

Game Analysis of the Rent-seeking in Government Procurement

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Abstract –This paper uses the situation of government procurement as the starting point, and takes the basis of rent-seeking behaviors. The paper is beginning with the definitions of Government Procurement and Rent-seeking. Then deeply analyzes the behavior of rent-seeking in government procurement on the basis of Game Theory. The author builds two models to analyze the rent-seeking mechanisms. According to the game analysis, this paper points out the reason why the appearance of rent-seeking in government procurement. At last, the author puts forward the correlative measures in government procurement.

Keywords –Game theory; Government Procurement; Rent-seeking

1. The definitions of Government Procurement and Rent-seeking

“The law of government procurement of PRC” which issued and implemented on January 1, 2003 provide that “Government procurement is that the state organs at all levels, institutions and organizations use the fiscal fund to procurement goods, construction and services which is included in the catalogue and quota of centralized purchasing set by law.” According to the definition of government procurement, we are informed that the subject of government procurement is the state organs at all levels, institutions and organizations; the capital source of government is fiscal fund; the basis of government procurement is the catalogue and quota for centralized government procurement which is set by law; and the objects of government procurement is goods, construction and services.

Rent-seeking is “looking for rent” in Popular explanation. Rent is the income differences which are the result of lacking of elasticity of supply, and the lacking of elasticity of supply is caused by the intervention of state power, not caused by the pure natural production factors. The income differences also are opportunity cost that is the maximum revenue which can be used in many other selectable usages for owners of resources. So rent-seeking is the pursuit of rent. In short, rent-seeking is non-productive activities of pursuing the economic benefits maximizing with the help of the power.

2. Qualitative analysis of rent-seeking in government procurement

The practice of “The law of government procurement of PRC” on January 1, 2003, showed that government procurement is from deconcentration to concentration.

According to the government procurement mode set in the “The law of government procurement of PRC”, government procurement refers to five main interest relevant parties in the process of approving, execution, acceptance and payment. The five main interest relevant parties are government procurement administration department (Ministry of Finance), centralized purchasing organizations, the end user of goods, supplier and settlement center. Government procurement system establishes a mutual controlling and balancing mechanism according to the separation of purchasing, acceptance and payment.

Figure 1 shows the detailed process of government purchasing.

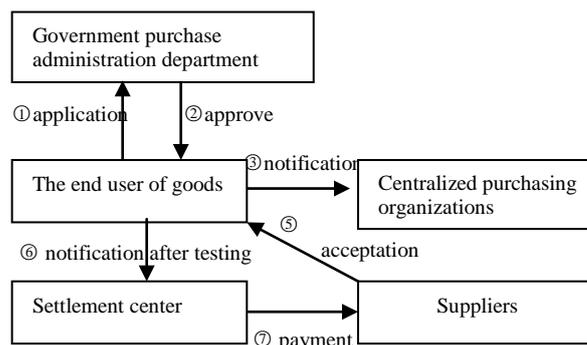


Figure 1. Flow Chart of Government Procurement

But in practice, there are always some deviations between goal and result. The problems are as follows:

φ Rent-seeking between government procurement administration department and centralized purchasing organizations. The procurement policy, procedure, limits and quota are set by government procurement administration department. Centralized purchasing organizations may appear rent-seeking behaviors to government procurement administration department. As

the result, the policy may be more useful to centralized purchasing organizations. Such as: reducing the standard of procurement quota, expand the limit of purchasing. But in author's opinion, the possibility is very low, because the policy is showed in the form of law. So the cost of this kind of rent-seeking is very high.

⊙ Rent-seeking between the end user of goods and government procurement administration department. This kind is the contrary to the first kind. The end users of goods hope that they can own more power in government procurement according to improve the standard of quota and reduce purchasing limits. And the result is the same as the first one, the possibility is very low because of the high cost.

⊙ Rent-seeking between suppliers and centralized purchasing organizations. The responsibility of centralized purchasing organizations is purchasing. So they'll face the situation that how to choose suppliers. The purchasing of government is always in large amount, so the suppliers of government procurement will be profitable. In order to acquire higher economic profits, suppliers are willing to pay more expense. It's very common in reality.

⊙ Rent-seeking between suppliers and government procurement administration department. Due to the domestic development of the relatively late Government procurement, the independent of government procurement administration department, centralized purchasing organizations and the end user of goods in the process of purchasing. The government procurement administration department plays a main role in the government procurement, so it may be appear.

⊙ Rent-seeking between suppliers and the end user of goods. In principle, the suppliers are determined by centralized purchasing organizations, but the result should be inspected by the end user, if the end users think they are not qualified with the standard, the suppliers can't achieve the profits.

⊙ Rent-seeking between suppliers and centralized purchasing organizations. For the centralized purchasing organizations are responsibilities for payment. If the centralized purchasing organizations are delayed payments, at the same time, suppliers are badly lack of capital, so the rent-seeking may occur between suppliers and centralized purchasing organizations. But in the author's opinion, the centralized purchasing organizations belongs to government, they are always in a good reputation. The possibility is always very low.

According to the analysis of the above six kinds, we are informed that Rent-seeking between government procurement administration department and centralized purchasing organizations, between the end user of goods and government procurement administration department, between suppliers and centralized purchasing organizations, between suppliers and government procurement administration department, are feasible in theory, but the cost is very high, so the possibility is very low. This paper is focus on the rent-seeking between suppliers and centralized purchasing organizations, suppliers and the end user of goods. And the analysis which is base on game theory is very similar, so the paper takes the

rent-seeking between suppliers and centralized purchasing organizations as the example to analyze.

3. Game analysis of rent-seeking in government procurement

For the game analysis of rent-seeking in government procurement, this paper uses two modes to analyze.

3.1 Simple dynamic game mode analysis

There are two choices for suppliers and centralized purchasing organizations, they are: ⊙ cooperation; ⊙ noncooperation. Supervisory agency also has two choices: ⊙ supervision; ⊙ nonsupervision. Suppliers and centralized purchasing organizations will choose cooperation if they don't have the risk of being supervised. But because of the existence of supervisory agency, suppliers and centralized purchasing organizations will have risk in their cooperation. For example, suppliers and centralized purchasing organizations should reduce cooperation if the punishment is heavy. For supervisory agency, it should be cost a lot if supervisory agency checks the behavior of government procurement every time. So supervisory agency selects random inspection.

There are some fundamental assumptions for game analysis in government procurement, as following:

⊙ If suppliers and centralized purchasing organizations choose to cooperate, they can achieve a common rent R . The distribution between both is determined by their deal.

⊙ If suppliers and centralized purchasing organizations don't choose to cooperate, they will achieve none.

⊙ If supervisory agency chooses supervision, the cooperation between suppliers and centralized purchasing organizations can be found. And the supervisory agency can achieve penalty F , at the same time, confiscating the rent R , so supervisory agency can achieve $F+R$ at all. It should pay cost C ; if suppliers and centralized purchasing organizations don't cooperate at all, supervisory agency will lose C .

⊙ If supervisory agency chooses nonsupervision, it'll get none.

⊙ The possibility of cooperation between suppliers and centralized purchasing organizations is α , the possibility of supervising for supervisory agency is β .

The game mode can be expressed as the following figure:

		suppliers and centralized purchasing organizations	
		cooperation (α)	noncooperation ($1-\alpha$)
supervisory agency	supervision	I $R+F-C$ $-F$	II $-C$ 0
	nonsupervision ($1-\beta$)	III 0 R	IV 0 0

Figure 2. The Simple Game Mode

The figure 2 shows that there are four strategies in the game theory: (cooperation, supervision); (cooperation,

nonsupervision); (noncooperation, supervision); (noncooperation, nonsupervision).

First, the expected utility function of suppliers and centralized purchasing organizations is

$$E_1(U) = \alpha[(-\beta F) + (1 - \beta)R].$$

And the expected utility function of supervisory agency is $E_2(U) = \beta[\alpha(R + F - C) - (1 - \alpha)C]$.

Economic agents in society decide their actions in order to maximize their benefit from the perspective of economics. The problem of maximizing the benefit can be solved by differential equation, the results are as following:

$$\partial E_1(U) / \partial \alpha = (-\beta F) + (1 - \beta)R = 0, \quad \beta = R / (R + F)$$

$$\partial E_2(U) / \partial \beta = \alpha(R + F - C) - (1 - \alpha)C = 0, \quad \alpha = C / (R + F)$$

So the possibility of cooperation between suppliers and centralized purchasing organizations in order to maximize their benefit is $C / (R + F)$, the possibility of supervision for supervisory agency to maximize their benefit is $R / (R + F)$.

3.2 Extend game theory

In the simple game analysis, we assumed that if supervisory agency takes the action of supervision, it can find out whether there is cooperation between suppliers and centralized purchasing organizations. But in our real life, the cooperation between them is not always found by supervisory agency. At the same time, the cooperation is determined by many conspirators. So in the extend game theory analysis, both factors are considered. The fundamental assumptions are as follows:

⊙ N is used to represent the number of conspirators of suppliers and centralized purchasing organizations. If they choose cooperation, they can achieve rent R, everyone will get R/N; if they choose noncooperation, they will none.

⊙ If supervisory agency takes the action of supervision under the presupposition of gaining adequate evidence. The way it gains evidence is interrogate to every conspirator. It can gain the evidence unless one of them confesses. The possibility of everyone confessing is P. The supervisory agency will get R if it gains the evidence of cooperation between suppliers and centralized purchasing organizations, at the same time, every conspirator will be fined F, and the one who confessed will not be fined. The cost of supervision for supervisory agency is C.

⊙ If supervisory agency doesn't supervise, it will get none.

⊙ The possibility of cooperation between suppliers and centralized purchasing organizations is α , the possibility of supervising for supervisory agency is β .

The game mode can be expressed as the following figure:

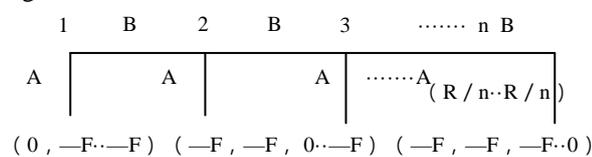


Figure 3 Extend Game Mode

The figure 3 is one part of extend game mode. The meaning is that the conspirators decide to cooperation, and supervisory agency chooses supervision. 1 in the figure 3 represents the first conspirator; 2 represents the second one; the number of conspirators is N. Every conspirator has two choices in the face of interrogation, they are A and B. A represents confession, B represents no confession. If 1 chooses B (no confession), 2 will be interrogated; if 1 chooses A (confession), the interrogation is over for supervisory agency already has evidence. If the interrogation lasts to the last one, when the last one chooses A, the conspirators' pay are (-F, -F, -F, ..., 0), when the last one people chooses B, the conspirators' pay are (R/N, R/N, R/N, ..., R/N).

According to the analysis above, the expected utility function of suppliers and centralized purchasing organizations is

$$E_1'(U) = \alpha[\beta(n-1)F * P * \sum_{i=0}^{n-1} (1-p)^i + \beta(1-p)^n * R + (1-\beta)R] ;$$

And the expected utility function of supervisory agency is

$$E_2'(U) = \beta \alpha [(n-1)F - C] * P * \sum_{i=0}^{n-1} (1-p)^i - (1-P)^n C - \beta(1-\alpha)C$$

Differential equations are as following:

$$\partial E_1'(U) / \partial \alpha = -\beta(n-1)F * P * \sum_{i=0}^{n-1} (1-p)^i + \beta(1-p)^n * R + (1-\beta)R = 0 ;$$

$$\partial E_2'(U) / \partial \beta = \alpha [(n-1)F - C] * P * \sum_{i=0}^{n-1} (1-p)^i - (1-P)^n C - (1-\alpha)C = 0 ;$$

So the possibility of cooperation between suppliers and centralized purchasing organizations in order to maximize their benefit is

$$\alpha = C / [(n-1)F - C] * P * \sum_{i=0}^{n-1} (1-p)^i + C [1 - (1-P)^n] ;$$

The possibility of supervision for supervisory agency to maximize their benefit is

$$\beta = R / [(n-1)F * P * \sum_{i=0}^{n-1} (1-p)^i + R [1 - (1-P)^n] .$$

3.3 Conclusion

According to the simple game mode analysis and extend game mode analysis, there are four conclusions:

⊙ The more benefit for cooperation between suppliers and centralized purchasing organizations, the higher possibility of supervision for supervisory agency;

⊙ The more penalties for between suppliers and centralized purchasing organizations, the less possibility of supervision for supervisory agency;

⊙ The more cost for supervisory agency to supervise, the higher possibility of cooperation between suppliers and centralized purchasing organizations;

⊙ The possibility of cooperation between suppliers and centralized purchasing organizations and the possibility of supervising for supervisory agency is related to the number of conspirators and the possibility of confession.

These conclusions are consistent with the reality. More penalties will lead to more cost and risks for suppliers and centralized purchasing organizations. The more cost for supervisory agency to supervise, higher possibility for supervisory agency to cooperate.

4. Policy proposals on eliminating rent-seeking in government Procurement

There are four policy proposals that base on the result of above analysis:

① Accelerate the pace of development of the market economy. Market economy in the allocation of resources plays a fundamental role. The intention of establish centralizing purchasing system is to raise the efficiency of government procurement. But our country's market economy system still lies in a stage that needs to perfect further. So government procurement may become a way to gain benefit. In order to eliminate rent-seeking in government procurement, fundamentally the development of market economy is a good way.

② Enhance supervision and enforce punishment. We are informed from the above analysis, if the possibility of supervision and punishment are high; the rent-seeking is low natural. There are two aspects about supervision: ① enhances the regulation of purchasing information, such as: project bid materials 、 notice pasted up by supervisory agency. If that information is not true, the government procurement is not justice. ② enhance the supervision of related departments. The related departments include the end user of goods, Centralized purchasing organizations, Settlement center and Suppliers. This can reduce the cost of supervisory agency.

③ Perfect relative law and regulations. Make sure the law and regulations are based on the present situation, and ensure the feasibility of those rules; making

responsibility clear; specifying the scope of government procurement; defining the judging standard.

④ Strengthen the propaganda of government procurement, improve the quality of staff. Strengthen the professional ethics construction and the sense of responsibility of staff in relative department. The power of public is huge. Strengthen social community to be opposite of government procurement, not only reducing the cost of supervisory agency, but also promote fairness.

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References

- [1] CHEN Hui-ru, Game Analysis of the Rent-seeking in Government Procurement, Journal of Tianshui College of Administration, 1 (2009)76-79.
- [2] Tao Xue, Problem and Proposals in Government Procurement, Economic Research Guide, 34 (2010) 105-106.
- [3] Bai Bin, The Behavior of Rent-Seeking in the Government Procurement of Our Country and How to Prevent, San Xi University, 2008.