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Research on Hidden Risks in International Project

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Abstract: Base on China's business of foreign contract projects and the contractor's failure to foresee the risks in bidding which causes great loss. This paper presents the concept of hidden risks in international contracting projects, establishes the implicit risks evolution model based on the evolutionary game theory, analyzes the hidden risks of transferring system and gives proposals to avoid the hidden risks in international project.

Key words: Risks, transferring system, evolution model

FOREWORD

During the first quarter of 2013, China's business of foreign contract projects has maintained a good trend of development, foreign contract projects of enterprises home has signed contracts as far as $1.038 trillion and the accumulated turnover is $680.8 billion.

Since, the time of "11th Five-year Plan", the number of foreign contract projects of Chinese enterprises has increased 30% or more annually, whether for new contracts or for realizing plans.

It is forecasted that in the next few years the scale of global foreign direct investment will remain at $1.4 trillion to $1.6 trillion. The size of the global infrastructure construction in 2020 will reach $12.7 trillion. There is great opportunity in future development for Chinese construction enterprises.

With China's foreign contract industry blooming, we should also notice that the new trend of risks transferred in international construction market. The number of contract projects are becoming bigger and bigger (Lei, 2013).

Last year, according to the statistics of China International Contractors Association, 80% of the overseas investment of Chinese enterprises in contract bidding projects was types of Design-Bid-Build Model and the "turn-key" project. The owners don't want to take on too much risk, or to pay high fees for the risks. Therefore, the way the owners transfer risks to the contractors is more and more hidden. It often happens that the contractors have suffered significant losses before they realize the existence of risks.

STUDY ON HIDDEN RISKS IN INTERNATIONAL ENGINEERING PROJECTS

Concept of hidden risks in International engineering projects: Risks in international engineering projects can be divided into dominant risks and hidden risks by the way they are transferred. Dominant risks refer to the risks expressed evidently in the contract signed by two sides. While hidden risks refer to content that the owner signs in the bidding document, requiring the contractor make his own decisions while bidding, for example, the contractor should make a decision whether to do or not to do something according to the site situation; another example is that the contractor should decide the coefficients in price adjustment formula; etc., In the decision-making process, contractors often make wrong or inappropriate decisions for the concealment of the risks, leading to the happening of losses.

Game theory of transferring hidden risks in international engineering projects: Evolutionary game theory think that bounded rational agents can't correctly calculate their maximum benefit and have limited ability to make the best decision. Decision makers often finally achieve a stable equilibrium state by trial and error and imitating higher income strategies.

The complexity of game environment and incompleteness of information determines its behavior with bounded rationality. The game is a kind of evolutionary game between them. In most cases, each participant adjusts his decision by learning to imitate the other subjects.

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Game model of transferring hidden risks in international engineering projects (Zhang and Huang, 2010): Both sides of hidden risks game in international engineering projects: The owner and the contractor. Both of them have bounded rationality.

Behavioral

Strategies: $S_E = \{S_1, S_2\}$, $S_g = \{S_3, S_4\}$
S_1: The contractor has hidden risks.
S_2: The contractor does not have hidden risks.
S_3: The owner monitors the hidden risks of the contractor.
S_4: The owner does not monitor the hidden risks of the contractor.

Proportion of behavioral strategies used: Assume that at the initial stage of the game, the proportion of contractor selection S_1 is x, selection S is (1×x), the probability of the owner to choose S_3 is y, to choose S_4 is (1-y).

Basic assumptions: First, T indicates the return gained from the presence of hidden risks (That is, the contractor gets additional benefit for the existence of hidden risks). Then, T = 0 when the conditions are certain; C is the monitoring cost of hidden risks, F is the loss the contractor may suffer when there are hidden risks; T, C and F are all over 0. Sec, there is no other significant factor for the contractor and the owner in the game. The matrix structure of the game is shown in the following Table1.

The meaning of each benefit paid in the matrix:

- When there are hidden risks and the owner monitors risks, the contractor not only loses the chance to get T but also pays for the compensation F. The owner not only gets back T which he should have paid but also get F the compensation from the contractor, while he must pay the cost of monitoring C. Therefore, the benefit or pay of the contractor and the owner are, respectively-T-F and T+F-C
- When the contractor has no benefit from hidden risks or monitoring of the owner, the contractor need not pay the compensation. Therefore, the benefit or pay of the contractor and the owner are, respectively-T and T-Cs
- When the contractor has no benefit from hidden risks and no monitoring of the owner, the owner does not need to pay the cost of monitoring but can get compensation T. Therefore, the benefit or pay of the contractor and the owner are, respectively-T and T

Table1: Benefit matrix of evolution game with hidden risks

Owner/contractor	Monitor hidden risks Y	Not monitor hidden risks
Benefit in hidden risks	X(-T-F,T+F-C)	(00)
No benefit in hidden risks	(-T;T-C)	(-T;T)

- When the owner does not monitor, the benefit or pay of the contractor and the owner are both 0

Analysis of game transferring hidden risks in international engineering projects: The following Model solution can be achieved based on the above assumptions and model analysis:

When there is hidden risks for the contractor, his expected return is:

$$E_1 = y(-T-F)+(1-y)$$

When there is no hidden risks for the contractor, his expected return is:

$$E_2 = y(-T)+(1-y)(-T)$$

So, the average expected return of the contractor is:

$$E = xE_1+(1-x)E_2$$

Similarly, when the owner carries out hidden risks monitoring strategy, the expected return of the owner is:

$$G_3 = x(T+F-C)+(1-x)(T-C)$$

when the owner does not carry out hidden risks monitoring strategy, the expected return of the owner is:

$$G_4 = x\times0+(1-x)T$$

Therefore, the average expected return of the owner is:

$$G = yG_3+(1-y)G_4$$

To sum up, the risks in international engineering construction are often hidden. The hidden property results from that the bidder tends to have this wrong belief: Since formula of price adjustment has been included in the contract, the owner should pay the cost of market price increase. These seemingly reasonable terms actually diverted the attention of the bidder. It may cause mistakes in decision-making of the bidder and results in the increase value much less than the actual cost, or even price lower while adjusting contract prices.

In tender documents, many owners in international engineering projects put in benchmark price index, price adjustment portion, price adjustment coefficient and rate selection table. Owners also provide advised scope and values for contractors to select freely while making decisions. Such way of giving decision-making power to contractors transfers a large part of risks in price increases to the contractor very covertly.

AVERSION OF HIDDEN RISKS IN INTERNATIONAL ENGINEERING PROJECTS

The main character of hidden risks transferring is that the owner shifts risks by utilizing the contractor's mistakes in making decision. If the contractor can identify the risks and manage them properly, they can decrease these risks, or even completely avoid them. But to properly manage the hidden risks, the contractor needs to do a lot of hard basic work.

For the hidden risks with fuzzy scope in contract, perfect risks management system should be established to manage these risks. Management ability of risks managers should be improved to avoid risks by constantly summing up experiences and lessons in project before.

For the hidden risks in contract price adjustment, there should be certain people in the risks management institutions, responsible for long-term following of the various factors affecting the price and exchange rate fluctuations, such as national economic conditions, political system and inflation. Dynamic management and warning mechanism of price and exchange rate should be set up, to avoid risks and create economic benefits for the company. The following factors should be considered.

Improve the parameter F: F is the compensation the contractor should make to the owner for the loss caused by hidden risks. Improving the parameter F can help the contractor be careful in bidding and develop more scientific and reasonable bidding strategies. This transferring strategy of hidden risks is that the owner requires the bidder give a reasonable explanation based on their own understanding of the bidding documents and take responsibility for the consequences caused by wrong explanation.

Decrease the parameter C: C is the risks monitoring cost of the owner. It includes cost in human, financial and material aspects for risks monitoring, such as consulting fees, absence cost and transportation fees. For the contractor, the probability of having benefit for hidden risks is proportional with monitoring cost; that is, C larger, the probability of having benefit is greater for hidden risks; C smaller, it is good for the owner to monitor risks more actively in the process of the project.

Pay attention to the parameter T: T is the hidden return when the contractor has hidden risks and the probability of hidden risks return for the contractor is inversely proportional with the cost of hidden risks. Attention should be paid to the parameter T and corresponding transferring system should be set up for different risks (Lv *et al.*, 2007).

Multiple currency quotation: When possible, multi-currency quotes should be tried to use; owners are required to pay various foreign currency based on the type and amount actually needed; then the exchange risks can be largely decreased (Huang, 2002).

SUMMARY

In international project contract, only when the risks are identified and risks data are collected, sorted and counted, risks can be effectively managed. Since there are all kinds of hidden risks in bidding documents, they are very difficult to be identified, therefore, the ability of risks managers to identify risks face more challenges.

Hidden risks in international engineering projects are analyzed with evolutionary game model which results in that right decisions are made in a very short tender period and the construction projects are managed effectively.

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