, 2021) https://www.researchgate.net/publication/351063082_Deep_learning_for_detecting_bid_rigging_Flagging_cartel_participants_based_on_convolutional_neural_networks.;
See Huber et al. (2022) and Wallimann et al. (2022) *supra* note 6.

[9] See David Imhof & Hannes Wallimann, *Detecting Bid-Rigging Coalitions in Different Countries and Auction Formats*, 68 Int'l Rev. L. & Econ. 106016 (2021); See also Huber et al. (2022) and Wallimann et al. (2022) *supra* note 6; Huber and Imhof (2021) *supra* note 8.

[10] See Hannes Wallimann and Philipp Wegelin. *Le dépistage permet de déceler des cartels dans la construction / Screening helfen Baukartelle aufzudecken.* Die Volkswirtschaft. (2019) dievolkswirtschaft.ch/fr/2019/wallimann-wgelin-01-02-2020fr/

methods for flagging incomplete bid-rigging cartels are more robust to detect a cartel even if the cartel is partial or if the cartel tries to thwart the screens.[11] Third, COMCO considers that screening methods are complementary to traditional tools, such as whistleblowers and leniency programs. In other words, even if a cartel might be able to 'beat' the algorithmic screening process, it can still be unveiled by other means. Once it has been detected, the flexible methods based on machine learning algorithms will likely consider such behavior in the future detection process. Besides, forming an intelligent cartel implies a higher degree of coordination, which might leave additional evidential materials or dissuade the forming of a cartel in the first place (which is precisely the effect of deterrence).

2. Enforcement areas

11. COMCO only uses a screening tool for detecting collusive horizontal agreements in sectors for which data are publicly available. It mainly concerns bid-rigging cases in the construction sector. However, it cannot be ruled out that COMCO will apply the screening tool in other sectors in the future.

3. Collection of data

12. In order to apply its screening tool, COMCO mainly relies on data from the bids. The bid summaries are publicly available or accessible upon request. However, COMCO does not systematically apply its screening tool, since the bid summaries are not always available in electronic form. In many instances, procurement offices provide COMCO bid summaries in paper form. The additional step of converting the paper form bid summaries into an electronic format partially impedes COMCO to apply its screening tool more often. Therefore, COMCO mainly collects data when doubts arise about sound competition in a specific market. Information from public procurement agencies or customers can trigger such an action. COMCO then applies its tool in order to verify these claims.

4. Resources for screening

13. The initial development of the screening tool was resource intensive. The subsequent improvements and the application are less time-consuming. For (further) developing and applying screening tools, COMCO disposes of a team of three to five economists. The team meets regularly to discuss issues related on screening. Yet, prosecuting cartels and other tasks outside the scope of screening prevent the respective economists from devoting more effort to screening topics. Consequently, COMCO has limited resources for substantially improving existing screening tools or developing new tools to be applied in other enforcement areas.

14. If COMCO should decide to develop new screening tools or extend its tools to other sectors or enforcement areas, it will do so if (a) suitable data is available and (b) there is indeed a need of such a screening tool in a specific sector or enforcement area. In this aspect, COMCO's decision to further develop the screening tools will be pragmatic and, in this case, COMCO will provide the necessary resources.

15. In the future, COMCO intends to collaborate with other competition agencies in order to build more performant screening tools based on algorithms. For example, the use

[11] See Wallimann et al. (2022) *supra* note 6.

of decentralized algorithms might become more prominent. Thereby, competition agencies would no longer have to exchange data (that are often confidential and difficult to exchange) but could solely exchange results from the application of these algorithms. In such a decentralized approach, each competition agency will train the same algorithm with their available data. The corresponding results will be sent to a competition agency who is in the lead (the central agent). By putting together the results obtained by the different competition agencies, the central agent may be able to improve the algorithm and distribute it back to the participating competition agencies. This process will be repeated until an optimal algorithm with the data of all the participants (but without exchanging sensitive data) is achieved. Future collaboration with other competition authorities can also support COMCO in applying new screening tools in sectors other enforcement areas.

5. Benefits and challenges of a screening tool

16. To fight collusion, screening tools can be more effective in sectors or industries in which firms are less likely to apply to leniency programs. In such cases, using a screening method might unveil cartels that are difficult to uncover with other traditional means. A screening method also helps to assess notifications or complaints from procurement agencies or third parties not involved in the cartel. While a denunciation itself might be insufficient to initiate an investigation, a complementary analysis with screening methods can make the difference and provide additional evidence necessary for opening an investigation.

17. Screening methods can therefore complement traditional means for detecting cartels. Its benefits depend on (a) the costs of application of a screening tool for the competition agency (without considering the costs for the development of the tool) and (b) the reliability of a screening tool. With regard to the latter, benchmarking methods fitted to a peculiar sector as well as data-driven approaches with algorithms seem to deliver high detection rates that are sufficiently reliable to initiate an investigation.

18. Regarding the costs for a competition agency, COMCO deliberately decided to focus on descriptive statistics as simple markers for collusion, which can be quickly applied to new data. Moreover, relying on publicly accessible data, such as the bid summaries, only contributes to keep down the costs for COMCO.

19. One main challenge is to understand how collusion differs from a competitive situation. Such an understanding can only be formed by experience obtained in past investigations. Sectors, in which COMCO previously did not open an investigation, are less suitable for an application of a screening tool if one cannot determine patterns indicating collusion (provided that data are available). In other words, a competition agency should generally have some “prior” information drawn from previous cases in order to develop screening methods capable of detecting collusive outcomes, even if – to a certain extent – this line of reasoning might appear endogenous.

20. Finally, we note that the major challenge faced by COMCO is the resource constraint in extend the existing screening tools to other sectors or other enforcement areas. International collaboration in general and exchange of methods with other competition agencies in particular might be very promising in reducing the costs associated with the further development of screening tools.