The Moral Hazards of Construction Agents from an Income Perspective

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Abstract: As the agent in the principal-agent relationship, a construction agent may have information advantages to pursue income maximization, which may lead to moral hazards and reduce the efficiency of government investments. In alignment with the principal-agent theory of economics, this study recognized risk problems such as rent-seeking, sluggishness and conspiracy during the process of building government-based projects and analyzed relevant regulations regarding income and components of a construction agent in regards to the issued management methods of the agent-construction system. This study also analyzed the risk factors by establishing the construction agent’s income patterns. Furthermore, this study provided corresponding measures to prevent moral hazards of construction agents.

Keywords: Construction agent, moral hazard, principal-agent theory, income pattern

1 INTRODUCTION

Since the Decision of the State Council on Reforming the Investment System was issued in 2004, the agent-construction system has become an important mode to implement and manage non-commercial government investment projects in China. After using the units proposed by this system and following its requirements for projects, the investment department has managed project investments, which were designed and constructed by bidding, entrusted to specialized project management units such as the construction agent and delivered upon final acceptance of construction. The agent-construction system, as an institutional innovation of non-commercial government investment projects management in China, effectively solved problems related to insufficient cost controls, poor management, and rent-seeking behaviors caused by the “quaternity” of investments, construction, management and use (Wu et al. 2013).

The agent-construction system refers to the principal-agent relationship between government agent investors and construction enterprises. Due to differing objectives and asymmetric information, a construction agent may act against government bailers, which will result in moral hazards and adversely impact the efficiency of projects. Actually professional knowledge, management experience, and levels of effort are universal methods to maximize construction enterprises’ profits (Xie 2014). Based on these concerns, this study recognized and analyzed possible moral hazards of the construction agent during the construction process by analyzing the income composition and presenting corresponding countermeasures and suggestions to provide options for the competent government department to improve risk management and maximize the benefits of agent-construction projects.

2 LITERATURE REVIEW

Since implement of the agent-construction system, Chinese provinces have explored available options according to their own situations and formed differing agent-construction patterns. A number of studies have been conducted by scholars. Li (2011) analyzed various agent-construction forms according to different operating approaches of the agent-construction system and he provided agent-construction patterns that includes government, middle and market mode. According to the working range of a construction agent, the agent-construction system separated into whole-process agent-construction and two-stage agent-construction. This study primarily analyzed non-commercial government investment projects by adopting the whole-process agent-construction pattern under the market agent-construction mode.

The charging standard of the construction agent is unclear in the reforming documents issued by China.

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Therefore, the regional government implements agent-construction projects primarily relying on the Trial Method of the Construction Project Management issued by the primary Construction Ministry in 2004 and the Instruction of the Finance Ministry about Strengthening the Agent-construction System Financial Management Problems of the Government Investment Projects issued by the Finance Ministry. The agent-construction fee is generally is no greater than the “management fee of the construction enterprise”. However, due to the different compositions of the agent-construction fee and the management fee of the construction enterprise, as demonstrated in Table 1, it is not reasonable that the management fee of the construction enterprise should be used as a standard to determine the agent-construction fee.

The construction agent is the economic component in this relationship that receives income as its primary purpose in the agent-construction market. The composition and charging standards of the agent-construction fee have been studied by numerous scholars. For instance, Shen and Lu (2007) analyzed charging methods of the agent-construction management fee from the organizational economics perspective. Gao (2013) explored the changes in the agent-construction fee by adopting the system dynamics model. By comparing the charging standards of the agent-construction system at home and abroad, Sui analyzed reasons for adopting the unreasonable agent-construction charging standard and suggested reforming the agent-construction charging standard (Sui 2009). Although some scholars have noted shortages in the composition of the agent-construction fee and the charging standard, relevant laws and regulations have failed to make any adjustments.

According to the principal-agent theory, upon signing a contract, the agent, for its own sake, will hide certain actions and information that cannot be verified by the principal, resulting in moral hazard. Dai et al. (2010) conducted a multiple-case study and identified key risk factors of agent-construction projects and suggested relevant measures to reduce risks. Based on the KMRW (Kreps-Milgrom-Roberts-Wilson) model, Li (2010) established a moral hazard model to reduce the irregularities of the regulators for the agent-construction system. Guo and Yao (2014) using the prospect theory, analyzed mental motivations, risk preferences and risk formation regarding moral hazards of the construction agent and suggested building an alliance of construction agents based on the conceptual model of moral hazard mechanisms for government investment agent-construction projects. Guo and Yao (2014) adopted the game theory method to establish a game model between the principal and agent for agent-construction projects and suggested policies and suggestions to prevent moral hazards in agent-construction projects.

Among the existing studies regarding moral hazards related to the construction agent, some scholars have analyzed the income of the construction agent; however, this research primarily referred to only one type of moral hazard, such as the risk of a construction agent that does not work diligently. The whole-process agent-construction and the two-stage agent-construction were not clearly defined in studies that analyzed moral hazards and caused the imprecise results. Based on the income model of the construction agent, this study conducted a detailed analysis of various factors that trigger moral hazards related to the construction agent during whole-process agent-construction.

### Table 1. Composition of the agent-construction fee and management fee of the construction enterprise

<table>
<thead>
<tr>
<th>Content</th>
<th>The agent-construction fee</th>
<th>The management fee of the construction enterprise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Included phases</td>
<td>Project proposal approval through project handover</td>
<td>Project planning and project completion</td>
</tr>
<tr>
<td>Primary components</td>
<td>Administrative expenses, management fee, and corporate profits</td>
<td>Administrative expenses</td>
</tr>
<tr>
<td>Performance bond</td>
<td>5%-30% of the total investment</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Payable taxes</td>
<td>Taxes paid by enterprise according to law</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Risk-taking</td>
<td>Bearing responsibility of project cost overruns, schedule delays, and quality defects</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

For non-commercial government investment projects, the government department first issues the project requirements and submits a project proposal to the investment department of government, which decides if the agent-construction system will be adopted according to the characteristics of the proposed construction project. For projects that have already been established by implementing the agent-construction system, the government department selects appropriate construction agents by using a bidding process. According to the project proposal, the construction agent conducts feasibility research and analysis, investigation, preliminary design, construction drawing design, construction implementation and completion acceptance.

China’s provincial and municipal governments have promulgated a number of regulations of agent-construction system. The regulations include the basic fee of the product between the project budget and the agent-construction management fee, an incentive fee of the product between the investment surplus and share rate. The agent-construction rate and the share rate of the investment surplus of certain provinces and cities are provided in Table 2.
Because of asymmetric information and imperfections in relevant laws and regulations, construction agents seek the maximum benefits, which may result in the loss of state property.

### 3.1 Rent-Seeking Risk

According to specifications of the agent-construction system issued by various provinces and cities, the definite ratio of the agent-construction management fee paid by the construction agent is determined according to the scale of the agent-construction project and the working requirements of the construction agent (see Table 2). For instance, the Provincial Non-commercial Agent-construction Project Management Approach Invested by the Government of Guangdong Province (Trial) issued by the Guangdong Province states that the construction agent is responsible for the organizational management during the preparatory and implementation stages. It also suggests that for project budgets less than 200 million yuan, the agent-construction management fee is 2% of the total investment; for project budgets over 200 million yuan, the agent-construction management fee is charged piecewise, specifically, the charging rate 2% applies to the first 200 million yuan and 1.5% applies to the remaining. Therefore, when the agent-construction management fee is determined, the construction agent increases the agent-construction service fee by increasing the project budget.

For the whole-process agent-construction mode, the preliminary work of the construction agent includes developing the feasibility report and preliminary design, developing the project budget, and submitting these documents to the appraisal institution and the investment department of government for approval. During the process of developing the project budget, most of the preliminary fee is included; however, the fees for designing construction drawings, requisitioning and demolishing land, purchasing equipment, supervising construction and paying for labor and materials are not specified, which requires flexibility in making and approving the project budget. The construction agent possesses more information advantages than the competent departments of the government investment in regards to the project budget and may collude with the budget approval institution to increase the budget and trigger rent-seeking behavior by some officials during the budget approval process, which increases the risk of rent-seeking behavior and may result in loss of state property.

### 3.2 Sluggish Risk

In order to stimulate construction agents to engage in behavior that is more favorable to the agent-construction project during construction, the agent-construction management approach issued by all provinces and cities regulates that a certain percentage of the investment savings should be distributed to the construction agent. Most provinces and cities limit the percentage of the investment savings to between 10% and 30% as shown in Table 2. Different levels of effort result in different effort costs incurred by construction agents, and the majority of income is shared by the clients. According to the principal-agent theory, the level of effort that the construction agent exerts generally does not reach the optimal level in the presence of asymmetric information (Zhang 2004).

### 3.3 Conspiracy Risk

When a construction agent may receive only a portion of the investment savings produced by its own efforts, it may exert a low level of effort; conversely, on the premise that the project’s actual cost do not exceed the project budget, the construction agent may collude with equipment and material suppliers or the project supervisory departments to improve payoff by deliberately increasing project costs and illegally transferring funds. In addition, during practical operations, a construction agent will deliberately reduce agency costs to win the project bid, which may reduce the bid price to less than the actual project management cost. In order to make up for these losses and obtain additional profits, a construction agent may also collude with construction departments and supervisory units, which may adversely impact state interests.

### 4 MODEL BUILDING AND ANALYSIS

As previously mentioned, the income of the construction agent, $\pi$, primarily includes a basic fee based on the project budget and an incentive fee based on investment savings. If the actual cost of the construction was $R_0$ and the construction agent falsely increased it to
Rent-seeking behavior is (3)-(2)>0, and the result is $R_1-R_0>C(\Delta R)$. When the bribing cost of the construction agent is low and the risk of punishment is weak, it is more likely that the construction agent will engage in illegal behaviors to increase the agent-construction project budget.

4.2 Sluggishness Risk Analysis

According to the actual income pattern of the construction agent (1), the income of the construction agent when it exerts a high level of effort and a low level of effort, respectively, are calculated as follows:

$$\pi(e_H) = Rv_1 + (ke_H - S)v_2 + Sv_3 - C(\Delta R, e_H, S, \sigma^2)$$ (4)

$$\pi(e_L) = Rv_1 + (ke_L - S)v_2 + Sv_3 - C(\Delta R, e_L, S, \sigma^2)$$ (5)

The condition for the construction agent to engage in a high level of effort is (5)-(4)>0 and $ke_1 - S>0$:

$$v_2 > \frac{C(e_H) - C(e_L)}{ke_H - ke_L}$$ (6)

The results indicated that the higher $v_2$ becomes, the higher the likelihood that the construction agent will exert a high level of effort. However, the existing agent-construction laws and regulations include specific provisions about sharing the proportion of investment savings, and certain provinces and cities have instituted a reward upper limit. Insufficient rewards result in a decreased effort exerted by the construction agent in regards to controls for quality, schedule and investment control that may result in the sluggish risk and damage the interests of the principal.

4.3 Conspiracy Risk Analysis

According to the actual income pattern of the construction agent and under the condition that other variables remain unchanged, the income of the construction agent under conspiracy and without a conspiracy condition, respectively, are calculated as follows:

$$\pi(S) = Rv_1 + (ke_i - S)v_2 + Sv_3 - C(\Delta R, e_i, S, \sigma^2)$$ (7)

$$\pi(S = 0) = Rv_1 + (ke_i)v_2 - C(\Delta R, e_i, \sigma^2)$$ (8)

The condition for the construction agent to choose to
engage in conspiracy is \((8)-(7)>0\) and \(ke_1 - S>0\):

\[ v_3 > \frac{C(S)}{S} + v_2 \]  

The results indicated that the higher \(v_2\) becomes, the greater the likelihood that the construction agent will conspire, but the possibility of collusion between the construction agent and the construction supervision department decreases.

5 RISK PREVENTION

To maximize benefits, a construction agent may trigger moral hazards that not only increase the costs of the agent-construction project but also reduce quality and cause construction delays for the agent-construction project. This scenario conflicts with the primary purpose of implementing the agent-construction system. In order to improve efficiency of anon-commercial agent-construction project, the government should take scientific and effective measures to prevent moral hazards related to the construction agent. All types of moral hazards related to the construction agent were reviewed based on the above actual income pattern analysis of the construction agent. Moreover, the following measures are recommended:

5.1 Strengthening Budget Reviews and Approvals of Agent-Construction Projects

A project budget is extremely important in preparing, beginning, building, and managing construction projects and the final settlement of accounts. The agent-construction project budget, as the charging basis of the agent-construction management fee, should be closely examined by the government and third parties. Government department should increase the rent-seeking threshold of the construction agent and institute certain punishment mechanisms and increase the rent-seeking cost, \(C(\Delta R)\) of construction agents. In addition, the government department enhances its ability to build a clean government and examine and supervise construction agents in accordance with laws and regulations and ensure that construction agents do not engage in moral hazard behavior.

5.2 Designing Reasonable and Effective Incentive Mechanisms

The above analysis indicates that the practical agent-construction management fee in China is low and that after more than ten years (when laws and regulations regarding the agent-construction system were issued), the necessary changes have not been made. Benefits for the construction agent have been insufficient, which causes construction agents to engage in conspiracy and is not conducive to the long-term development of the agent-construction system.

In order to better motivate construction agent sand prevent moral hazards, the government should develop reasonable and effective incentive mechanisms in alignment with the investment scale and the complexity of the construction project. These incentive mechanisms should include the following aspects. The first recommendation is to reasonably increase \(v_2\) and determine a lower limit for the charging ratio because scientific and reasonable agent-construction management fees may attract more high-level project management enterprises to participate in project bidding, which is conducive to improving the management level and sound development of the agent-construction market. Furthermore, these initiatives would increase the penalty costs of construction agents and effectively prevent moral hazards such as jerry-build projects and conspiracy behavior. The second recommendation is to adjust the sharing ratio of investment savings, including classifying the investment savings and calculating the charge according to different proportions, which could increase the degree of effort exerted by the construction agent or may reduce the conspiracy risk between the construction agent and the builder. The third recommendation is to develop a dynamic adjustment mechanism that would adjust the relevant charging standard of the agent-construction management fee in the laws and regulations of the agent-construction system in order to adjust the market development by engaging in practical development.

5.3 Perfecting the Supervision of the Construction Agent

Due to the limitation of manpower, financial resources and the lack of the relevant supervision and management systems, the supervision of the agent-construction project is not clearly divided, which increases the risk of moral hazards. Perfecting the government supervision system may not only increase the moral hazard cost of the construction agent but also effectively solve the moral hazard problems related to the construction agent in agent-construction projects. The qualitative methods used in this study demonstrated the following. First, it is necessary to establish a diversified supervision strategy led by the principal. All supervisors should reasonably distribute the responsibility they assume and make specific provisions to supervise construction agents as a group. Second, a comprehensive and whole-process supervisory process is needed for the construction agent. Government supervision departments should closely supervise the project during the early-stage preparation of the project through to the completion of the project and from the approval of the project budget to the examination of the final accounts. Third, a supervisory system should be developed. Certain systems, such as budget estimate censorship, agent-construction alteration of contract systems, beyond budgeting payment censorship, accountability system and offence reporting system, should improve the supervisory system from the perspective of laws and regulations.
6 CONCLUSIONS

By analyzing the actual income patterns of the construction agent, it is apparent that due to asymmetric information during the implementation of the agent-construction system, construction agents may have increased rent-seeking, sluggish and conspiracy risks in order to maximize income. To reduce unwanted behaviors of construction agents that adversely impact the overall benefit of agent-construction projects, the government should take certain measures such as designing reasonable and effective incentive mechanisms, improving supervisory systems of the government and strengthening the development of a clean government to prevent possible moral hazards related to construction agents and ensure the success of the agent-construction system.

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