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Research and Analysis on Bid-Rigging Mechanisms

Koki Arai
Competition Policy Research Center,
Japan Fair Trade Commission
Ikuo Ishibashi
Osaka School of International Public Policy
Osaka University, and CPRC, JFTC
Rieko Ishii Ishibashi
Faculty of Urban liberal Arts
Tokyo Metropolitan University

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1-1-1, Kasumigaseki, Chiyoda-ku, TOKYO 100-8987 JAPAN
Phone:+81-3-3581-1848 Fax:+81-3-3581-1945
URL:http://www.jftc.go.jp/cprc.html
E-mail:cprcsec@jftc.go.jp

Research and Analysis on Bid-Rigging Mechanisms[+]

Koki Arai[a,*], Ikuo Ishibashi[b] , Rieko Ishii Ishibashi[c]

[a] Researcher, Competition Policy Research Center, Japan Fair Trade Commission
[b] Associate Professor, Osaka University, and Visiting Researcher, Competition Policy Research Center, Japan Fair Trade Commission
[c] Associate Professor, Tokyo Metropolitan University

[Abstract]

In this study, we surveyed and sorted out bid-rigging mechanisms based on the decisions of the Japan Fair Trade Commission (JFTC) and also described economic analysis in line with the categories of bid-rigging mechanisms. To be more specific, we have developed some indicators representing important characteristics based on economics perspectives, analyzed JFTC's decisions to sort out bid-rigging mechanisms in line with the indicators mentioned above, and analyzed the indicator value from the economic viewpoint.

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[+] The views expressed in this paper are those of the authors and do not necessarily represent the views of the JFTC or any organizations.

[*] Corresponding author: (address) 1-1-1 Kasumigaseki, Chiyoda-ku, Tokyo, Japan, 100-8987 (telephone) +81-3-3581-5480, (facsimile) +81-3-3581-1945, (e-mail) koki_arai@jftc.go.jp

1. Introduction

Cartels and bid riggings have been since a long time, and still are, one of the most important issues from the viewpoint of competition policies. To date, government authorities responsible for antitrust on-site tasks have been making various efforts and ingenious attempts to enhance the detection of bid-rigging scandals.[1] Researchers have also yielded some positive results through continuously evaluating economics approaches to figure out the mechanisms of cartels and bid riggings and identify effective competition policies on the basis of such identified mechanisms.[2]

Despite these efforts and ingenious attempts made by practitioners and researchers, it is very difficult to say, unfortunately, that the mechanisms of cartels and bid riggings are completely made clear. This is mainly a concern because it is difficult to have a true figure of cartels and bid riggings. Cartels and bid riggings are obviously illegal acts. In this context, the lack of risk of being detected by law enforcement organizations, does not lead to any trouble among the participating firms, and they operate smoothly; consequently, these illegal acts are unlikely to be exposed. In other words, it is extremely difficult and almost impossible to grasp the overall picture of cartels or bid riggings in each industry; consequently, policymakers are obviously facing a massive difficulty for developing new policies or verifying the effects of the policies that they have adopted.

Taking into consideration such difficulties in grasping the actual conditions, careful analysis and case studies on the basis of the available data are particularly important when seeking for effective competition policies. By carefully surveying and analyzing whether or not the government has detected cartels or bid riggings because they are "defective" in some respects, or whether or not they employ a certain cartel or bid-rigging method due to some reasonable factors, researchers should try to achieve a theoretical foothold to attain competitive equilibrium by detecting as many undersurface cartels and bid riggings as possible and by depressing the stability of undersurface cartels and bid riggings.

[1] The most significant change in recent years is the rapid diffusion of the leniency program, which was introduced in January 2006 in Japan. Roughly speaking, under the leniency program, penalties or criminal liabilities on a bid-rigging participant may be mitigated or exempted if the participant (satisfying certain conditions) cooperates with the JFTC's examination process. As a lot of bid-rigging cases have been detected in Japan since the introduction of this program, the program has been showing very successful results.

[2] Standard reference books on competition policies include Motta (2004).

As one of the research projects in this context, this paper surveys and sorts out bid-rigging mechanisms on the basis of the decisions of the Japan Fair Trade Commission (JFTC), and offers economic analysis in line with the categories of bid-rigging mechanisms. To be more specific, we have developed some indicators representing important characteristics from the economic perspectives, analyzed JFTC's decisions to sort out bid-rigging mechanisms in line with the indicators mentioned above, and analyzed the indicator values from the economic viewpoints. This study has yielded the following major outcomes and results: (1) We have successfully developed a new database "format" capable of calculating/sorting out various bid-rigging mechanisms in a cross-sectional manner; (2) Calculation and analysis on data from FY1996 to FY2005 (December, 2005) have revealed that considerably primitive methods have been often employed in the bid-rigging cases detected in Japan during the same period; (3) Calculation and analysis on the bid-rigging cases have also revealed that, in construction works involving observable costs, such as continuity (of repair or refurbishing works) or territoriality factors of construction sites, due attentions are paid to these "right holders" in many bid-rigging mechanisms; (4) Bid-rigging mechanisms that would eliminate asymmetry of information are employed only in a supplementary manner in the bid-rigging cases involving observable costs.

The most significant contribution of this research project would be the calculation and sorting out of the bid-rigging mechanisms. Thus far, research projects based on economic theories often need to assume abstract mechanisms in many studies in order to clarify general and universal characteristics, while empirical studies also need to provide high-quality and in-depth analysis by narrowing down individual cases. As we calculate and sorts out the actual bid-rigging cases on the basis of the obtained data, objective materials, and past research outcomes, our study would serve as a complementary project to the studies conducted so far.

In addition, from the viewpoints of policymakers, further understanding and more sophisticated analysis on the frequently used bid-rigging mechanisms will lead to more efficient detection/surveys on the bid-rigging cases. They are detected due to various factors, such as whistle-blowing or a report from stakeholders. In any case, if a law enforcement organization acquires certain evidence by collecting information, narrows down the alleged bid-rigging cases, forecasts the overall picture of possible bid-rigging cases, and embarks on the examination procedures, it would be possible to allocate

limited resources more efficiently, sending up the success rate of detection of bid-rigging cases. In addition, a deeper understanding of the possible bid rigging cases will lead to better identification of the actual scenarios after the start of examination procedures and will be helpful (as a indirect evidence) in proving possible bid rigging cases. Furthermore, it is known that improvement in detection accuracy in this manner would better prevent cartels and bid riggings in the long run.[3]

The contents of this research paper are as follows. Section 2 outlines the past research outcomes and explains some research papers closely related with this study. Section 3 also describes the position of this study by comparing it with the past studies. Section 4 explains JFTC's decisions that are surveyed in this project, describes the database that we have developed, and analyzes our survey outcomes and interpretations of these survey outcomes. Section 5 briefly outlines the results of this study and points out the possible problems in the future.

2. Past Studies and Position of This Research Project

Theoretical and empirical research activities on bid-rigging cases have been rapidly advancing since the 1990s.

The bottommost framework of theoretical research efforts is auctions (based on long-term relationships). Theoretical researchers are the most interested in how much bid riggings are efficient under asymmetry of information (private information**)**, such as willingness of winning a new order. For example, in the case of public works, a contractor that has abundant other works, faces higher opportunity costs, and is less willing to win a new order, while a contractor with a lower capacity utilization rate and lower opportunity cost is more willing to win a new order. Generally speaking, this kind of information (willingness to win a new order) is asymmetry because it is only available to the contractor itself.

Usually, in order to maximize the profit (of the entire bid-rigging community), a contractor with stronger willingness to win a new order should be awarded a construction work. Since a contractor with the lowest cost is in charge of the actual production activities in this case, it is the most efficient from the viewpoint of the

[3] For example, Motta and Polo (2003), and Ishibashi and Shimizu (2008) theoretically explain this phenomenon.

society.[4] In addition, if a contractor who is more willing to win a new order fails to make a successful bid, the contractor will have a stronger incentive to break up the bid rigging scheme than less willing contractors (i.e., contractors of unsuccessful bidding). In this context, it is desirable that more willing contractor should be awarded a construction work from the viewpoint of stability of bid-rigging mechanism.

However, if the information is asymmetry, the more willing contractor cannot be awarded a construction work easily. If a new order is estimated to provide certain economic benefits to all contractors, a contractor less willing to win a new order might pretend to have strong willingness. In order for a bid-rigging mechanism to work stably, they need to have a rather complicated mechanism to assign designations to the successful bidders that is capable of addressing these problems.

McAfee and McMillan (1992) is a pioneering study that analyzes the efficiency of bid riggings by taking these aspects into consideration. Among the aforementioned problems, they excluded the dynamic elements[5] and analyzed the static framework. They suggested that the participants would achieve an efficient bid-rigging scheme by conducting “auction of successful tenderer status” prior to actual biddings (hereinafter, this auction is referred to as “preliminary auction”). The winning contractor of this preliminary auction makes a side payment, which is predetermined based on bidding results, to other participant contractors. For this reason, the conclusion of McAfee and McMillan (1992) would be “if side payments and preliminary communications are possible, efficient bid-rigging is attainable even under asymmetry of information.”

Further, Aoyagi (2003) considered dynamic elements of bid-rigging mechanisms, analyzed the efficiency of bid-rigging schemes without side payments, and proved that dynamic bid rotation-based mechanisms[6] would yield highly efficient bid-rigging practices. The mechanism suggested by Aoyagi (2003) eliminates the aforementioned problems of asymmetric information by mitigating the requirements for future

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4 In a specific construction work project, this might represent a desirable condition because the size of economic pie is maximized. It should be noted that excessively high cost due to bid-rigging practices is a problem of allocation of an economic pie, which is different from the matter of efficiency.

5 To squarely analyze this kind of bid-rigging framework, it is necessary to consider the following two factors: A deviation from information flow (“Do contractors really report their order acceptance willingness?”); and a behavioral deviation (“Do contractors really obey their bid rigging scheme after forming a consensus based on information available?”). McAfee and McMillan (1992) analyze the former aspect after simplifying the bid-rigging mechanisms by assuming that the latter deviation sufficiently binds bid-rigging participants.

6 Briefly speaking, it is a mechanism in which determination of a factor of successful tenderer would change on the basis of the contractor’s past record (history) of successful bids.

successful biddings (for participants stepping aside from successful bidding), rather than employing side payments. Since this kind of bid-rigging mechanism is intuitively understandable and is highly likely to get employed in actual bid-rigging process, Aoyagi's conclusion that it would yield highly efficient bid-rigging practices is a very interesting and important conclusion.

The main purpose of empirical studies is empirically identifying bid-rigging possibilities based on actual data. In the case of public works, researchers basically use the cost data of bid-rigging participants[7] to examine the appropriate bidding price (under the competitive conditions). Usually, if the bidding process is competitive, a contractor with better cost conditions will offer a lower bidding price. However, in the case of bid-rigging, it is highly likely that the bidding price will not be attributable to the gap of cost structures in many cases. Empirical researchers attempt to identify whether or not anticompetitive factors exist as a determinant of bidding prices.

The study of Porter and Zona (1993) is a pioneering empirical study in this context. By sorting out bid-rigging participating contractors and outsiders (nonparticipants) on the basis of the data on freeway-related pavement works in Long Island,[8] they empirically analyzed how much bidding prices and the order of bidding prices are explainable by observable costs. They have proved that observable cost is persuasive for the outsider group, while it gets less persuasive for the bid-rigging participating contractor group.[9]

As a different but related new research approach, there are interesting empirical studies that attempt to identify the bid-rigging mechanisms in a more direct manner. By analyzing the bidding process of school-use milk in Florida and Texas, Pesendorfer (2000) has concluded that there are side-payment-based bid-rigging practices in Florida as well as market segmentation-based bid-rigging practices in Texas. By analyzing the reparation consultant[10] bidding process in Naha City, Ishii (2009) empirically explains that "debt-credit relations" of the past bidding processes poses some impacts on the subsequent bidding results.[11]

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[7] For example, a distance to construction site and construction materials storage site, or orders backlog held by contractors at the time

[8] They are able to sort out contractors into these groups because they used fact data already confirmed in the litigation proceedings.

[9] Other studies similar to Porter and Zona (1993) include Porter and Zona (1999), which analyses school-use milk in Ohio, and Bajari and Ye (2003), which employs structural estimation to analyze the bidding process for freeway-related repair works. Yanagawa et al. (2005) deals with Japanese bid-rigging cases.

[10] Reparation consultant means a consultant in charge of reparation-related affairs in road construction or other public works that require relocation of private sector's facilities.

[11] Considering several commonly-used bid-rigging mechanisms, Ishii (2008) attempts to empirically identify which

In comparison with these theoretical and empirical studies conducted previously, the authors recognize that this study would suggest new aspects about actual bid-rigging practices, encourage further advancement of theoretical and empirical studies, and at the same time present useful background information for competition-related policymakers to develop new survey methods based on objective data. As mentioned earlier, theoretical and empirical researchers have different problem consciousness each other when working on their studies. Theoretical researchers put various assumptions or offer various bid-rigging mechanisms in order to analyze asymmetric information or efficiency of bid-rigging practices. It is a very important task to examine the similarity of these assumptions or mechanisms to those employed in actual bid-rigging practices. Empirical researchers would provide more accurate research outcomes if they could identify empirical research methods for frequently-used mechanisms or important points for processing data on actual bid-rigging practices. In addition, if competition officials embark on investigation efforts after identifying actual bid-rigging mechanisms to a certain extent, they are expected to yield satisfactory outcomes more quickly by using smaller amount of resources. In this respect, the authors believe that the impacts of this study would never be marginal.

3. Survey Outline and Analysis

3.1 Survey outline

Based on JFTC decisions, the authors sort out bid-rigging mechanisms in the following manner. First of all, as characteristics of bid-rigging mechanisms, we picked up six factors (i) that pose important impacts from the viewpoint of economics and (ii) that are identifiable from descriptions of JFTC decisions. It should be noted that these factors are not conflicting each other. A bid-rigging mechanism that would simultaneously satisfy several factors might possibly exist.

(1) Does the mechanism confirm the expected bidder’s willingness or unwillingness for order acceptance?
(2) Does the mechanism pay attention to observable costs?
(3) Does the mechanism pay attention to the signals of private information?

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bid-rigging mechanism is actually used.

(4) Does the mechanism pay attention to the fairness of simply allocating successful bidding?
(5) Does the mechanism pay attention to the fairness of allocation in line with opportunity cost?
(6) Is it a collusive bidding initiated by government agencies?
(7) Others

First of all, the first factor is “Does the mechanism confirm the expected bidder’s willingness or unwillingness for order acceptance?” This is for determining whether or not the mechanism confirms the basic element, which is the expected bidder’s willingness for accepting an order. As already mentioned in the theoretical research outcomes section, bid rigging essentially involves asymmetry of information. In order to determine whether or not an actual bid-rigging mechanism pays attention to this aspect, we have picked up this element, which is frequently described in JFTC’s decisions. It should be noted, however, that some mechanisms, in very rare cases, automatically designate a successful tenderer without confirming the expected bidder’s willingness for order acceptance. In these cases, there are three possible scenarios: JFTC does not simply describe this factor (although it has actually confirmed the contractor’s willingness); JFTC intentionally omits this factor because all expected bidders are obviously willing to accept a new order; or JFTC intentionally avoids (or solves) the problems of asymmetric information by employing this approach. Unfortunately, we are unable to draw concrete conclusions from the data available this time.

Then, the second factor is “Does the mechanism pay attention to observable costs?” This is to ascertain whether or not the bid-rigging mechanism pays attention to efficiency. The observable costs depend on the distance between construction site and the contractor’s headquarter (i.e., if the headquarters are closer from the construction site, the contractor can easily transport construction equipment; further, since the contractor would also have a thorough knowledge of the neighboring locations or actual conditions in this case, he would be able to perform the tasks smoothly), as well as on whether or not the contractor has undertaken past construction works in the case of continuous works (i.e., if the new work is a repair or refurbishing work of the past construction work by the same contractor, the contractor would enjoy more advantages by employing his past experiences than winning an order for a totally new work; the retail sector would also have similar characteristics). In this context, “efficiency”

means the efficiency from the viewpoint of the entire community consisting of bid-rigging participants. If revenues from winning a new order are constant, production cost should be minimized in order to maximize the earnings for the entire community.

The third factor is “Does the mechanism pay attention to the signals of private information?” This is for examining whether or not the mechanism has any framework that would address the contractor’s uncertain willingness for order acceptance, which results from asymmetric information. A contractor with stronger willingness will have stronger incentives for breaking up the bid-rigging scheme.[12] In this sense, if there is a contractor more willing to win a new order, it is desirable to avoid, from the viewpoints of stability and efficiency of bid-rigging scheme, a situation in which a less willing contractor makes a successful bid (by disguising his order acceptance willingness through leveraging asymmetric information). As one of schemes for eliminating such asymmetric information, this factor determines whether or not the bid-rigging mechanism actually employs the so-called “signaling” in the context of game theories. For example, signals in this context refer to the sales efforts directed toward the outsourcers or the activities of the bid-rigging community.

The fourth factor is “Does the mechanism pay attention to the fairness of simply allocating successful bidding?” This is for determining whether or not a bid-rigging mechanism employs automatic allocation rules. As discussed by Pesendorfer (2000) and Ishii (2008, 2009), empirical research efforts have revealed that some bid-rigging mechanisms designate a successful tenderer on the basis of the order amount or equalization of successful bidding opportunities. This factor would be helpful to examine how much actual bid-rigging mechanisms are employing automatic equalization approach in this manner.

The fifth factor is “Does the mechanism pay attention to the fairness of allocation in line with opportunity cost?” This is for analyzing whether or not a bid-rigging mechanism pays attention to the allocation of public works on the basis of the corporate power of the participating contractors. For example, suppose that (a small number of) contractors are nominated almost every time in the process of designated competitive bidding, while (a lot of remaining) other contractors are nominated only sometimes. In this case, if the percentage of successful biddings is the same for these

[12] It should be noted that a contractor with the lowest (opportunity) costs will enjoy the maximum profits by breaking up the bid-rigging scheme (by offering a bid price at a little bit lower level than the predetermined bidding price).

two contractor categories, profits are allocated among bid-rigging participants without respect to possible corporate profits under the competitive conditions. This factor would be helpful to a certain extent to examine the manner in which the actual bid-rigging mechanism operates.

The sixth factor is “Is it a collusive bidding at the initiative of government agencies?” This helps in understanding if a collusive bidding at the initiative of government agencies might be regarded as a different type of bid-rigging community. Fundamentally, this study does not cover a collusive bidding at the initiative of government agencies because the ordering party is in collusion with order-accepting parties. In this sense, we have added this factor in order to clearly distinguish collusive biddings at the initiative of government agencies.

The seventh factor is “Others,” which represent other factors that do not fall under the aforementioned six factors.

3.2 Data

Cartels and bid riggings are mainly regulated by the latter half of Article 3 of Antimonopoly Act (Paragraph 5, Article 2 of Antimonopoly Act sets forth applicable definitions). However, bid riggings in Japan are also regulated by other articles, such as Subparagraph 1, Paragraph 1, Article 8 (four cases are falling under this category) and Article 6. This study basically covers the violation cases under this article.

In very rare cases, some research projects in the past have attempted to identify horizontal collusive relationships in Antimonopoly Act violation cases other than business combinations, and aimed to grasp the actual practices of cartels and bid riggings. On the basis of these research outcomes, this study presents deeper and more detailed analysis. For more information on data and important points in relation with the data please refer to our database. However, from this research project, we have eliminated all of the “order acceptance adjustment” cases as seen in the “pattern” section of the classification table.[13]

Based on this database, we have developed a table that includes data from all the

[13] Appendix of Tanno, et al. (2008), “Cartel/Bid-Rigging Database”

bid-rigging cases[14] on JFTC decisions and selected and sorted out JFTC decision statements that fall under the aforementioned six factors. If a statement of JFTC decision includes more than one factor, it is listed in multiple cells.

3.3 Category of bid riggings

Let us now return to the point of how are bid-rigging cases sorted out. After having determined bid-rigging mechanism's factors, we have checked out these factors in each of the total 173 bid-rigging cases as seen in the JFTC decisions. In this process, figure "1" means that the corresponding factor is included in a bid-rigging mechanism, while figure "0" suggests that it is not included in the mechanism. In this way, we express the results of all the seven factors in the form of 7-digit binary numbers. For example, if a bid-rigging mechanism includes the first factor "Does the mechanism confirm contractor's willingness or unwillingness for order acceptance?" and the third factor "Does the mechanism pay attentions to signals of private information?" but does not include all other factors, the bid-rigging mechanism is expressed in "1010000." The results are presented in Table 1 below.

(Table 1: Distribution table)

Table 1 clearly shows that a lot of bid-rigging mechanisms actually employed during our research period in Japan are relatively simple mechanisms. The most common case is "1100000," which confirms contractor's order acceptance willingness and simply designates the successful bidder in line with observable costs (such as sphere of influence). The second common case is "0001000," which allocates public works so that successful bidding opportunities or order amount would be equalized. The third common case is "0100000," which is basically similar to the most common case. These top three bid-rigging practices account for almost half of the overall bid-rigging cases.

Contrary to our preliminary expectation, the actual bid-rigging mechanisms do not pay attention to the fifth factor, or the contractor's past records (such as the number of times being nominated for the competitive tender in the past) in many cases. This is clearly indicated in Table 2. This table illustrates the overlapping of several factors and is suitable for examining the depth of relationships among multiple factors. For

[14] Total 173 cases from April 1996 to December 2005; From January 2006 to March 2008. This study does not cover 18 cases that have emerged since introducing the leniency program.

example, the number of mechanisms employing the first factor and the third factor at the same time is 13, from the column of (1, 3) (or (3, 1)). The (5, 5) column of this table shows that only 26 cases employ the fifth factor, which only account for 15% of the overall bid-rigging cases.

In addition, the column (2, 2) of Table 2 clearly shows that the second factor is employed in more than a half of the overall bid-rigging mechanisms. This suggests that bid-rigging participants appear to give a top priority to decision-making based on objective data, while taking efficiency into consideration to a certain extent. This phenomenon is compatible with the fact that the first factor is employed in approximately 45% of bid-rigging mechanisms.

(Table 2: Factors overlapping table)

Table 3 describes the correlation coefficients that suggest the depth of relationships between two factors.[15] Unfortunately, not many clear relationships are observable from this table. There seems a negative correlation between the second and forth factors as shown in the (4, 2) element, and there is a slight positive correlation among the first, second, and third factors.

Nonetheless, this fact suggests an interesting corollary. First of all, since the combination of the second and fourth factors is less likely, bid rigging participants do not often employ a compound rule of these factors. In other words, (if these factors are employed) each of these factors independently serves as a pivotal rule in bid-rigging mechanisms. Since the second factor is frequently used as mentioned earlier, bid-rigging mechanisms possibly have a structure consisting of two layers with some kind of the influence sphere factor and without such factor. For example, there might be a mechanism that divides public work involving the sphere of influence factor and those without such factor, and then awards the public work to the holders of the sphere of influence, while designating successful bidders in accordance with some other sub-mechanisms in the case of public work that does not involve the sphere of influence factor.

In addition, if the first or third factor is mainly related with the second factor, it would be beneficial for researchers and practitioners to take into consideration the high

[15] Note that the existence/nonexistence of each factor is expressed in the figure 0 or 1.

compatibility of these factors. Taking into consideration this aspect, Table 4 attempts to grasp the possible causal relationships between these two factors. With n_{ij} representing the (i, j) element of Table 2, a_{ij} (the (i, j) element of this table) is expressed in the following formula.

$$a_{ij} = \frac{n_{ij}}{n_{ii}}$$

a_{ij} shows a causal relationship immeasurable with the correlation coefficients. For example, (2, 3) = 0.23, while (3,2) = 0.92. This suggests that the second factor does not always accompany the third factor, while the third factor involves the second factor in almost all cases. This fact might not necessarily suggest a causal relationship, but we can assume that the third factor (i.e., paying attention to signals of private information) is employed to supplement the second factor (i.e., paying attention to observable costs). This kind of causal relationship would be possibly identified through more detailed analysis in the future.

(Table 3: Table showing correlation coefficients)

(Table 4: Factors overlapping percentage table)

4. Conclusion

According to the abovementioned viewpoints, this article has calculated and sorted actual bid-rigging cases on JFTC decisions in line with the factors suitable to economic analysis. If researchers will make efforts to theoretically identify why simple bid-rigging mechanisms are preferred (at the cost of efficiency) or to improve accuracy in efficiently detecting simple mechanisms, we will be able to understand the actual bid-rigging practices in a better way.

The most significant problem of this study is the trustworthiness of the available data. Roughly speaking, trustworthiness in this context has two different meanings: the first refers to trustworthiness resulting from fact-finding surveys, while the other refers to trustworthiness related with JFTC decisions.

The matter of trustworthiness emerges from fact-finding surveys because all of bid-rigging cases on our database are “successfully detected” by JFTC. In other words, they are detected because of some specific characteristics. Sophisticated and well-planned bid-rigging schemes are highly likely to stay invisible. If a lot of such

sophisticated and undetected bid-rigging schemes exist, we will be unable to grasp the actual bid-rigging practices no matter how many serious efforts are undertaken to analyze the "successfully detected cases." This kind of problem inevitably emerges because a bid-rigging scheme is an illegal act. There is no drastic solution to this problem.[16]

The matter of trustworthiness also emerges in relation with JFTC decisions because JFTC might omit necessary statements on its decision formats. In other words, since JFTC does not deliver its decisions in a suitable manner to economic analysis, JFTC decisions might not describe the entire picture of bid-rigging factors that would pose no impacts on JFTC's decision. For example, even if they actually employ bid-rigging mechanism factors in a certain case, JFTC does not describe such a fact as long as it is not associated with providing evidence to prove bid-rigging scandals. In this case, even if the factor value "1" should have been allocated to some bid-rigging cases, they might be expressed as the factor value of "0."[17] To mitigate such problems, it is an idea to conduct the same type of analysis by putting exclusive focus on JFTC's examination decisions.[18] However, since a limited number of examination decisions are available from JFTC in Japan, it is more likely that sufficient samples are not available, preventing effective classification of bid-rigging cases. If bid-rigging cases subject to JFTC's examination decision process have some kind of common tendency, such tendency will be naturally reflected, posing difficulty in correctly identifying the actual bid-rigging schemes.

As mentioned at the outset of this paper, cartels and bid riggings have been around for a long time, and continue to be one of the most important issues from the viewpoint of competition policies. It is almost impossible to solve this problem immediately due to its characteristics, but we obviously need to improve the situation gradually in a step-by-step manner. As the first step for solving the problem, we sorted out JFTC decision's database. In this regard, various stakeholders are expected to have open

[16] If specific reason for detecting a bid-rigging case is successfully identified, the situation might get improved to a certain extent. For example, if defective bid-rigging cases (i.e., detection due to break-up of bid-rigging scheme) are clearly distinguished from accidentally detected cases (for example, a bid-rigging case gets detected due to some accidental factors; or it became obvious because of a report from a bona fides third party or stakeholder's whistle-blowing due to a sudden change in the stakeholder's mindset), analysis on the latter cases might provide a rough guess of undersurface bid-rigging schemes to a certain extent.

[17] On the contrary, if the factor value 0 should be allocated to certain bid-rigging cases, the factor value 1 will never be allocated to these cases. This is because, if JFTC argues a bid-rigging mechanism incorrectly, such JFTC arguments will surely pose serious problems in the litigation processes.

[18] Examination decision refers to JFTC's decision that describes augments of both JFTC and a bid-rigging participant firm when they have different opinions on Antimonopoly Act violation. On the other hand, JFTC may deliver a suggested decision without holding examination hearings. For this reason, JFTC's suggested decision only describes simplified statements on Antimonopoly Act violation facts in many cases.

discussions from their perspectives in the future.

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Table 1: Distribution table

type	number	1	2	3	4	5	6	7
1100000	36	○	○					
0001000	32				○			
0100000	21		○					
0000010	10						○	
1001000	9	○			○			
0110000	8		○	○				
0101000	7		○		○			
1000000	6	○						
1100100	6	○	○			○		
1110000	6	○	○	○				
0000100	5					○		
1110100	5	○	○	○		○		
1000100	4	○				○		
0000001	3							○
1101000	3	○	○		○			
0001100	2				○	○		
0011000	2			○	○			
1000001	2	○					○	
1111100	2	○	○	○	○	○		
0001001	1				○			○
0100100	1		○			○		
0111000	1		○	○	○			
1001100	1	○			○	○		

Table 2: Factors overlapping table

		1	2	3	4	5	6	7
1	willingness	80	58	13	15	18	0	2
2	observable cost	58	96	22	13	14	0	0
3	private information signal	13	22	24	5	7	0	0
4	simple allocation	15	13	5	60	5	0	1
5	opportunity cost	18	14	7	5	26	0	0
6	government initiation	0	0	0	0	0	10	0
7	others	2	0	0	1	0	0	6

Table 3: Table showing correlation coefficients

		1	2	3	4	5	6	7
1	willingness	1						
2	observable cost	0.3174	1					
3	private information signal	0.0638	0.2921	1				
4	simple allocation	-0.3105	-0.4959	-0.1168	1			
5	opportunity cost	0.1939	-0.0139	0.1588	-0.1365	1		
6	government initiation	-0.2297	-0.2766	-0.0994	-0.1805	-0.1042	1	
7	others	-0.0491	-0.2116	-0.0761	-0.0717	-0.0797	-0.0469	1

Table 4: Factors overlapping percentage table

		1	2	3	4	5	6	7
1	willingness	1	0.725	0.1625	0.1875	0.225	0	0.025
2	observable cost	0.6042	1	0.2292	0.1354	0.1458	0	0
3	private information signal	0.5417	0.9167	1	0.2083	0.2917	0	0
4	simple allocation	0.25	0.2167	0.0833	1	0.0833	0	0.0167
5	opportunity cost	0.6923	0.5385	0.2692	0.1923	1	0	0
6	government initiation	0	0	0	0	0	1	0
7	others	0.3333	0	0	0.1667	0	0	1