

# Game analysis on the regulation of listed companies' accounting information—gaming between Internal Audit Department and Audit Office

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**Abstract:** Through the establishment of game model, this article formulates the intuitive and experiential understanding of regulation on listed companies' accounting information by using game analysis method, and from an economic point of view, it analyzes how various parameters affect Internal Audit Department's nonfeasance probability and Auditing Office's supervision probability. Hope that this article can provide a reference for regulation on accounting information.

**Key words:** game analysis; Audit Office; Internal Audit Department; accounting information

## 1. Introduction

Twenty-ninth article of "Audit Law" provides that: company that is lawfully audited and supervised by Auditing Office, should establish a sound internal audit system in accordance with relevant regulations of the state; and its internal audit work should be guided and supervised by Auditing Office. Central enterprises, large state-owned enterprises or state-controlling enterprises and listed companies should establish an independent Internal Audit Department. Therefore, based on both sides of the regulation on listed companies' accounting information, this article regards Auditing Office as subject and listed companies' Internal Audit Department as object, and then establishes game model between them, finally uses the model to analyze and reveal the economics nature of regulation on listed company's accounting information.

## 2. The basic assumptions of game model

- (1) Listed company's Internal Audit Department and personnel is rational "economic man";
- (2) There exists inefficient Auditing Office to supervise Internal Audit Department of listed companies;
- (3) Auditing Office has two strategies: supervision and non-supervision, while listed company's Internal Audit Department has two options: action and nonfeasance.

## 3. Game model between Auditing Office and Internal Audit Department

### 3.1 The establishment of game model

From strategy combinations of the model, the model has the following four strategies: (supervision, action), (non-supervision, action), (supervision, nonfeasance), (non-supervision, nonfeasance). The corresponding payoff

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table is shown in Table 1.

**Table 1 Game table between Auditing Office and Internal Audit Department**

| Internal Audit Department<br>Auditing Office | Action( $1-\mu$ ) | Nonfeasance( $\mu$ )    |
|--|-------------------|-------------------------|
| Supervision( $\lambda$ )                     | $-K, E-C_A-M$     | $-K+J, E+C_A-C_B-J-Q+F$ |
| Non-supervision( $1-\lambda$ )               | $0, E-C_A-M$      | $-S, E+C_A-C_B+F$       |

Among them,  $K$  represents the supervision cost of Auditing Office to supervise Internal Audit Department;  $E$  represents the revenues that the Internal Audit Department can get if it operates in the normal range;  $C_A$  represents the cost that Internal Audit Department spends on regulating accounting information legally;  $M$  represents the tangible or intangible revenues that Internal Audit Department will certainly lose when it regulates accounting information legally, especially when it regulates listed company's illegal actions;  $C_B$  represents the cost that Internal Audit Department spends on nonfeasance and omitting necessary procedures;  $J$  represents Internal Audit Department's tangible loss, such as money and welfare, if its nonfeasance action was investigated and punished;  $Q$  represents internal Auditing Office's intangible loss, such as reputation, if its nonfeasance action was investigated and punished;  $F$  represents the revenues that the Internal Audit Department obtained from listed company by illegal means;  $S$  represents the negative utility to society that was caused by the Internal Audit Department's nonfeasance action;  $\lambda$  represents the supervising probability of Auditing Office ( $0 \leq \lambda \leq 1$ );  $\mu$  represents the nonfeasance probability of Internal Audit Department ( $0 \leq \mu \leq 1$ ).

### 3.2 The analysis of game model

#### 3.2.1 Optimal strategy analysis of Internal Audit Department

Given  $\lambda$ , the expected revenues of Internal Audit Department at the circumstance of action ( $\mu=0$ ) and nonfeasance ( $\mu=1$ ) are respectively shown in equation (1) and equation (2).

$$V(0, \lambda) = (E - C_A - M)\lambda + (E - C_A - M)(1 - \lambda) \quad (1)$$

$$V(1, \lambda) = (E + C_A - C_B - J - Q + F)\lambda + (E + C_A - C_B + F)(1 - \lambda) \quad (2)$$

(1)  $V(0, \lambda) = V(1, \lambda)$ , we can get  $\lambda = \frac{2C_A - C_B + M + F}{Q + J}$ , the expected revenues of action are the same as nonfeasance, and there is no differences between them.

(2)  $V(0, \lambda) < V(1, \lambda)$ , we can get  $\lambda < \frac{2C_A - C_B + M + F}{Q + J}$ , the expected revenues of action are less than nonfeasance.

In other words, when the equation is true, the optimal strategy of Internal Audit Department is nonfeasance.

(3)  $V(0, \lambda) > V(1, \lambda)$ , we can get  $\lambda > \frac{2C_A - C_B + M + F}{Q + J}$ , the expected revenues of action are more than nonfeasance. In other words, when the equation is true, the optimal strategy of Internal Audit Department is action.

From the above analysis, we can get the following explanation.

(1) When  $2C_A - C_B + M + F > Q + J$  is true, neither equation (1) nor equation (2) exists solution, besides,  $V(0, \lambda)$  is always less than  $V(1, \lambda)$ . The explanation of this solution is as follows. The optimal strategy of Internal Audit Department is nonfeasance and it undertakes certain investigated and punished risks. At the same time, the optimal strategy of Auditing Office is supervision. Therefore, the Nash equilibrium is (supervision, nonfeasance).

(2) When  $2C_A - C_B + M + F \leq Q + J$  is true, whether Internal Audit Department abuses power for personal gains or not, it is determined by the supervising probability of Auditing Office. When the supervising probability is more than  $\frac{2C_A - C_B + M + F}{Q + J}$ , the optimal strategy of Internal Audit Department is action; When the supervising

probability is less than  $\frac{2C_A - C_B + M + F}{Q + J}$ , the optimal strategy of Internal Audit Department is nonfeasance; When the supervising probability equals to  $\frac{2C_A - C_B + M + F}{Q + J}$ , the optimal strategy of Internal Audit Department is nonfeasance or action. In brief, whether Internal Audit Department acts or not, it is determined by the supervising probability of the Auditing Office.

### 3.2.2 Optimal strategy analysis of Auditing Office

Given  $\mu$ , the expected revenues of Auditing Office at the circumstance of supervision ( $\lambda = 1$ ) and non-supervision ( $\lambda = 0$ ) are respectively shown in equation (3) and equation (4).

$$V(\mu, 1) = -K(1 - \mu) + (-K + J)\mu = -K + J\mu \quad (3)$$

$$V(\mu, 0) = -\mu S \quad (4)$$

(1)  $V(\mu, 1) = V(\mu, 0)$ , we can get  $\mu = \frac{K}{J + S}$ , the expected revenues of supervision are the same as non-supervision, and there is no differences between them.

(2)  $V(\mu, 1) > V(\mu, 0)$ , we can get  $\mu > \frac{K}{J + S}$ , the expected revenues of supervision are more than non-supervision. In other words, when the nonfeasance probability of Internal Audit Department is more than  $\frac{K}{J + S}$ , the optimal strategy of Auditing Office is supervision.

(3)  $V(\mu, 1) < V(\mu, 0)$ , we can get  $\mu < \frac{K}{J + S}$ , the expected revenues of supervision are less than non-supervision. In other words, when the nonfeasance probability of Internal Audit Department is less than  $\frac{K}{J + S}$ , the optimal strategy of Auditing Office is non-supervision.

### 3.2.3 Mixed strategies and Nash equilibrium

$$\lambda = \frac{2C_A - C_B + M + F}{Q + J} \quad (5)$$

$$\mu = \frac{K}{J + S} \quad (6)$$

That is  $(\lambda, \mu) = (\frac{2C_A - C_B + M + F}{Q + J}, \frac{K}{J + S})$ . In other words, when internal audit department thinks that the supervising probability of Auditing Office is  $\frac{2C_A - C_B + M + F}{Q + J}$ , the probability it selects nonfeasance is  $\frac{K}{J + S}$ ; conversely, when Auditing Office thinks that the nonfeasance probability of Internal Audit Department is  $\frac{K}{J + S}$ , its optimal supervising level is  $\frac{2C_A - C_B + M + F}{Q + J}$ .

## 4. Conclusions

Through the establishment of game model between Auditing Office and Internal Audit Department, and by analyzing the Nash equilibrium of the model, we can draw a conclusion that the nonfeasance probability of Internal Audit Department is proportional to the supervision cost ( $K$ ) of Auditing Office and it is inversely proportional to the tangible loss and the negative utility to society ( $J + S$ ); the supervising probability of Auditing Office is proportional to  $(2C_A - C_B + M + F)$  and it is inversely proportional to Internal Audit Department's tangible and intangible loss ( $J + Q$ ) if its nonfeasance action was investigated and punished.

### References:

- QIN Rong-sheng. (2006). Revising review on audit law. *Audit Research*.  
 WU Hao. (2007). *Game analysis on accounting information distortion of listed companies*. Market modernization.  
 ZHANG Wei-ying. (1996). *Game theory and information economics*. Shanghai People's Press.

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