

# A STATISTIC RESEARCH ON CHANGES IN THE NUMBER OF BIDDERS FOR BUILDING WORKS PROJECTS USING THE DATABASE IN THE KANTO REGION

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## Abstract

In order to ensure the transparency of public works, disclosures of competitive bidding results are widely practiced in accordance with Japanese law. The purpose of research is to collect bidding results data in chronological order and to observe fluctuations. The data collection range is the Kanto region including the Tokyo metropolitan area. We targeted bidding result information of building works over 100,000 data after 2000 fiscal year. First, we surveyed the characteristics such as type, region, scale of construction, and bidding method. Second, we analyzed trends in the number of bidders and successful bid rates, which were calculated by 5 owner agency categories. Over the past 20 years, Japan's public procurement market has undergone a major system change from designated bidding to general competitive bidding. There are many construction markets where the number of participants per bid has decreased over time. Especially in Tokyo, not a little bid ended up with single bidder, which exposed the challenges of competition policy. In 2017 to 2018, the Tokyo Metropolitan Government had tried to cancel the project that was a single bidder, but finally gave up due to disturbance to the implementation of public works projects and the oppositions from the industry. In this paper, by analyzing bidding result data, we have described in detail the situation, such as when and in what layer the number of single bids occurred. Other major findings are as follows: 1) Although the number of bidders tends to decrease at each owner, there are differences depending on the bidding conditions. 2) Looking at the long-term transition of the successful bid rate, it dropped around 2009 to 2011 after the Lehman Shock. 3) In many cases, it was also observed that as the number of bidders decreased, the successful bid rate increased.

**Keywords:** big data, competitiveness, only one offer, single bid, tender, time series analysis

## 1. Research purpose and scope

Data retention period (collection start time) Last Update Oct. 2022

**データ保有期間**

各地域別のデータ保有期間・保有件数は以下のとおりです。  
 入札ネットは当該年度+過去2か年の情報を、入札ネット+αは全情報をそれぞれ検索・閲覧できます。

地域	Advertisement of ordering		Nomination information		Bid result information	
	期間	件数	期間	件数	期間	結果 件数
国(関東)	1994/07/01~	377,573	1994/04/01~	163,450	1994/04/01~	605,052
茨城	1998/04/01~	93,840	1998/04/01~	326,099	1994/04/01~	559,571
栃木	1998/05/01~	43,840	1998/04/01~	274,120	1998/04/01~	350,526
群馬	1998/04/01~	32,731	1998/04/01~	255,396	1994/04/01~	421,782
埼玉	1998/04/01~	135,023	1998/04/01~	406,769	1994/04/01~	765,708
千葉	1997/01/01~	190,696	1996/05/01~	321,730	1996/04/01~	620,652
東京	1994/04/01~	463,096	1994/04/01~	162,860	1994/04/01~	881,869
神奈川	1998/04/01~	223,796	1998/04/01~	44,729	1994/04/01~	518,260
新潟	2000/04/01~	98,880	2000/03/01~	274,754	2000/03/01~	410,478
山梨	1998/04/01~	38,173	1998/04/01~	99,452	1994/04/01~	260,949
長野	1998/04/01~	159,014	1998/03/01~	242,429	1997/04/01~	531,912

Each 2 column : Collection start time; Cumulative number of data

\* This database need fee for membership.

Fig. 1. The database used (Source: <https://www.nikoukei.co.jp/PurchaseItems/PurchaseNyusatunetAlpha>).

It would be said that bidding results reflect the competitive situation of each market at that time. We believe that it is necessary to broadly collect, carefully monitor, and understand such long-term time-series information. In particular, the number of bidders is an important indicator. Our research used bidding result information that has been collected over many years by a construction newspaper company. Much of the information is the result of painstaking collection of data released by public owner organizations under Japanese law: *Act for Promotion of Proper Tendering and Contracting for Public Works (Act No.127 of 2000)*. They are big data of 5.92 million rows x 36 variables for 11 regions of Kanto: the central part of Japan, including the Tokyo metropolitan area. (see Fig. 1)

In the analysis below, various ordering agencies are grouped into five broad categories - these are national, prefectural, municipal, related public organizations and private sector. And the target was narrowed down under 4 conditions below: (1) Bidding date is after 2001 so, the analysis period: Apr. 2001 to Oct. 2022. (2) The work category limited to construction work, i.e. it does not include bids for consultancy work, etc. (3) The successful bid amount is 5 million yen or more. (4) Bidding method is limited to general competition or designated competition (not include negotiations, etc.). After all, number of analysed data limited to 142,672 bidding results. In this study, we mainly examined following 3 points:

- Changes in bidding competition methods for more than 20 years in Japan
- Changes in the number of bid participants in construction bidding
- Trends and changes in single bids, and the relationship with the successful bit rate

## 2. Coverage of the database

The coverage of this database turned out to be high based on the statistics: Turnover-based values in public sector tables of general construction statistics obtained from eStat, which is a comprehensive statistical website provided by the Japanese Government.

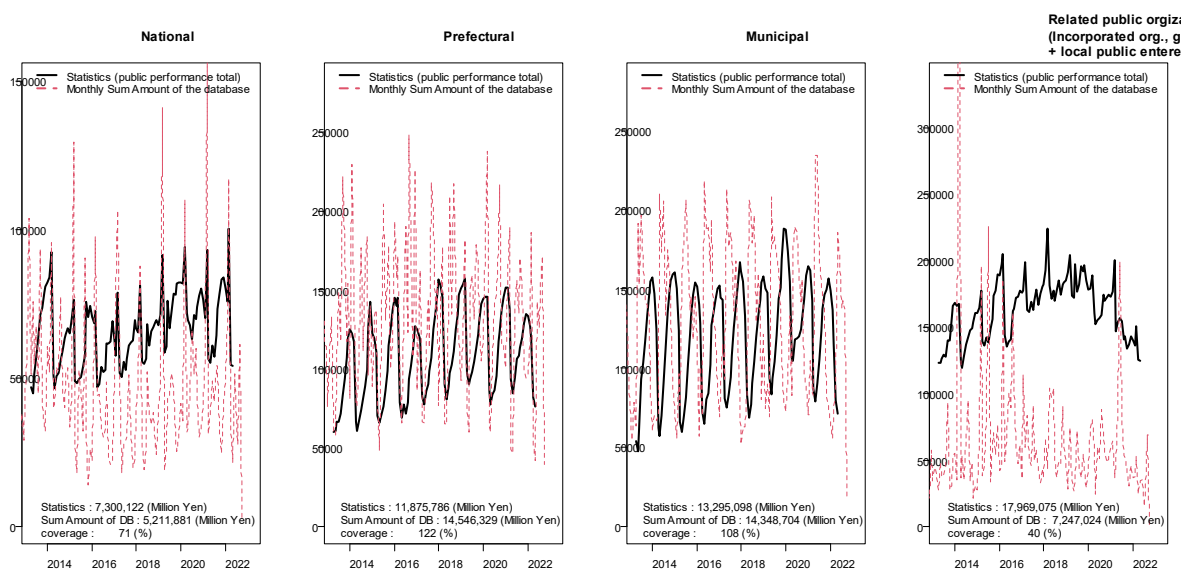


Fig. 2 Coverage of the database – compare with the Government's "General Construction Statistics": the amount figures in the public table (based on the amount of work completed) supervised by MLIT: Ministry of Land, Infrastructure, Transport and Tourism.

From whole databases, we created a subset of about 2.9 million construction-related projects, such as construction and civil engineering, whose bidding dates ranged from April 1994 to October 2022, and

calculated the monthly total value of successful bids of them. These figures were tabulated according to four categories of public ordering agencies. (see red dashed lines in Fig.2) On the other hand, using the public sector table of the latest general construction statistics in eStat, we investigated the monthly "public performance total" in the Kanto region by public ordering agency, and obtained monthly values from April 2013 to May 2022. (black line in each figures). Fig. 2 compares these two amounts by public ordering agency. Overall, these figures show the high coverage of the database. In this study, analysis was performed using 142,672 data extracted from the database with 4 conditions mentioned above.

### 3. Over 20 years of competition system change

Examining the trends in the composition ratio of the number of projects over the last 20 years, we find that the construction type has changed from new construction to maintenance work in many public ordering organizations. Fig. 3 shows the various attributes of 142,672 data over 20 years.

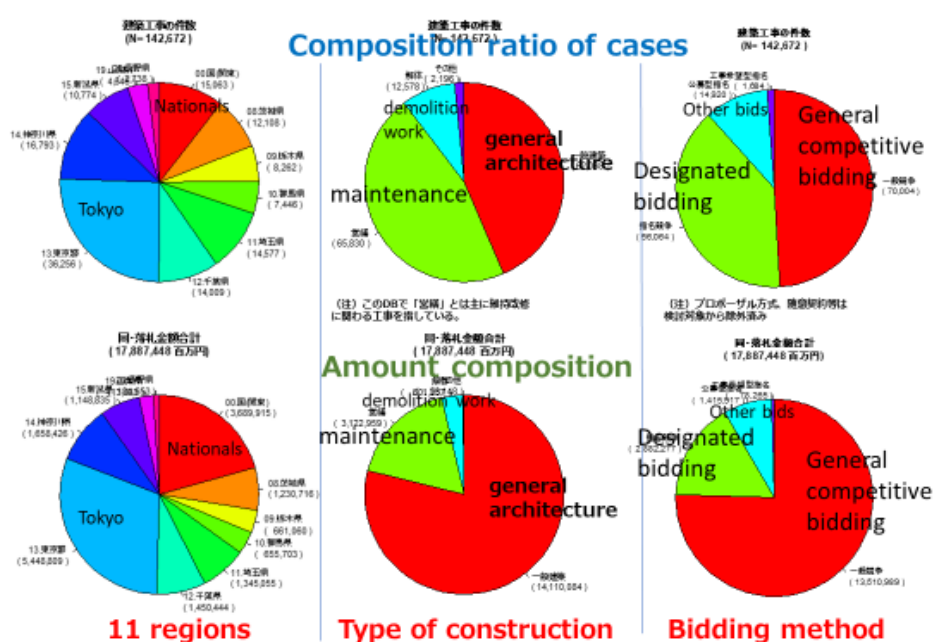


Fig. 3. Composition ratio of cases (upper side) and amount (lower side) of analyzed construction work data (All data looks like this: N=142,672; 17.8 trillion yen; and ranged fiscal year of 2001-2022).

In the case of MLIT (Ministry of Land, Infrastructure, Transport and Tourism) which is the main part of *the National* and which had taken the initiative for the reform, the bidding method changed significantly from 2005 to 2007. At that time, it had been gradually changed from designated competitive bidding to general competitive bidding. Such changes were expanded from large construction works to progressively smaller works. (see bold black line in Fig. 4).

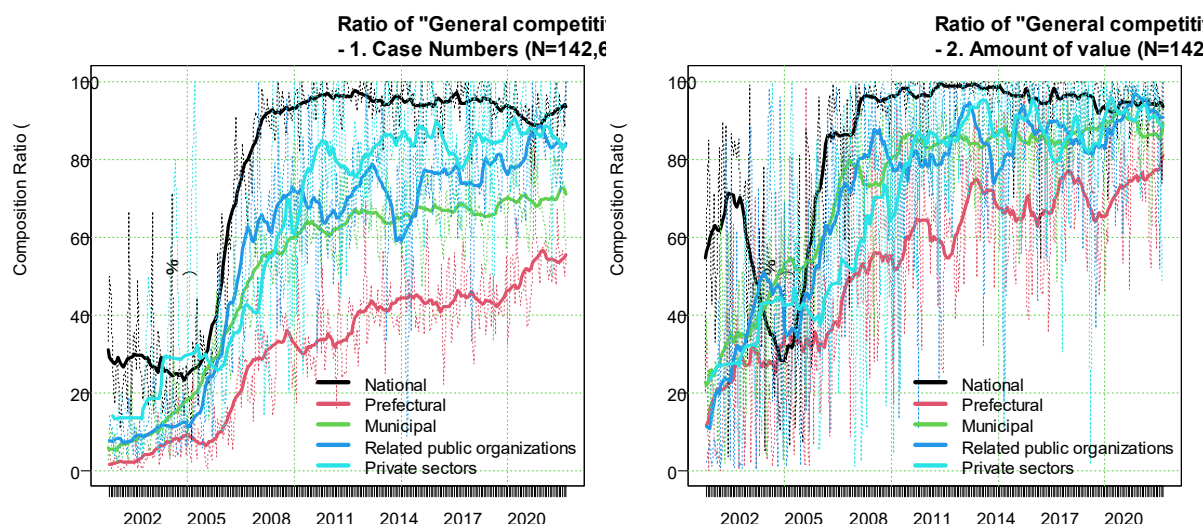


Fig. 4. Trends in monthly composition ratio (%) of bidding method classification “General competitive bidding” by ordering agency category with 12 months moving average: (left) composition ratio of cases, (right) composition ratio of sum amount

#### 4. The number of bidders

The number of bidders has been gradually decreasing (see Fig.5). The number of bidders of general competitive bidding in *national* and *related public organizations* has bottomed out around 2007, and has declined sharply since December 2005, when private demand such as the housing mini-bubble by the second generation of baby boomers increased, and the construction industry leaders declared a farewell to bid rigging at that time. We remember that it was a period when the trend was remarkably competitive. During the period when designated competitive bidding was dominant, 10 nominations were common. This is probably because the Accounting Law had stipulated that “in a designated competitive bidding, at least 10 bidders must be nominated to participate in a competition”. And it is true that similar measures had been taken all around Japan under the *Local Autonomy Law*.

The probability distribution of number of bidders had changed over time. Although there seems to be a difference in the distribution of number of bidders between the general competition and the designated competition over entire period, the difference due to bidding competition method is no longer clear for example in the probability distribution of the latest three years.

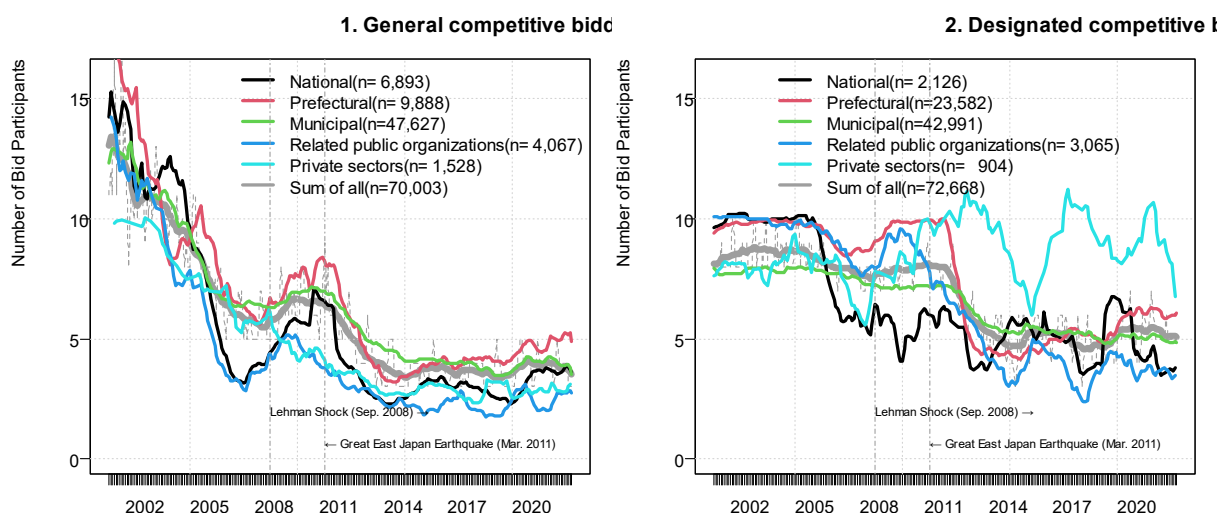


Fig. 5 Changes in number of bid participants --Differences between general competitive bidding and designated bidding.

#### 4.1. Occurrence trends of “single bids”

As the number of bidders decreased, the single bids became more common. On February 13, 2014, three large construction projects related to the *Toyosu New Market* were ordered by the Tokyo Metropolitan Government (with successful bid amounts of approximately 24.7 to 41.5 billion yen), all of them were single bids won by JVs. In February of that year in Tokyo Metropolitan Government, a total of 134 bids all worth approximately 113 billion yen were all single bids. Later, under the newly elected governor of Tokyo, the reform of bidding system was tackled, and an attempt was made to cancel single bids in 2017 to 2018, but the impact on the implementation of public works projects was so great that the cancellation was abandoned. In addition, as regard the single bids, there is no written regulations of the JFTC (Japan Fair Trade Commission) regarding specific measures to be taken.

Fig. 6 shows the trends in the appearance rate of single bids calculated on a monthly basis by attribute of public ordering agencies. Since the monthly aggregated values vary when the number of cases is small, we calculated the 12-month moving average and indicated it with a thick line. The left side of the figure is based on the number of bids, and the right side is based on the successful bid price amount. When the latter number is higher than the former, it means that there were independent bids for relatively large-scale. Looking at these time-series charts, it can be seen that independent bidding became apparent after 2005. At that time, private construction projects such as condominiums were booming, and construction companies were extremely busy. However, after the collapse of Lehman Brothers in 2008, private construction demand plummeted, and interest in public works increased. Then, it became apparent again around 2014 after the Great East Japan Earthquake. During these period, the demand for post-earthquake reconstruction work had got into full-scale. In addition, with the Tokyo Olympic Games, the economy continues to improve, and private construction demand surpassed as if it were the bubble period in 1986-1991. And, there was a shortage of construction workers and construction costs soared.

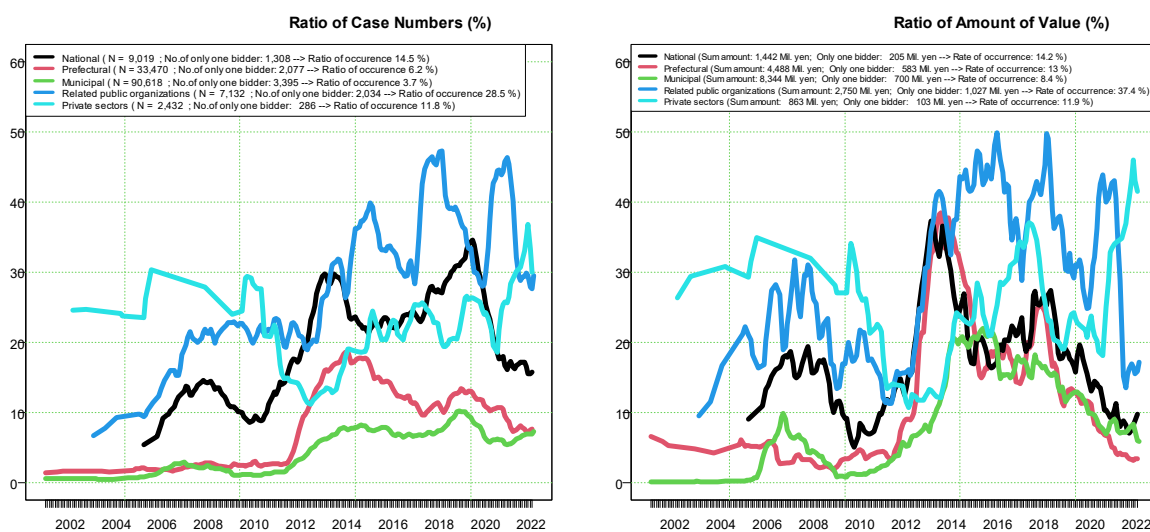


Fig. 6 Monthly occurrence of “single-bids” by ordering agency: (left) composition ratio of cases, (right) composition ratio of sum amount (12-month moving average; The number of single bids that occurred during the entire period, the total amount, and the ratio of each are shown in the legend column.).

#### 4.2. How does the successful bid rate differ depending on whether it is a single bid or not?

The ratio of the successful bid price to the scheduled price determined in advance by the ordering agency is called the successful bid rate. It cannot be calculated if there is no scheduled price. In addition, there were more than 200 data without information on the number of bidders. Since 24,146 data in this database meet these conditions, it should be noted that the number of valid data will decrease especially in the private sector. The successful bid rate is often used as a proxy variable for judging the competitiveness of the bid, and cases with a high successful bid rate are often considered to be inferior in competitiveness. Fig. 7 compares the differences in successful bid rate distribution for the whole period by comparing whether it was a single bid or not. The median (thick black line in the square box) lies 95% of the time within a 'notch' of the statistical distribution error. In every figure, there is no overlap between the notch values of the box plots on the left end and those on the centre and right ends. In other words, although there are individual exceptions, overall the successful bid rate for single bids is high, and conversely, it can be said that single bids are less competitive. On the other hand, single bids generally have a high successful bid rate, but there is no clear difference between "Single bid as a result of withdrawal" and "Pure single bid from the beginning".

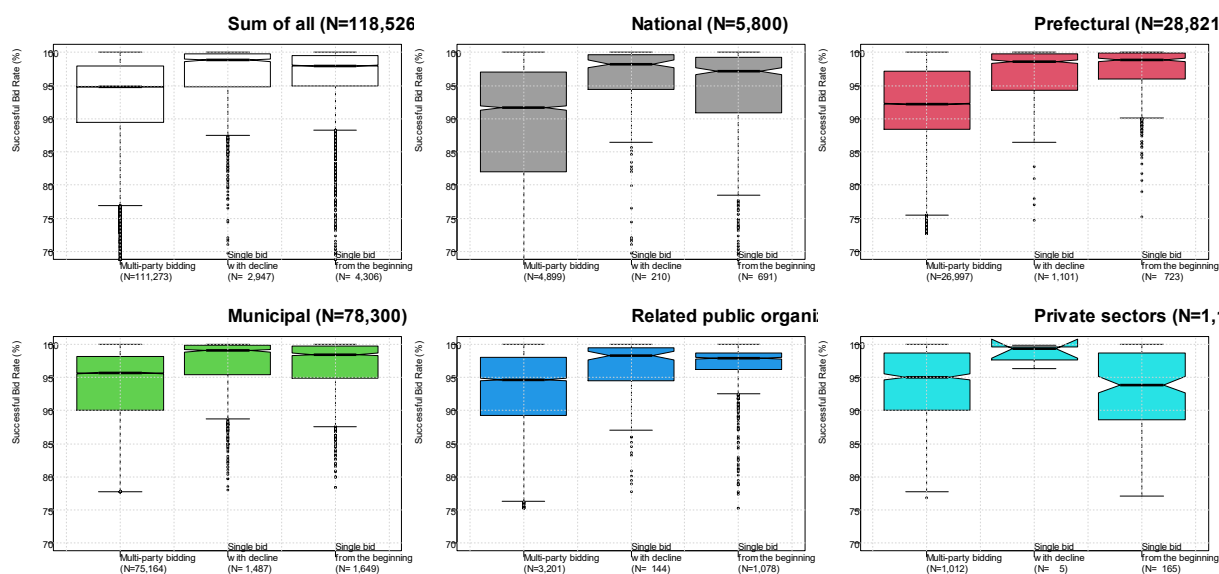


Fig. 7 Comparing successful bid rate over the entire period by whether or not it was a single bid (by public ordering agency) -  
 -The data are divided into three parts: Multi-party bidding, Single bid as a result of withdrawal, and Pure single bid from the beginning.

## 5. Conclusions

The bidding result data collected by a construction newspaper company have revealed extremely high data coverage compared with the government statistics. A time series analysis was performed using these data. In recent years in Japanese construction tendering, the number of bidders has tended to decrease. In this survey, we were able to grasp the reality of single bids, which was not clear until now. The conclusions drawn in this study are summarized as follows:

- Over the last 20 years, the bidding system for construction work in Japan has changed significantly to general competitive bidding. And the number of participants in the tender gradually decreased. As a result, many single bids have been observed.
- Single bids has a higher successful bid rate than multiple bidding, and former cannot said to be tough competition compared with the latter by the analysis using successful bid rate metrics.

- In single bids, it cannot be said that the presence or absence of bid declines has any bearing on the successful bid rate.

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