Market Entry in Public Procurement

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***Abstract*—This study analyzed market entry timing based on the procurement data of construction works of the eight Regional Development Bureaus of Japan's Ministry of Land, Infrastructure, Transport and Tourism. After reviewing key aspects, a regression analysis was performed on the possible factors leading to entry. We found that when an efficient company enters the market, the number of bids is large and there are many tender participants, regardless of the previous bid rate and predetermined planned price trend.**

***Index Terms*—Bidding price, Japan, market entry, public procurement.**

I. Introduction

Regarding entry and price problems in the construction industry, research results indicate that entry tends to lower prices, and it does so particularly under cooperative practices, but such effects are not seen in a competitive environment. [1]. With regard to market entry in the construction industry, studies have been conducted mainly from the perspective of risk assessment [2] or using consensus-building techniques to identify the factors that determine entry [3]. Based on the information of actual market entry, an analysis of firm entry and its impact was conducted, and there were no significant results. This is a data-driven analysis of the reality and impact of this market entry.

The general situation of entry related to the construction industry, which is explained at the beginning of the discussion, can be summarized as follows: A person who intends to run a construction business must obtain permission from the Minister of Land, Infrastructure, Transport and Tourism or the prefectural governor under the Construction Business Law (Law No. 100 of May 24, 1949) (Article 3). This permission is said to be relatively easy to obtain [4]. For this reason, as shown in Fig. 1, the number of registered construction industry licensed companies was 600,980, peaking in 1999, but dropped to 468,311 in FY2018. Among them, the number of new entrants was 2018. There are 16,245 traders (see Fig. 1). This trend shows that there are both a certain number of entrants and exciters in the construction market, and the number of contractors themselves is steadily decreasing.

Since April 2008, construction bidding ordered by the Ministry of Land, Infrastructure, Transport and Tourism (MLITT) has, in principle, applied the general competitive bidding comprehensive evaluation method. This has changed from the days of nominated competition, where the procurer decides the scope of competitors, to the days of open competitive bidding, where companies themselves decide where to compete on their own [5]. On the other hand, the view on the entry of the construction industry under the rapid increase and decrease of construction investment in recent years is the recognition that "the construction industry in Japan is in a state of oversupply and faces an unprecedented severe situation due to intensifying competition [6]." If further measures for correcting the oversupply situation are necessary, we will also consider the review of permission requirements and entry requirements to the public market, taking into account the impact on each direction. Control is considered.

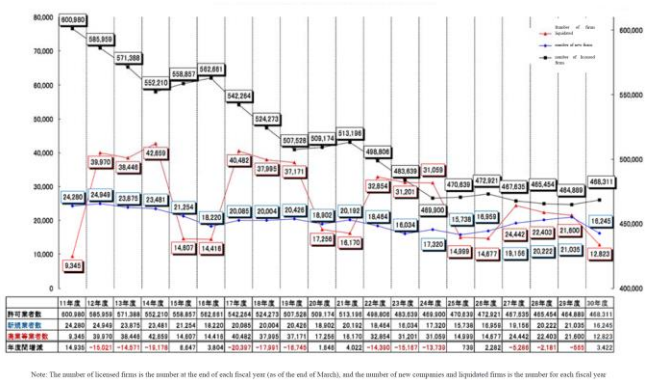

Fig. 1. Trend of the license.

Thus, in discussing the actual conditions of competition in the construction industry, viewing entry methods along with human resource issues and quality assurance are important issues. There is not much discussion as far as we can see and this is verified from the viewpoint of improving the qualities of those who run the construction industry, optimizing the construction contracts, ensuring proper construction work and promoting sound development within the construction industry. Therefore, it is necessary to verify the entry behavior and its impact, and include it in the policy.

Based on these viewpoints, we analyze the characteristics of where entry has occurred in public procurement. The case of a contractor who has not participated in the bidding of the surveying ordering organization for the past three years or has participated in the bidding for the first time is called "entry." The conclusion is that for an efficient company (in the sense that the bid rate is lower than the average), the number of bids is large and there are many participants, regardless of the previous bid rate and planned price movement. An entry was made. In that entry, the successful bid rate was high, and there was a possibility that the entrants could make a successful bid, but the possibility of an actual successful bid was low for the entrants.

There are two ways a company can enter a new industry:

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business takeovers and new business launches. A comparative analysis of the survival patterns and the determinants of these two types show that business takeovers have a higher survival rate than new entries [7]. Santarelli and Vivarelli state that new firm entry is heterogeneous with innovative entrepreneurs being found together with passive followers, over-optimist gamblers and even escapees from unemployment, thus the policy incentives should be highly selective [8]. Huynh *et al*. examine the survival of new firms from a financial perspective and use duration analysis to quantify the effects of firms, industries and aggregation factors [9]. Vivarelli characterizes entrepreneurship in developing countries and examines the concept of entrepreneurship [10]. Colantone *et al.* examine import competition, including entry, and find that small and large firms constitute different strategy groups within the same industry [11]. Creane and Jeitschko consider market entry in situations where the quality of the seller is private information, and show that markets with asymmetric information about quality may be less concentrated but carry higher than usual profit margins [12]. Further, entry may be less likely in markets with asymmetric information about quality, because entry lowers prices and this triggers adverse selection.

However, not much has been done to identify the reality of market entry through public procurement, and a basic empirical analysis of when market entry occurs and what happens to markets because of entry is needed. By presenting a basic analysis of this new entry, this paper makes a significant contribution to encouraging applied research.

As mentioned in previous studies, there are structural problems in the construction industry related to subcontracting, wages for workers, the employment environment, and entry research. It seems that analysis of bid data that can generally be examined as a demand table is insufficient for understanding various problems in the construction industry. From this point of view, we recognize that the problems involved in the construction industry structure are greatly affected by public investment, and so are issues that should be addressed in future discussions.

This article is organized as follows. In Section II, we define "entry" for bidding data from the Regional Development Bureau of the MLITT and give an overview of the situation of entry. Section III estimates and verifies when and where the entry occurs based on aggregate data and individual bid data. Section IV presents the conclusions.

II. Overview of Market Entry

This study uses bidding result data from the target period 2006 to 2018 for general civil engineering work published on the websites of eight regional maintenance offices (Tohoku, Kanto, Hokuriku, Chubu, Kinki, China, Shikoku, Kyushu). Note that there are some missing data.

New entry in this article refers to the fact that in the bidding of each type of construction for each regional development bureau, the companies that did not participate in the bidding for the three years from 2006 to 2008 began to participate in the bidding. It should be noted that this is handled differently for a new start, which refers to a company that has started a new business. In addition, "re-entry" is defined as 1096 days or more having passed since a certain tender was made and participation was restarted. Thus, new entry and reentry are both treated as entries. The reason for entering for those who had not participated in the bidding for 3 years was that they were treated as entrants after a blank period of 3 years (period of time not participating in the bidding process), and there were too many people to be treated as new in 2 years. Correspondingly, 4 years or more can be considered the same as 3 years, so a blank period of 3 years was set as the limit of entry. This can be seen from Table I and Fig. 2. Note that the average number of days from participation in one bid to the other was 118.72 days, and the standard deviation was 266.65 days. Other descriptive statistics are shown in Table II and Table III. Blank periods of more than 3 years (1095 days) are extremely rare.

TABLE I: Tender Participants, New Entrants, and Re-entrants by Year

	participants	new entrants	re-entrants	entrants	new entrants (%)	re-entrants (%)	entrants %)
2006	81136	19004	0	19004	23.42%	0.00%	23.42%
2007	64057	4139	0	4139	6.46%	0.00%	6.46%
2008	60007	2480	1	2481	4.13%	0.00%	4.13%
2009	65114	2350	260	2610	3.61%	0.40%	4.01%
2010	60387	1599	551	2150	2.65%	0.91%	3.56%
2011	67199	1663	770	2433	2.47%	1.15%	3.62%
2012	57974	1200	590	1790	2.07%	1.02%	3.09%
2013	59545	1229	765	1994	2.06%	1.28%	3.35%
2014	48336	848	650	1498	1.75%	1.34%	3.10%
2015	49025	1239	931	2170	2.53%	1.90%	4.43%
2016	49620	935	975	1910	1.88%	1.96%	3.85%
2017	38973	715	812	1527	1.83%	2.08%	3.92%
2018	36038	728	818	1546	2.02%	2.27%	4.29%
total	737411	38129	7123	45252	5.17%	0.97%	6.14%

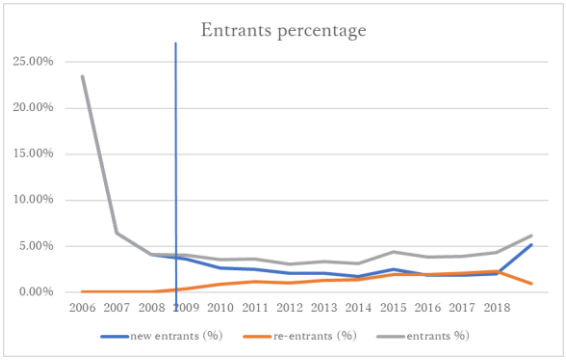

Fig. 2. Transition of entry rate (vertical lines indicate the fiscal 2009).

TABLE II: Participation Rate by Year of Grading

	Tohoku	Kanto	Hokuriku	Chubu	Kinki	Chugoku	Shikoku	Kyushu	total	Coefficient of variation
2009	3.82%	3.81%	6.76%	3.10%	0.84%	3.99%	2.99%	2.56%	4.01%	0.479
2010	3.50%	3.62%	5.37%	2.84%	1.42%	3.52%	3.16%	2.40%	3.56%	0.352
2011	3.90%	2.81%	4.88%	2.77%	1.51%	3.71%	2.94%	3.20%	3.62%	0.308
2012	2.55%	2.95%	7.80%	2.64%	0.94%	2.36%	3.87%	2.17%	3.09%	0.647
2013	2.80%	3.04%	6.84%	2.34%	1.21%	3.80%	2.71%	3.20%	3.35%	0.504
2014	2.57%	3.21%	6.46%	1.88%	1.42%	3.89%	3.08%	2.39%	3.10%	0.500
2015	5.60%	3.71%	4.57%	4.18%	2.66%	5.55%	4.25%	3.30%	4.43%	0.242
2016	4.54%	2.79%	4.83%	2.05%	2.38%	5.57%	2.45%	3.62%	3.85%	0.373
2017	4.63%	4.25%	3.46%	2.34%	2.39%	3.85%	3.43%	3.89%	3.92%	0.232
2018	2.53%	2.99%	4.16%	2.92%	2.67%	9.72%	6.26%	4.27%	4.29%	0.555
total	3.63%	3.29%	5.72%	2.73%	1.66%	4.31%	3.43%	3.01%	3.69%	
Coefficient of variation	0.290	0.150	0.251	0.239	0.407	0.442	0.313	0.227	0.124	

TABLE III: Participation Rate by Year of Grading

	Prestressed Concrete	Asphalt Pavement	Maintenance and Repair	General Civil Engineering	Machinery	Architecture	Steel Bridge Tops	Landscaping	Communication Equipment	Electrical Equipment	Painting	Slopes	Total
2009	2.38%	2.35%	5.36%	1.82%	6.98%	21.17%	4.89%	3.50%	6.42%	10.14%	4.24%	13.36%	4.00%
2010	4.39%	2.91%	4.91%	1.57%	4.32%	16.84%	4.05%	5.16%	5.44%	9.56%	3.53%	17.57%	3.80%
2011	3.73%	2.99%	4.59%	1.28%	7.48%	15.23%	4.48%	3.77%	7.82%	11.87%	4.23%	15.83%	3.47%
2012	2.96%	2.37%	3.65%	1.12%	6.67%	22.77%	4.76%	3.37%	5.27%	10.20%	4.14%	13.30%	3.27%
2013	1.56%	3.33%	4.21%	1.32%	5.36%	25.41%	2.65%	5.33%	5.71%	10.44%	5.52%	8.67%	3.16%
2014	1.16%	2.00%	3.99%	1.13%	5.73%	30.98%	2.40%	2.53%	5.21%	8.82%	2.73%	10.92%	3.12%
2015	2.78%	2.87%	4.52%	1.26%	7.75%	32.93%	2.45%	3.23%	5.20%	14.24%	7.22%	26.12%	4.07%
2016	1.90%	4.75%	5.57%	1.32%	7.41%	30.36%	2.97%	3.42%	2.93%	14.22%	10.10%	18.99%	4.36%
2017	4.91%	3.45%	4.55%	1.17%	7.65%	22.80%	2.31%	3.31%	3.94%	19.40%	15.49%	13.43%	3.75%
2018	3.06%	2.69%	4.30%	1.32%	7.93%	38.51%	1.77%	2.90%	3.40%	13.98%	17.84%	13.92%	4.17%
2019	1.53%	1.55%	5.01%	0.85%	6.15%	19.66%	0.36%	0.00%	3.48%	10.61%	8.97%	15.22%	2.86%
Total	2.68%	2.90%	4.58%	1.33%	6.55%	24.62%	3.32%	3.74%	5.05%	11.43%	5.47%	15.85%	3.66%

Regarding entry, the following research results have been compiled (Geroski; occupancy rate and business closure rate are omitted) [13].

1. Entry is common
2. There are major cross-sectional fluctuations in entry, but there is no long-term sustainability between industries. Intra-industry fluctuations are greater than inter-industry fluctuations.
3. Entry is slow to respond to high profits.
4. Barriers to entry are high.
5. It is difficult to explain the entry rate in terms of profitability and barriers to entry.
6. Entry has little impact on profit.
7. High entry rate is accompanied by high innovation.
8. Almost no response from existing companies.
9. Price does not normally prevent entry.

The facts and empirical results stylized in these fields of economics, show the following in the analysis of Japanese public procurement participants [14].

1. Entry is common (occurs in all years, all regions and all types of work).
2. Entry has significant cross-cutting fluctuations. However, interregional variation is greater than intraregional variation (results opposite to previous findings).
3. Responses to high profits, barriers to entry, relationships with profits/innovations, and relationships with existing companies require analysis for each region and work type by year and month. Therefore, next, we will examine when and where new entries occur.

III. When and Where New Entries Occur

Next, we consider when and where new entries occur. As we saw in Section II, new entry usually occurs when there is excess profit, and long-term competitive equilibrium is considered under free entry. For this reason, new entry possibly occurs when new companies are efficient or when existing companies have market power.

The number of participants per month is based on the number of bids, average number of participants, average planned price, and average bid rate, and the contribution of each element is examined.

$$NumberOfEntrants_{i,j(,k)} = C_1 + \beta_{1,1} NumberOfBid_{i,j(,k)}$$

$$+\beta_{1,2} AverageParticipants_{i,j(,k)} + \beta_{1,3} AveragePlanPrice_{i,j(,k)} \quad (1)$$

$$+\beta_{1,4} AverageBidRate_{i,j(,k)} + \varepsilon_{1,i,j(,k)}$$

In the above, i represents the year and month in which the bid was placed, j is a region, and k represents the type of work. *NumberOfEntrants* represents the number of participants in a month, *NumberOfBid* is the number of bids in that month, *AverageParticipants* is the average number of bidders in that month, *AveragePlanPrice* is the average price in the month, and *AverageBidPrice* is construction in that month. It is the average of the average bid rate, and the value obtained by dividing the bid price by the planned price. This is averaged for each construction and the simple average is obtained. ε is the error term. If data are available, they are compiled for each regional development bureau and each type of work to form (unbalanced) panel data.

This is a guidance type estimation, which uses ordinary least squares (OLS) method to estimate the contribution of various elements. In general, the estimated price and the number of participants is thought to be strongly correlated, but in our data, the correlation coefficient is 0.191. Therefore, the problem of multicollinearity, that the number of participants increases due to construction with a large planned price, does not necessarily occur.

The estimation results are listed in Table IV.

TABLE IV: Analysis of Tenders with New Entrants

Dependent Variable:	entrants		entrants		entrants		entrants	
	n=957		n=939		n=1379		n=1271	
Method: Pooled Least Squares	Coefficient (Std. Error)		Coefficient (Std. Error)		Coefficient (Std. Error)		Coefficient (Std. Error)	
C	-9.683	*	-0.100		0.410		5.725	
	(5.6063)		(6.5528)		(2.4386)		(4.3470)	
NumberOfBid	0.124	***	0.127	***	0.088	***	0.088	***
	(0.0132)		(0.0136)		(0.0032)		(0.0035)	
			-0.019				0.004	
			(0.0138)				(0.0036)	
			-0.014				0.006	
			(0.0139)				(0.0035)	
AverageParticipants	1.649	***	1.598	***	1.001	***	1.025	***
	(0.1002)		(0.1023)		(0.0514)		(0.0554)	
			0.248				-0.070	
			(0.1025)				(0.0568)	
			-0.100				-0.070	
			(0.1029)				(0.0560)	
AveragePlanPrice	1.46.E-10	*	4.92.E-10		-3.32.E-09		-2.94.E-09	
	(1.08.E-09)		(1.09.E-09)		(1.81.E-09)		(1.94.E-09)	
			-9.34.E-10				-4.16.E-09	
			(1.09.E-09)				(1.96.E-09)	
			-7.63.E-10				-2.50.E-09	
			(1.09.E-09)				(1.93.E-09)	
AverageBidRate	1.930		26.559	***	-0.666		-0.676	
	(5.5857)		(9.1125)		(2.4169)		(2.7171)	
			-23.047	**			-4.409	
			(9.7654)				(2.7374)	
			-9.538				1.179	
			(9.0518)				(2.5970)	
FixedYear)	yes		yes		yes		yes	
Fixed(Region)	yes		yes					
Fixed(Type)					yes		yes	
R-squared	0.642		0.650		0.756		0.759	
Adjusted R-squared	0.585		0.591		0.730		0.730	
S.E. of regression	11.788		11.766		10.152		10.345	
Akaike info criterion	7.899		7.902		7.565		7.613	

In the table, *** is 1% significant, ** is 5% significant, and * is 10% significant. In the following table, the symbols have the same meaning

According to this result, it is presumed that entry has a positive correlation with the number of bids and with the number of participants. However, there is no relationship between the average planned price and the average bid rate.

In addition, the two columns on the right side of each element show what effect the data of the previous period (before January and before 2 months) has on each element. Similarly, entry has a positive correlation with the number of bids and the number of participants. When viewed by region, the bid rate has a positive correlation in the current period and a negative correlation in the previous period.

In other words, it seems that entry has a limited reaction to the average of high bid rates and high planned prices where high profits are expected.

Next, in order to see what kind of bid has occurred at entry, we review whether there is an entrant in a bid and whether the entrant is likely to make a successful low bid. We also review the successful bid rate.

This can be formulated by equation (2).

$$WinDummy_i = C_2 + \beta_{2,1} EntrantDummy_i + \beta_m \sum x_{m,i} + \varepsilon_{i,j(k)} \quad (2)$$

where *i* is a subscript representing each bid, and m is a subscript representing the type of other related variables. *WinDummy* is a dummy variable that indicates whether a successful bid has been made and represents 1 when a successful bid is made and 0 otherwise. *EntrantDummy* is a dummy variable that indicates whether an entrant is present and represents 1 for an entrant and 0 for no entrant. *x* represents other related variables (control variables). Here, the binary value of whether an entry has been made is estimated by logit. Table V shows the status of entry.

TABLE V: STATUS OF INDIVIDUAL BIDDING

Dependent Variable:	WinDummy		WinDummy		WinDummy		WinDummy	
	n=532211		n=532211		n=532211		n=532211	
Method: ML - Binary Logit (Newton-Raphson / Marquardt steps)	Coefficient		Coefficient		Coefficient		Coefficient	
	(Std. Error)		(Std. Error)		(Std. Error)		(Std. Error)	
C	-2.471	***	-1.849	***	-1.932	***	-2.254	***
	(0.0290)		(0.0315)		(0.0175)		0.033	
EntrantDummy	-0.219	***	-0.199	***	-0.055	***	-0.216	***
	(0.0215)		(0.0214)		(0.0206)		0.022	
YearDummy			yes		yes		yes	
MonthDummy			yes		yes		yes	
RegionDummy	yes				yes		yes	
TypeDummy	yes		yes				yes	
McFadden R-squared	0.043		0.043		0.019		0.049	
S.E. of regression	0.352		0.352		0.356		0.350	
Akaike info criterion	0.818		0.818		0.839		0.812	

According to Table V, the coefficient of the entrant dummy is negative and dominant, indicating that it is difficult to make a successful bid being an entrant.

Similarly, the left side of equation (2) is changed to the following, and the average bid rate (*AveBidRate*) for the bid with the participant (*WithEntrantDummy*) and the successful bid rate (*WinRate*) for that construction are linearly regressed with OLS. Table VI shows the situation.

TABLE VI: IMPACT OF ENTRANTS

Dependent Variable:	AveBidRate		WinRate	
	n=112,126		n=112,126	
Method: Pooled Least Squares	Coefficient		Coefficient	
	(Std. Error)		(Std. Error)	
C	0.865	***	0.901	***
	(0.0014)		(0.0043)	
WithEntrantDummy	-0.0003		0.008	***
	(0.0005)		(0.0015)	
EntrantDummy	-0.010	***	0.009	***
	(0.0008)		(0.0024)	
YearDummy	yes		yes	
MonthDummy	yes		yes	
RegionDummy	yes		yes	
TypeDummy	yes		yes	
R-squared	0.084		0.024	
Adjusted R-squared	0.083		0.024	
S.E. of regression	0.061		0.188	
Akaike info criterion	-2.743		-0.501	

In the case of bidding with entrants, the average bidding rate of all construction participants is not much different, and the bidding rate is higher. In addition, new entrants are negative from the average construction bid rate and positive and significant from the successful bid rate. In other words, entrants have the effect of lowering the average construction bid rate and increasing the successful bid rate.

To summarize, in the monthly data, the number of entries increases as the number of bids and the average number of participants increase. However, the entry is not related to the average planned price or the average bid rate. In addition, the relation between the average of the high bid rate or high planned price, expected to be a high profit in the previous month, is limited. Looking at each individual bid, it is difficult for entrants to make a successful bid. There is no difference in the average construction bid rate of bids with entrants, but entrants bid slightly (about 1%), and the bid rate is high for bids with entrants. In addition, the successful bid rate of entrants is high among them.

Therefore, entry is effective when an efficient company (in the sense that the bid rate is lower than the average) has many bids and a large number of participants, regardless of the previous bid rate and planned price movement. In that entry, the winning bid rate is high, and there is a possibility that the entrants make a successful bid.

IV. CONCLUSION

This study analyzes FY2006 to FY2018 based on the procurement data of the construction works of eight Regional Development Bureaus of the MLITT regarding when and where entry (new/reentry) occurs. Since the data for 3 years were used, data from 2006 to 2018 were analyzed. Specifically, after reviewing the land preparation, type of work, and fiscal year in which entry occurred, regression analysis was performed on various points that are generally considered as factors leading to entry.

As a result, Hokuriku and Chugoku Regional Development Bureaus had a large proportion of participants in the Regional Development Bureau, and less in Kinki and Chubu. Moreover, the fluctuations were large between Kinki and China. In terms of construction type, the percentage of entrants was large in terms of architecture and slope, and there were few in general civil engineering and Prestressed Concrete construction. Fluctuations were large in paintings. Most of them were seen in FY2015 and FY2018, and less in FY2012. In addition, for an efficient company (in that the bid rate is lower than the average), the number of bids is large and there are many participants regardless of the previous bid rate and planned price movement. In that entry, the successful bid rate was high, and there was a possibility that the entrants could make a successful bid, but the possibility of an actual successful bid was low for the entrants.

The contribution of this study is that it is one of the few that consider the outline and conditions of market entry in the construction industry. In principle, market entry in public procurement in Japan can occur in any region for any type of work, in any fiscal year, but it has been found that the fluctuations are quite large.

This study has the following two policy implications. First, in general, encouraging entry is to attract efficient companies, and efficient companies can enter even in a competitive situation. However, entrants are not necessarily able to make a successful bid, and it is necessary to train them from a medium- to long-term perspective. To this end, it is necessary

to consider not only direct entry promotion measures, but also measures that take into consideration the creation of an easy-to-enter environment and support for business promotion after entry.

Second, there are few measures to promote entry in the construction industry. Measures to secure and develop human resources include creating attractive workplaces, securing existing human resources, and developing new human resources. It may be necessary to shift these to new entry promotion measures and consider rejuvenation of companies in the industry. For these, social experiments such as adding points in the overall evaluation for entry, considering the effect of promotion of entry on the construction industry, examining the grade and evaluating new businesses by entrepreneurship can be performed. The entry and consideration of various other factors can be said to be another issue.

There are three management implications of this paper. First, recognizing that new entrants tend to be made because they are more efficient compared to competing firms. However, it is important to recognize that the greater the rate of entry into the market and the higher the bidding rate is, the higher the price tends to be. It is also important to note that the likelihood of winning the bid is not high, as there are competing firms.

Second, new entrants will revitalize the region and industry in terms of efficiency. This has been pointed out by many other papers besides the current one, and indeed, t pro-entry measures are often adopted as policy.. Those who are thinking of entering the market should investigate these various efforts, keep their use in mind, and proceed with their business by using everything they can.

Third, as noted earlier in Geroski's summary, high entry rates are accompanied by high innovation. This is more of a correlation than a cause-and-effect relationship, but this is a management nod to the story. When trying to enter an area or industry where competition is already fierce, it is essential to have some kind of innovation. However, incumbents rarely pay attention to this, and entry with actual innovation in hand is likely to be very advantageous. For this reason, innovation should be emphasized for market entry.

As for limitations and challenges, the analysis in this paper is about public procurement in Japan. However, the content of this paper, which examines incentives for businesses, is different from the paper's broad scope. It will be generally applicable and generalizable. In terms of challenges, the data from procurement as well as qualitative data from social experimentation will allow us to test whether the hypothesis here us supported in future research.

Conflict of Interest

The author declare no conflict of interest.

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