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Data Screening Tools for Competition Investigations – Note by Korea

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1. Introduction

1. The Fair Trade Commission (KFTC) strives to tackle nine types of "illegal cartel conduct" prohibited by the Monopoly Regulation and Fair Trade Act (MRFTA), taking action with administrative fines or a referral to the Prosecution. Bid-rigging not only affects the relevant market by reducing consumer choice and increasing prices to consumers, but also causes great harm to the national economy resulting in inadequate distribution of resources and X-inefficiency. For such reasons, international competition authorities are committed to strong enforcement of cartel behaviors. Among all form of cartel, bid-rigging is a high priority in their detecting and regulating efforts in that it is hard-core and only has anticompetitive effects without any efficiencies increased.

2. There are indications frequently observed when a bid-rigging occurs, such as a high Bid-to-Expected ratio—a ratio dividing the winning price by the expected price—and low number of bidders, making it possible to crate indicators for bid-rigging. Also, in case of bid-rigging, it is much simpler to define the relevant market affected by the restrictions on competition than other anticompetitive activities. As each bid is seen as a single market, individual bids are totally separate from other tenders or markets. These characteristics allow common signs of bid-rigging to be measurable and quantitatively assessed.

3. Thus, if the bid markets presenting high risks of collusion are identified after collecting and analyzing public procurement data, and the analysis outputs are used in selecting and handling cases, the efficiency in monitoring bid-rigging will be enhanced. Plus, the establishment of *ex-ante* electronic system that processes procurement data prior to the opening investigations may also have deterrence effects on illegal cartel activities, as it gives a warning to industries.

4. OECD Recommendation on Fighting Bid-rigging in Public Procurement suggests that member countries develop digital tools for analyzing procurement data to detect bid-rigging schemes in advance. To this end, the KFTC has been operating a Bid-rigging Indicator Analysis System (BRIAS) since 2006. BRIAS is an online system designed to collect procurement data from purchasers—frequently national and local governments—and analyzes the data calculating score for each indicator of bid-rigging, which will be later used in competition investigations. This report aims to provide a clear and comprehensive overview of BRIAS.

2. Launch of BRIAS (Bid-Rigging Indicator Analysis System) in 2006

5. From 1997, the KFTC was operating a system compiling bid data kept by public sector authorities. The system collected data on contracts for facilities construction from eight government bodies including the Public Procurement Service of Korea (PPS), if the total project amount is at KRW 10 billion or greater and the winning rate is at 90 percent or more. But, the system was insufficient to treat a large amount of data because indications of suspicious bidding were manually assessed with limited time and human resources.

6. In January 2006, the KFTC launched an online system that receives bid data from public sector authorities and detects signs of bid-rigging by analyzing the collected raw data. The analysis is utilized in competition investigations. This is the start of a Bid-Rigging Indicator Analysis System. However, in early days of BRIAS, the PPS was the only

authority sending tender data to the KFTC while a majority of the data was decentralized across contracting authorities.

7. In 2007, an amendment of the MRFTA allowed the KFTC to request bid-related materials and cooperation from national and local governments along with public corporations, providing legal basis for such request. By 2009, authorities that send tender data from their own e-procurement system were expanded to include 11 public corporations in addition to the PPS. The scope of gathering data was also expanded. Previously, construction projects valued at KRW 5 billion or more and contracts for the purchase of goods and services valued at KRW 2.5 billion or more were fed into the system, but later, the amounts changed to KRW 5 billion for general constructions and KRW 0.5 billion for other types of contracts.

8. However, the 2015 National Assembly's audit of state affairs raised concerns about BRIAS and commented that the system needs an advancement project. The next part explains the advancement project of BRIAS initiated to address issues.

3. BRIAS Advancement Project in 2018

9. From the establishment in 2006 to September 2015 when the need for upgrading the system was first born, only three bid-rigging cases were uncovered by the analysis of BRIAS. The low utilization came from the following reasons.

10. First, there were cases where an error occurred when BRIAS received bid data from other government agencies. Initially, some agencies with their own e-procurement systems—the Public Procurement Service of Korea (PPS) and the Defense Acquisition Program Administration (DAPA)—directly transferred bid data to BRIAS, while others without their own systems used Korea On-line E-Procurement System (KONEPS) rendered by the PPS. It means that individual agencies and the KFTC needed to link their decentralized databases manually, and the way of connection reduced the stability and management efficiency.

11. Second, it was pointed out that the minimum amounts for contracts to be collected as bid data were so high that BRIAS may have blind spots in its monitoring activity. In 2015, the system gathered the contracts for the purchase of goods and services valued at KRW 0.5 billion or more as bid data. But, out of all 2015 contracts listed on the KONEPS, only four percent were valued at KRW 0.5 billion or more.

12. Moreover, BRIAS did not include the contracts awarded through a two-phase Multiple Award System into its database. The Multiple Award System (MAS) was first established in 2005 where a procurement agent (the PPS) invites companies meeting certain qualifications and makes unit-price contracts with companies at pre-negotiated prices on an annual basis, so that requiring agencies can choose and buy the needed supplies or services on an on-line shopping site offered by the PPS. In 2010, a two-phase MAS was brought in, basically working the same way as a selective bidding; except the fact the bidders that already had concluded MAS contracts with the PPS are only eligible for participating in the two-phase schedule. Despite a high collusion risk the two-phase MAS has, the contracts awarded through the schedule were excluded from monitoring targets because the new schedule was adopted after the establishment of BRIAS in 2006. The MAS is considered to have many advantage, being suitable for e-commerce and providing requiring agencies with a wide range of options, which was not possible with previous lump-sum contracts. Accordingly, the use has been growing since its introduction, heightening the need for two-phase MAS contracts to be included in BRIAS database.

13. Third, before an advancement project, BRIAS had a low accuracy since a set of parameters for cartel screening were not specified for each bid type. There used to be only four parameters—a win rate, the number of bidders, the number of bidders who submit bids higher than expected prices, and the level of competition (open or restricted competition). The parameters were designed for the ordinary purchase of goods and services with a procedure to pre-validate bidders' eligibility. Therefore, before the project, BRIAS often made errors when producing a collusion risk score, failing to consider that collusion scores might be too high or low according to the characteristics of each bid type.

14. For instance, in a design-bid that combines design and construction in a single contract with one contractor and an alternative bid that permits offers made by a bidder in addition to or as a substitute to the original construction requirements, the contractor can produce the entire construction plans or submit alternative plans in lieu of the requiring authority. Those bids are intended to stimulate a design competition among bidders making the design quality an important variable in determining the winning bid. Also, to ensure a high-quality, the bidders are required to produce heavy investment in designs, and the investment amount is inevitably reflected in bid prices. Regardless of the facts, a collusion risk of other bid types (e.g. design-bids and alternative bids) was treated as an ordinary type on BRIAS based on the uniform four parameters like the number of bidders and the win rate, resulting in unreliable scores.

15. Lastly, the early version of BRIAS examined individual bids without grouping neighboring bid markets that deal with the same good or service. Thus, the number of suspicious bids was as many as 1,000 per year. The large volume of data made it difficult for investigators to analyze and use the data as a basis for opening investigations given limited time and human resources.

16. For these reasons, the KFTC started to prepare improvement measures from 2015 and secured budgets for enhancing the data usability of BRIAS. And contracting with a professional service provider, it successfully completed the system's advancement project in January 2018. The projects' details are described below.

17. First, for the stable transmission and receipt of data, BRIAS changed the form of data connection from a one-to-one connection with each requiring authority to a centralized connection through Public Information Sharing Center (PISC). The center helps to prevent gaps and omissions of tender data even in the event of network failures, because the connection system is rebooted automatically when the network is normalized.

18. Second, the minimum amounts of contract required to be collected as bid data were raised to at KRW 100 million or more for the purchase of goods and services and for the MAS contracts; and at KRW 5 billion or more for construction contracts. Particularly, in case of the purchase of goods and services, which demands analyzing bidding history due to a high risk of repeated bid-rigging in the same product group, the expanded data pool helped to increase the reliability of analysis on bidding history. Plus, the contracts awarded through the MAS, previously excluded from monitoring targets, were able to be fed into the BRIAS dataset.

19. In addition, the number of data categories connected to BRIAS was raised from four to ten, adding the composition of bid consortium, the classification code of products and services, and the bid price. The added categories are praised for providing greater usefulness of the bid data and for supporting the decision whether to take investigative steps. As the extension of category was anticipated to at least triple the data amount to be collected, a new function was added to BRIAS enabling a selection of search conditions, such as the publication date of contract award, the successful bidder, the requiring

authority, and the bid type. The new function allowed investigators to use the search results more efficiently, otherwise they needed to search the information separately on each authority's system or send request letters to contracting authorities as previously did.

20. Third, the project improved the reliability of screening results by creating sophisticated parameters that build on the relevant public procurement system and the actualities of bid-rigging. In order to create the parameter, the KFTC examined its previous decisions for the recent five years regarding bid-rigging cases. The commission found that different indicators of collusion are specific to different bid types in real collusive cases, so created a screening system tailored to the respective bid type for the sake of high detection-rates. After the advancement, BRIAS has been equipped with parameters tailored to bid types to screen for bid-rigging, such as the purchase of goods and services, construction contracts, and the two-phase MAS contracts.

21. Especially for construction contracts using the design-bid and alternative bid procedures, the parameters of bid-rigging were specified to two collusion types – complementary bidding and price-fixing. And the aspects of complementary bidding that were not examined before, such as the difference in scores of design evaluations and the difference in the number of members consisting of consortia, were incorporated into a set of parameters. Also, for two-phase MAS contracts, the collusion risk is now assessed based on the gaps between the proposal ratios of unsuccessful bidders, calculated by dividing the contract price by the proposed price, and the history of companies simultaneously participating in bids with the successful bidder for the last one year.

22. Lastly, grouping of tenders with the same product and the same business entity has become available for analyses. After signs of bid-rigging in individual cases are calculated in scores by a set of parameter, products or business entities with high collusion risk scores are grouped together. The groups are analyzed further, focusing on the history of repeated bidding, the market circumstances and other factors. The analysis results, after grouped by product or business entity, allowed investigators to have more condensed information for investigations and enhanced the utilization of BRIAS. The following part is about how BRIAS is used in practice and its successful results.

4. Utilization and Outcomes of BRIAS

23. The KFTC has expanded a list of government agencies connected to BRIAS since the advancement project, currently receiving bid data from 16 agencies. In parallel, the commission has been in continuous consultation with the connected agencies for BRIAS to be efficiently operated. From 2014 to 2022, 17 regular meetings were held between the KFTC and the agencies where they could share the best practices of monitoring activity and discuss how to correct a few errors when connecting bid data.

24. The bid data compiled by BRIAS is analyzed every six months to select which bids should be flagged for monitoring. As the process of selecting the flagged bids is different for each bid type, the process explained herein is for the purchase of goods and services with a pre-validation procedure of bidders' eligibility.

25. First, indications of collusion in individual bids are assessed by a set of parameters specified to each bid type. Section points under each parameter are combined into a single collusion score, with the full mark of 100. High scores are interpreted as a high risk of bid-rigging. Each parameter has a rating scale that converts percentages of collusion risk to different points. For instance, a win rate – one of parameters - equal to or over 99 percent converts to 40 points, the full mark, and a win rate of equal to or over 98 percent and less than 99 percent converts to 35 points.

26. If BRIAS finds tenders to have the collusion score of more than 85, the bid is subjected to further analysis. The analysis process divides bids with the same product code into groups based on the UNSPSC code system to review in detail. The process examines each group's bid-related records for the last three years, such as the number of bids with the collusion score over 85 and the ratio of bids indicative of bid-rigging, to classify the groups into grade A, B, and C.

27. Later, the final score is calculated, multiplying the individual bids' assessment scores by 70 percent and the further analysis scores by 30 percent. The final score determines bids requiring three-level monitoring; Intensive, Cautious, and Attentive monitoring. The bid markets to be monitored do not promptly come under investigation. The officers designated with the job of managing BRIAS decide on which case they open an *ex-officio* investigation after supplementing qualitative data like the relationship between bidders.

28. Since the completion of the BRIAS advancement project, the number of cases where BRIAS succeed to detect bid-rigging and impose fines has soared. From 2018 to 2021, a total of 26 cases were initiated *ex-officio*, of which nine cases were sanctioned with fines of KRW 13.4 billion; and of which four cases were closed with issuances of warning notices.

29. The success is likely due to the adoption of parameters tailored to bid types. Despite the second analysis process newly added, the parameters allow BRIAS to produce a manageable amount of data, preventing data overload and ensuring effective detection. In practice, the number of bids with the collusion risk score≥85 plunged from 1,227 in 2017 to 297 in 2021.

30. Together with *ex-officio* cases, the BRIAS analysis is widely used in other cases with different bases for initiating cartel investigations. When a complaint or report of bid-rigging scheme is filed with the KFTC, the investigators first search the bidders of the bid in question. Then, they try to understand and learn about the bid market situations by looking at bid-related records, including winning experiences, the bid-to-expected ratio, and the companies who placed a bid on the contract won by the successful bidder. In this way, the KFTC investigators may determine what investigation methods to use in consideration of the likelihood of cartel, the possible form of agreement, and others.

31. Further, the KFTC sends a signal to companies in bid markets that the commission will not tolerate and vigorously pursue any bid-rigging schemes, underscoring that BRIAS is working at all times when issuing press releases on collusion detected by the system. BRIAS serves as a preventive measure against cartel as well as a screening and deterrence tool.

32. Despite achieving success, a few issues for improvement were raised as the system management experience builds up. So, the following part discusses what supplementary measures are necessary.

5. Discussion points for BRIAS Improvement

33. First, the scope of data collection should be extended. The current version sets the minimum amounts of contract to be targeted and fed into the BRIAS database. However, small contract amounts do not mean a low collusion risk. Also, if the bidding history and the characteristics of the bids with grouping processes are incorporated into the BRIAS data pool making the pool larger, the system reliability would rise. To the extent that data

overload does not occur, the minimum amounts need to be phased down as well as out in the long run.

34. Second, more government agencies should be connected to the BIRAS. Currently, the list of agencies transferring bid data to BRIAS does not include local state-owned enterprises (SOE), failing to receive the bid information solicited by the SOE. This is because that the MRFTA provisions exclude local SOEs from the public entities from which the KFTC may request bid-related materials and cooperation. A proposed amendment is submitted to the National Assembly suggesting that local SOEs are included in the BRIAS data pool. When passed, the amendment is expected to expedite the connection.

35. Third, the BRIAS's parameters should be regularly updated since indications of bid-rigging change depending on the bid market circumstances. The parameters that BRIAS now uses were made based on previous decisions made five years prior to 2018. So, the bid market situations and the changes in cartel behaviors thereafter have not been reflected. Although BRIAS offers a function of individual parameters selection, it has limitations. The function enables users to adjust a set of parameters screening bid-rigging signs, considering aspects like how the bid markets move. But the adjustment is limited to alter the points of the rating scale for each parameter. Moreover, the KFTC designates a single officer to decide which cases to be under *ex-officio* investigation. As the officer performs other investigation duties apart from the system management, it is hard to expect for the officer to conduct intensive analysis and rapidly update the BRIAS parameters in consideration of the bid market situations and changes in collusion behaviors. In order to update the BRIAS parameters in a timely manner, the KFTC should prepare regular update plans and start a system-level project for the parameters to keep up the times.

36. Lastly, the role of the BRIAS officer in deciding cases to be investigated should be discussed. The BRIAS screens for cases with risks of collusion first, then the officer is able to further examine the cases for decisions to take investigative steps. The further process allows the investigation target to be selected by the officer even looking at factors that BRIAS misses, and priorities can be set between the target cases regardless of the BRIAS's scores, which is appropriate for real investigation environment.

37. But, since the officer does not have a specific set of standards to select the target cases, biased decisions or mistakes can be made. And there may be a large gap between the collusion detection rates presented by BRIAS officers depending their abilities. Hence, when the officer selects the target cases for *ex-officio* investigations, the factors frequently used by the officer should be figured out and the understanding needs to be reflected in the system. In the KFTC, for the selecting of target cases, investigators confirm a range of aspects from the previous bid-rigging records within the same industry to how many times the bidders in question together participated in previous tenders. As bid-rigging among affiliates frequently occurs, the rates of holding multiple positions among business entities in the relevant bid should be taken into account.

38. BRIAS was established for the purpose of screening bid-rigging indications with data, compensating limited human resources. For the purpose, any treatment or engagement should be minimized with the most elaborate algorithm that screens for signs of collusion. But, all of the collusion signs hardly be reflected in the BRIAS parameters in a technical sense, and errors might be created in selection due to a lack of flexibility. So, before upgrading algorithm merely adding new parameters, there should be a careful review of balancing the roles of the BRIAS officer and the system.

6. Conclusion

39. The KFTC first launched a bid-rigging detection system in procurement markets called BRIAS in 2006, and completed the system advancement project in 2018 for the improved utilization. Many efforts by the commission made today's BRIAS possible—changing how data is shared on the online tool, extending the scope of bid data collected, designing of a set of parameters tailored to each bid type, and adopting further analysis on bids grouped by the same product. The advancement project is of great significance, in that the number of detecting bid-rigging schemes increased, and the tool provides better support for investigators in the examination of the bid data prior to initiating investigations.

40. It is expected that the BRIAS's monitoring function will become more stringent as the tool gains operation experiences, and the advances in data analytics continue enabling rapid data processing. Meanwhile, there are issues to be discussed for the improvement of BRIAS, for example, the extension of the scope of data collection, upgrading the current BRIAS parameters, and adding new parameters.

41. The KFTC, in tandem with the effort on stabilizing the order of the domestic market economy using data verification methods, seeks to find what contribution it can make to the global market economy. For instance, the commission provides policy consulting on a system of analyzing bid-rigging indicators to the Philippines as a part Knowledge Sharing Program (KSP) spearheaded by the Ministry of Economy and Finance. In addition to the consulting to developing countries, the commission hopes to further discuss how to improve our screening system by sharing information with other competition authorities that established their own systems of managing anti-competitive behaviors.

42. Bid-rigging in the public bid market will be made more secretly behind the closed doors, and new types of bid concerning noble product groups will emerge in the future. Amid the transformation, the KFTC plans to maintain and manage BRIAS with constant examination of market trends, so that the system will flexibly adapt to changes and function in a timely manner.