

The Research of Financial Fraud and Regulatory Countermeasures to the Listed Companies Based on Game Theory

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Abstract: Accounting Fraud, as immoral behavior which violates the law, may cause severe damage to economic and market trust. The listed companies may acquire short term benefits through accounting fraud; therefore, the government regulatory authority should set up severer policy to prevent and avoid this behavior from happening. This review article aims to analyze the existing problem of accounting fraud, games between listed companies and regulatory authorities based on game theory, and the mechanism that caused accounting fraud to happen. The articles have found that the behavior of accounting fraud may confuse the investors by its invalid financial report, which often results in wrong investment decisions. If the accounting fraud has been revealed and known by the public, the listed company's share price will plummet, overall market confidence will suffer, and the entire economic system and financial stability will also be affected. By damaging the financial stability and decreasing the overall investments, accounting fraud handicaps economic growth by its possible consequence of decreasing the economic activity, capital expenditures, and the employment opportunities. However, the game theory research on the games between listed companies and regulatory authorities may offer supervisory measures to reduce and prevent the occurrence of financial fraud.

Keywords: game theory, listed company, financial fraud, supervisory measurement

1. Introduction

Accounting fraud refers to the behavior of a company intentionally altering its financial statements by inflating profits to mislead the public and the relatives in the market with the aim of fabricating a deceitful facade of a company's financial health. Engaging in such conduct not only disregards ethical and legal standards, but also deceives the market, leading to severe harm to the financial well-being of investors. According to Zhengwei Long, ever since the establishment of Shanghai Stock Exchange back on November 26, 1990, the Chinese stock market has been aroused with an incessant stream of financial fraud scandals involving listed companies. These scandalous affairs have garnered significant attention from various sectors of society, igniting a sense of widespread concern. Both the academic and political realms have placed considerable emphasis on the management and control of such deceitful practices [1]. In recent years, there has been a noticeable surge in incidents involving

financial fraud committed by companies listed on the market. A prime example of this would be the recent punishment faced by Xiong'an New Power Technology Co., Ltd. which once again thrust the matter of financial fraud into the limelight. Since 2017, Xiong'an New Power Technology Co., Ltd. has been engaging in some rather questionable practices. They have been constantly changing the dates of their project, signing reports, and manipulating their financial profit income, a whopping 21 times to be exact. All of this has been done with one goal in mind - to inflate their annual profits and reduce the losses recorded in their books. In 2016, the profit attributable to their parent company was a staggering -292 million yuan, and it somehow managed to get even worse in 2018, with a profit of -475 million yuan. The China Securities Regulatory Commission found that the company's 2017 total profit reported was adjusted from 10.67 million yuan to a mere 3.49 million yuan. This raises serious concerns about the accuracy and integrity of their financial reporting. This news has had a major impact on Xiong'an New Power Technology Co., Ltd.'s stock price, which dropped by a staggering 7.6% just two days after the announcement was made. The consequences of their actions are not only limited to economic losses for the public, but it has also caused significant damage to market confidence. It's a situation that calls for immediate attention and action [2]. As the global economy thrives and the financial market grows increasingly intricately, the issue of financial fraud within businesses escalates, presenting an urgent global quandary in dire need of resolution [3]. Hence, it holds immense value both in theory and practice to conduct thorough investigations into the motivations and control techniques employed by publicly traded companies engaging in financial misconduct. Such research not only bears practical significance for the flourishing progress of the Chinese economy, but also possesses great potential for shedding light on effective monitoring approaches through the lens of game theory. The aim is to offer valuable insights and tailored solutions to combat financial fraud. Furthermore, this article is dedicated to enhancing corporate governance, mitigating financial hazards, and bolstering market equilibrium and openness.

2. The Motivation of Accounting Fraud

Due to the intense rivalry among businesses in the industry, listed companies generally have a higher economic profit tendency. When regulatory bodies lack robust oversight, this inclination towards financial deceit becomes more probable for the listed companies, fueled by unethical behavior of financial managers and company executives, and vice versa. Consequently, this paper identifies six underlying causes that drive listed companies to partake in fraudulent financial activities.

1) The Intensity of market and profit growth

Yuan Fang believes that to fulfill the market and investors' desire for substantial profit growth, companies enlisted on the stock exchange might resort to deceitful financial practices to artificially boost their earnings and overall performance. Such deceptive maneuvers can create an illusion of enhanced allure, enticing a greater number of investors and financial resources, consequently leading to an upsurge in both stock prices and market valuation [4].

2) Performance Rewards and Reward Mechanism

According to Yan Huang, the executives and management of listed companies are usually motivated by the performance reward mechanism, in which their wages and bonuses are often linked to the company's fiscal and stock market achievements. In their relentless pursuit of greater rewards, these executives may resort to engaging in deceitful financial misconduct, fabricating performance figures and inflating profits [5].

3) Debt and Reputation

Burgstahler and Dichev believe that there is a possibility that certain publicly traded corporations could find themselves burdened by substantial debts. To safeguard their standing and prevent potential consequences such as debt defaults or credit rating downgrades, these companies might opt for engaging in fraudulent financial activities to obscure their actual financial condition [6].

4) The Share Holders' Expectations

Ryan is of the opinion that certain significant stakeholders might possess a higher expectation of the company's achievements and insist on substantial profits. To fulfill these stakeholders' demands, corporations may potentially engage in acts of financial deceit to enhance the appearance of their financial reports and satisfy the shareholders [7].

5) The Market Share

Yuan Fang holds the viewpoint that the listed companies harbor a reluctance for investors to cast doubt upon their business and prospects. They aim to safeguard their competitive standing within the market. To achieve this, companies might resort to using deceptive information and manipulated financial data to bolster their public image [4].

6) The Tension arose from the market

Dongwu Niu asserts that the listed companies face continuous supervision and evaluation from the capital market. He suggests that instances of financial fraud may occur to conceal the actual state of the company's operations to prevent the potential withdrawal of investments by interested parties [8].

3. The Reference of Game and Model

Assumptions:

1. Regulatory agencies (regulators): The regulatory agencies in this model aim to prevent and discover financial fraud in listed companies and maintain market stability and investor rights. The goal of regulators is to minimize the occurrence of financial fraud while avoiding unnecessary costs to compliant public companies.

2. Listed companies (supervised): Listed companies pursue the maximization of their margin profit, and may use financial fraud to falsely report profits, assets, and income to attract potential investors, increase stock prices, and market share.

Game Model:

C: The decision of the listed company to choose to engage in financial fraud (0 means no fraud, 1 means fraud).

R: The decision of the regulator to choose a regulatory measure (0 means light regulation, 1 means severe regulation).

Parameter Settings:

$A > 0$, indicating the company's benefit from financial fraud.

$B > A > 0$, denoting the cost to regulators of detecting fraud.

Table 1: The game matrix between the government regulatory department and the financial department of listed companies.

	R=0(light regulation)	R=1(severe regulation)
C=0(no fraud)	(0,0)	(0, -B)
C=1(fraud)	(A-C <u>cost</u> , -C <u>gain</u>)	(-B+R <u>cost</u> , -A)

Within:

1. C_gain represents the benefit that the listed company obtains from financial fraud.

2. C_cost represents the strategy adjustment cost that the listed company may bring due to financial fraud.

3. R_cost represents the cost of strict supervision by regulators.

In this game matrix, the interests (utilities) of listed companies are calculated through financial fraud decision C and regulatory decision R. The interest of the regulator is the opposite number of the profit of the listed company minus the supervision cost of the regulator, because the interests of the two are opposite to each other.

Moves:

1. Regulatory agencies: Regulatory agencies can take regulatory measures, such as strengthening financial audits, raising disclosure requirements, and increasing penalties, to reduce the possibility of financial fraud.

2. Listed companies: Listed companies can choose whether to engage in financial fraud to obtain short-term benefits but face the risk of penalties and be held accountable by regulatory agencies.

Benefits and Costs:

1. Regulatory agencies: The benefits of regulatory agencies are maintaining market stability and investor confidence, but at the same time, they also need to cover the resources to implement regulatory measures, including audit costs and labor costs.

2. Listed companies: Listed companies may obtain short-term profits and stock price surge through financial fraud, but once discovered, they will face huge legal liabilities and reputation losses.

Consequences and Profit:

1. If the regulatory agencies take severe regulation measures, such as strengthening financial audits, raising disclosure requirements, and increasing penalties, the listed companies may be awarded, therefore the possibility of financial fraud can be reduced, and the market stability could also be maintained.

2. If the regulatory agencies adopt light regulation measures or they could not effectively discover financial fraud, listed companies may have greater incentives to engage in financial fraud to obtain short-term benefits.

3. If the financial fraud of a listed company is not discovered by the regulatory agency in time, it may bring profits in the short term, but once it is discovered, it will face serious penalties, including legal sanctions and reputation losses.

The “Best” move

In the game matrix of listed companies and the regulatory agencies, a Nash equilibrium strategy combination is in which neither listed companies nor regulators can change their strategies to increase their utility. In other words, in a Nash equilibrium, each player’s strategy is the best choice, and considering that the others’ strategies unchanged.

In this game model, the Nash equilibrium is achieved when listed companies choose no fraud ($C=0$), and regulators choose severe regulation ($R=1$). This is the best-case scenario when the regulatory agencies take severe regulation ($R=1$) no matter which decision the listed company will choose: ($C=0$ or $C=1$). The listed companies will never benefit from taking financial fraud, therefore choosing ($C=0$) not to fraud is the best optimal strategy for them.

Moreover, if the regulator strictly decided to choose severe regulation ($R=1$) no matter what the listed companies’ choices are, the possibility that the listed companies choose to fraud will also be significantly minimized.

To summarize, in this Nash equilibrium, listed companies cannot increase their utility by changing their strategies between ($C=0$ or $C=1$), because financial fraud will no longer bring benefits to it. Meanwhile, the regulatory agencies cannot increase its utility as well, since it has adopted the most severe strategy, and the possibility of financial fraud has been prominently decreased.

4. Suggestions on Regulatory Measures

1) It is imperative to reinforce the oversight of the government in external matters, while simultaneously urging listed companies to enhance their internal governance mechanisms. In addition, there should be a concerted effort to bolster the independence of third-party external audits, while also effectively managing the costs associated with regulators’ supervision. Such measures are crucial in safeguarding the interests of all participants within the market [9].

2) According to the Nash equilibrium of the game between the regulatory agencies and the listed company upon, the regulatory agencies can increase the penalties. If the regulatory department finds that the fine of the financial fraud does not exceed the cost B of the regulatory department's implementation of supervision, then the regulatory department will not impose penalties. At the same time, if the listed company finds that when the financial fraud is punished and the loss is less than the profit brought by the financial fraud, the possibility of financial fraud in the listed company will increase [1]. Regarding the cost of supervision by the regulatory authorities, there are two optimal suggestions. a. To increase the enthusiasm of the supervisory department to make penalties, the cost C of implementing supervision can be covered by the government so that the cost can be less or equal than to the fine F of listed companies for financial fraud, and even the personnel or groups that discover the possibility of financial fraud can be imposed a bonus mechanism is provided for incentives. b. Increase the punishment of financial fraud by the regulatory authorities so that F is greater than or equal to the cost C . Then listed companies will not commit financial fraud and other illegal acts out of consideration for their own interests and losses. All in all, under the ideal situation where costs can be amortized, regulatory agencies should strictly adopt strict regulatory strategies so that listed companies will not bring any benefits by taking their financial fraud strategies or non-fraud strategies, to ultimately minimize the possibility of financial fraud.

3) The relevant: Improving the ethical standards in accounting and shareholder practices remains a crucial objective. It is imperative for those listed publicly to take responsibility for enhancing their internal monitoring and oversight systems. One effective approach is to implement stringent internal disciplinary measures to deter any instances of financial fraud. Simultaneously, the board of directors should also formulate appropriate measures to prevent shareholders from engaging in unlawful manipulation of accounting records, thus mitigating the risk of financial fraud and other illegal activities. To further bolster moral standards, shareholders with questionable integrity should face proactive measures and sanctions. Audit institutions also have a critical role to play by overseeing the conduct of their internal auditors, ensuring they do not engage in improper collaborations with listed companies or form unethical business partnerships. These measures are essential for upholding professional ethics and safeguarding the integrity of the auditing profession [9].

4) Regulators ought to contemplate adopting a stance of strategic equilibrium when it comes to dealing with publicly traded companies. In the event that such companies engage in deceptive financial practices, it is imperative for regulators to ensure that they are capable to employ corresponding and stringent supervisory measures, thereby ensuring a system of checks and balances. This can be accomplished by means of a flexible regulatory framework, thereby enabling regulators to adapt their strategies in response to market needs and the conduct of listed companies. Drawing inspiration from the principles of game theory, regulators must display adaptability and capacity to modify their regulatory approaches in accordance with prevailing market circumstances as well as the actions of listed companies. Consequently, regulatory bodies must maintain a constant awareness of the market and promptly adjust their regulatory endeavors to effectively address potential instances of financial fraud.

5) Cooperation and negotiation take center stage in game theory, highlighting their crucial significance. The harmonious collaboration between regulators and listed companies presents a remarkable opportunity for both parties to attain mutual benefits. By joining forces, regulators can extend their support to listed companies, offering them valuable training and guidance. This proactive assistance aids in the establishment of robust internal control mechanisms, effectively diminishing the likelihood of financial fraud occurrences.

5. Conclusion

Through the lens of game theory, this paper conducted an extensive analysis of the financial fraud exhibited by publicly traded corporations and formulated a set of recommendations from a regulatory standpoint. These suggestions, rooted in the principles of game theory, seek to establish a harmonious equilibrium between regulatory authorities and listed companies. Their ultimate objective is to minimize the likelihood of financial fraud and foster a thriving marketplace.

The authors believed that in the application of game theory concepts to regulatory practices. This approach enables this paper to gain a deeper understanding of the incentives and actions of all stakeholders, thus providing invaluable support for the formulation of more efficacious regulatory strategies. It is only through the collective efforts of regulators, listed companies, and investors that individuals can establish a preferable market characterized by integrity, transparency, and stability. This, in turn, will pave the way for more sustained future economic development.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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