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The Influence of ESG Reporting on Competitive Dynamics in Business: Insights from a Game Theoretical Approach

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Abstract: As the basis of ESG rating, ESG information disclosure has gradually moved from a niche investment concept to a mainstream trend in recent years, which plays a key role in the ESG investment process. However, many enterprises still choose not to disclose relevant information for reasons such as controlling costs and reducing negative information output. For enterprises in the same industry with competitive relations, different choices made by both parties may bring about impacts on enterprise competitiveness, financing cost, strategic transformation, and regulation and policy formulation. This paper, from the perspective of enterprises and their competitors in the same industry, uses the game theory model to put forward suggestions for improving enterprises' strategic choices. By establishing a game model to promote the establishment or improvement of ESG management systems within enterprises, enterprises can seek the balance between cooperation and competition in the game, and finally achieve the overall sustainable development in their respective industries.

Keywords: ESG information disclosure, Enterprise competition, The Prisoner's dilemma, Nash equilibrium

1. Introduction

Environmental, Social, and Governance (ESG) is the cornerstone of green investment and the cornerstone of socially responsible investing. It stands for environmental preservation, social responsibility, and corporate governance in the investment process. Traditional investing strategies struggle to provide investors with steady, long-term profits. As a result, adding an ESG assessment system to the scope of the research during the investment decision-making process can significantly lower investment risks and increase future returns [1].

China's relevant norms and policies on ESG information disclosure are mainly implemented by the government, exchanges, and financial regulators. From 2017 to 2021, the number of listed companies issuing social responsibility reports in China has shown an increasing trend year by year. According to the data sorted out by the green governance database of Nankai University, 1,366 listed companies in China have published 2021 ESG information disclosure reports. It accounts for 29.42% of all listed companies, an increase of 2.52% over 2020. On the whole, some companies have rich experience in releasing ESG-related reports, and ESG disclosure is being further standardized and comprehensive.

Nonetheless, there are still gaps when compared to industrialized nations. For example, the United States requires the publication of ESG information to increase oversight of listed firms' social and environmental responsibility; GRI, SARSB, and ISO26000 are the primary disclosure standards. The European Union strengthened the disclosure of ESG information to reduce the risk to investors caused by listed companies' neglect of environmental and social factors. Hong Kong, China requires listed companies to disclose ESG information to provide more real and effective information to the capital market, so that investors can make an accurate assessment of listed companies, but this data is still lower than that disclosed by companies in other developed countries and regions [2].

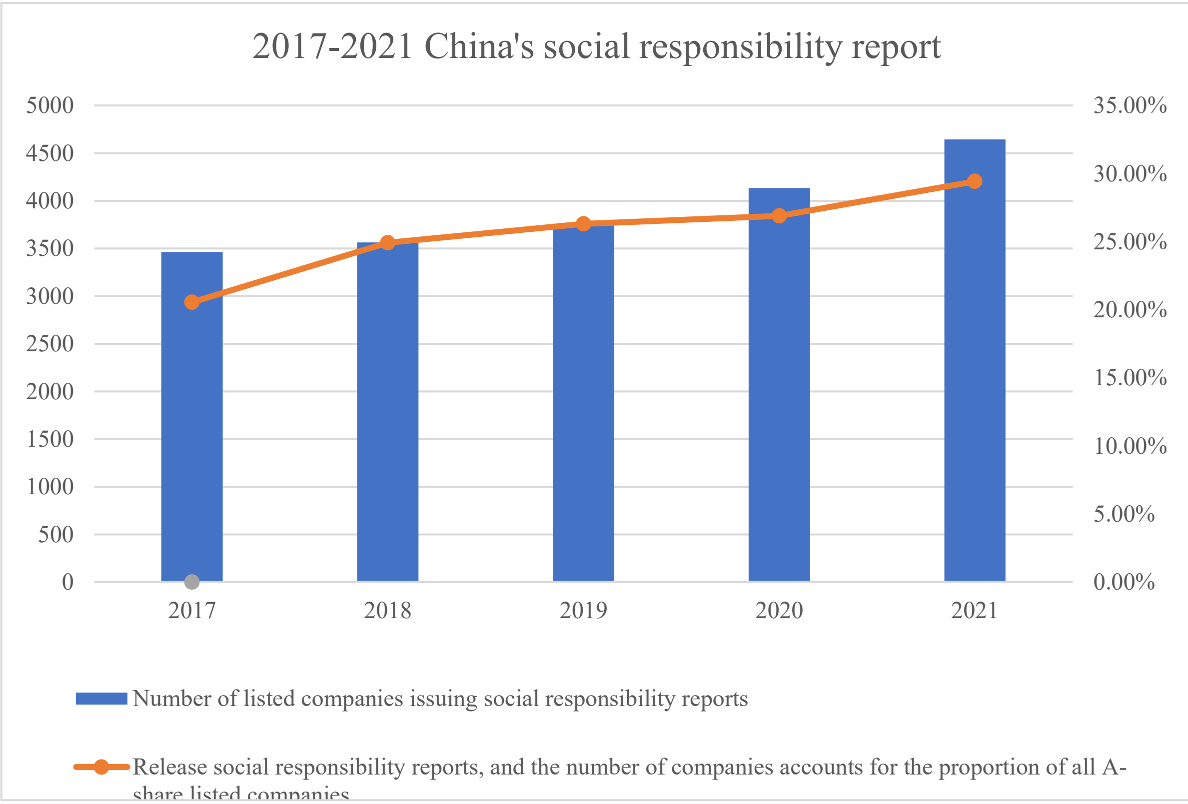

Figure1: 2017-2021 China's social responsibility report
Data source: Green Governance Database of Nankai University.

Manuscript PreparationIt can be seen from the figure 1 that the current situation of Chinese enterprises is that the cost of ESG information disclosure is high, and enterprises need to invest human and material resources to collect, analyze, and display ESG information, which may involve the hiring of professional personnel, such as lawyers and auditors. Most current forms of ESG disclosure rely on third-party intermediaries. For companies, if regulators require mandatory disclosure of ESG information, companies will need to invest a lot of money to obtain, analyze, and present relevant information, which will lead to increased costs. In addition, mandatory disclosure of ESG information may expose companies to a higher risk of litigation.

At the same time, the phenomenon of "greenwashing" exists in ESG investment products. Some enterprises publicize their investment projects in the name of ESG, exaggerating the environmental benefits and sustainable development ability of the products to attract investors, resulting in some investment products in the name of ESG investment market, which not only violates the ESG investment concept but also causes market chaos. It also increases investment risk. Companies that force themselves to increase ESG targets may have the undesirable consequence of greenwashing themselves, contrary to what the market originally expected.

These are all issues that may hinder Chinese companies from making ESG information disclosure.

2. Literature review

Since the United Nations released the report "Who Cares Wins" and introduced the ESG concept, it has emerged as a key non-financial metric to gauge the sustainability of economic entities internationally. An increasing number of listed companies are now considering investing their corporate resources in environmental, social, and governance improvements. However, different corporate managers hold varying attitudes towards ESG. Supporters argue that enterprises should persistently invest in ESG even during overall economic downturns. On the other hand, there are critics like Elon Musk, CEO of Tesla - a renowned entrepreneur who believes that using ESG indicators to measure corporate sustainability performance is meaningless. In August 2022, Strive Asset Management launched an anti-ESG fund aimed at encouraging enterprises to engage in activities that do not meet ESG standards such as oil exploration. The divergence in attitudes towards ESG primarily arises from uncertainties regarding the economic consequences that enterprises may face when investing resources into ESG initiatives. Consequently, scholars both domestically and internationally have conducted extensive research on the economic implications of corporate ESG [3].

From the perspective of China, to fully implement the spirit of the Party's 20 Major Congress and promote the high-quality development of China's economy, the State-owned Assets Supervision and Administration Commission of the State Council formulated and issued the "Work Plan for Improving the Quality of Listed Companies held by Central Enterprises" in May 2022, aiming to improve the quality of listed companies held by central enterprises. The plan puts forward higher requirements for domestic environmental, social, and governance (ESG) management and information disclosure, requiring listed enterprises controlled by central enterprises to actively implement new development concepts and explore the establishment of an ESG system in line with China's national conditions. This shows that the Chinese government actively encourages and supports ESG information disclosure, providing strong policy support for promoting sustainable development. In recent years, the awareness of ESG disclosure of Chinese A-share enterprises has gradually increased, and the disclosure rate is increasing year by year. As per wind statistics, 1,413, or approximately 30.2% of A-share listed businesses, disclosed ESG reports in 2022 out of A-share listed companies. Of China's top 100 listed corporations (N100), 89% now disclose ESG information, up from 78% in 2020. The majority of listed businesses' ESG reports are disclosed, and the rate at which scientific and technology board corporations disclose ESG information has been rising quickly. Following the introduction of mandatory requirements for the disclosure of social responsibility reports by companies on the Science and Technology Board by the Shanghai Stock Exchange in January 2022, the percentage of listed companies' ESG reports that were disclosed on the Science and Technology Board increased from 14% to 30% [4].

From the perspective of the macro environment, in terms of the impact of external government supervision on the disclosure of ESG information by enterprises, Wang Rong analyzed the payment matrix of the two through the game theory obtained to reduce the probability of illegal disclosure by listed companies, the regulatory authorities should effectively reduce the cost of the regulatory authorities [5].

With the increase of financial disclosure, in the market, non-financial information has attracted more and more attention from investors and other third parties. At the same time, it has also become an important way for enterprises to show their competitiveness. The internal and external factors affecting the disclosure of ESG are interwoven, and relevant scholars have discussed them from different perspectives.

From the internal perspective of enterprises, the research results of Li Zhibin et al.show that internal control has a significant positive impact on the disclosure of social responsibility information. The stronger the positive effect is in non-state-owned enterprises [6]. Corporate management and other factors will also affect the disclosure of ESG. For example, Cucari et al. found that the stronger the board of directors is and the corporate social responsibility committee is set up, the more willing enterprises are to disclose ESG, and frequent CEO changes will hurt the disclosure of ESG.

From the external perspective, business ESG disclosure will be impacted by things like macro policy. Carbon emission trading policies have a substantial positive effect on the quality of business ESG information disclosure, including bank-enterprise ties, according to research by Cai Haijing et al. According to Wang Jiaxin,and Zhai Shengbao et al.., the quality of ESG disclosure of businesses associated with banks is higher, and the link between banks and enterprises before lending inhibits the disclosure of ESG [6-9]. The rise of information technology has led to increased external oversight, which is more extensive and powerful. According to Zhai Shengbao's research, media attention at this point can greatly aid in improving the caliber of corporate ESG information disclosure, with the key strategies being the enhancement of corporate external oversight and internal control [10].

Existing literature has discussed the factors affecting the strategic ESG behavior of enterprises from the aspects of corporate governance structure, policy regulatory pressure environmental institutional differences, etc. However, they are all based on their perspectives, and the strategic choice of competitors is rarely considered. Therefore, this paper uses game theory as an analytical tool and builds a model based on the perspectives of enterprises and their competitors in the same industry. Analyze corporate ESG disclosure options.

3. Construct game model

Under the premise of the rationality of enterprises and competitors in the same industry, the static game model of complete information is established. I make the following assumptions.

The game between competitors in the same industry and the enterprise

Participants: Assume that in a game model, both the regulatory authorities and the management of listed companies are rational, they understand the structure of the game, and can choose the best strategy to maximize their interests.

Strategy: Suppose that the strategy that the firm and the competitor can choose is J={A1, A2}, where A1 represents disclosure and A2 represents non-disclosure;

Assume that both sides do not know each other's strategy before making a decision, and both sides choose strategies at the same time.

Therefore, there are four main strategic situations in this game in Table 1:

Table 1: The game model explores the decisions of enterprises and competitors regarding the disclosure of ESG information.

		Competitors	
		Disclosure (A1)	Non-disclosure (A2)
The business	Disclosure (A1)	(-B,-B)	(-B+C,-D)
	Non-disclosure (A2)	(-D,-B+C)	(0,0)

From this table, both disclosures (A1, A1): The listed company chooses to make true disclosure and pays the cost of the relevant ESG disclosure (denoted as B). In this case, the listed company receives no additional benefit.

Neither party discloses (A2, A2): Both the listed company and the competitor choose not to disclose, so there is no additional fee to pay. However, this can lead to a lack of transparency that may be questioned by the public in society.

Listed companies disclose (A1), competitors do not disclose (A2): Listed companies choose to disclose information truthfully and pay related fees (B), but competitors choose not to disclose. In this case, the listed company may gain additional revenue (denoted C), while the competitor may face pressure from the public (denoted D).

Listed company does not disclose (A2), competitor disclosure (A1): Listed company chooses not to disclose and therefore does not need to pay additional fees. However, competitors may gain additional benefits by choosing to disclose (denoted C), while listed companies may face public pressure (denoted D).

Assign values to B, C, and D: According to the ESG Development Report of China's Listed Companies (2022), more than 90% of enterprises employ third parties (including data collection, report preparation, printing, release, third-party verification, etc.), so this article assumes that the disclosure costs of both parties are the same.

C is the additional income brought by the disclosure. According to the MSCI ESG rating, AAA and AA can be classified as C1, and the remaining rating is classified as C2. Where $C1 > B$ and $C2 < B$. The significance of discussing the size of C is that for small and medium-sized enterprises, making ESG information disclosure may cause financial pressure on them, and it is difficult to obtain considerable actual benefits. However, for large and listed enterprises with high ratings, the cost paid is far lower than the additional benefits brought by ESG information disclosure. Therefore, variable C is divided into C1 and C2 for separate discussion.

D is a relatively abstract concept, so we assume two cases of $D > B$ and $D < B$.

So there are four situations where (B, C, D are always positive)

When the enterprise rating is AA or AAA, $C1 > B$ in Table 2-3,

Table 2: When $B > D$, the game model explores the decision of enterprises and competitors regarding the disclosure of ESG information.

		Competitors	
		Disclosure (A1)	Non-disclosure (A2)
The business	Disclosure (A1)	(-B,-B)	(-B+C1,-D)
	Non-disclosure (A2)	(-D,-B+C1)	(0,0)

According to the table, there is little difference between choosing to disclose or not to disclose, (-B+C1, -D), (-D, -B+C1) are all Nash equilibrium optimal solutions.

Table 3: When $B < D$, the game model explores the decision of enterprises and competitors regarding the disclosure of ESG information.

		Competitors	
		Disclosure (A1)	Non-disclosure (A2)
The business	Disclosure (A1)	(-B,-B)	(-B+C1,-D)
	Non-disclosure (A2)	(-D,-B+C1)	(0,0)

According to the table, find all pure strategy Nash equilibria by crossing lines, so both sides choose disclosure (-B, -B).

When the firm is rated A and below, $C2<B$, in Table 4-5,

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Table 4: When B > D, the game model explores the decision of enterprises and competitors regarding the disclosure of ESG information.

		Competitors	
		Disclosure (A1)	Non-disclosure (A2)
The business	Disclosure (A1)	(-B,-B)	(-B+C2,-D)
	Non-disclosure (A2)	(-D,-B+C2)	(0,0)

According to the table, find all pure strategy Nash equilibria by crossing lines, so both sides choose not to disclose (0,0)

Table 5: When B < D, the game model explores the decision of enterprises and competitors regarding the disclosure of ESG information.

		Competitors	
		Disclosure (A1)	Non-disclosure (A2)
The business	Disclosure (A1)	(-B,-B)	(-B+C2,-D)
	Non-disclosure (A2)	(-D,-B+C2)	(0,0)

According to the table, because both parties are rational people, the loss of non-disclosure may be greater than the cost of disclosure. According to the Prisoner's dilemma Nash equilibrium, both parties will choose to disclose ESG information when they are not clear about the choice of their competitors, so (-B,-B) is the optimal solution.

4. Conclusion and Suggestion

The game model shows the additional benefits that disclosure can bring to the enterprise are greater than the cost that the enterprise should pay, in order not to fall behind the competitors, the enterprise should also choose to disclose ESG information. The intensity of competition is related to an enterprise's hard power, that is, an enterprise needs to consider its resources and capabilities to evaluate whether it can maintain a competitive advantage with its competitors in disclosing ESG information.

However, when the disclosure of ESG information does not bring additional benefits to the enterprise, the enterprise needs to consider the balance of costs and benefits more carefully. In this case, enterprises can decide whether to disclose ESG information according to their situation. This may require a combination of factors such as the company's financial situation, market demand, industry standards, and stakeholders' expectations.

It is important to note that even in cases where it is not possible to quantify directly, the disclosure of ESG information may still yield some potential benefits to the business, i.e., the specific case of C.

To sum up, when considering whether to disclose ESG information, enterprises should comprehensively consider the additional benefits and costs brought by disclosure as well as their competitive advantages and resources. When additional benefits are available and resources are available, disclosure of ESG information can enhance a company's reputation and sustainability. However, where additional benefits are not available or resources are limited, companies need to carefully weigh the costs and benefits and make decisions based on their circumstances.

If an enterprise is in the early stage of entrepreneurship, it should balance the costs and the advantages brought by ESG disclosure and choose an ESG disclosure plan that is suitable for its own development stage, industry characteristics, stakeholder needs, feasibility and sustainability considerations, as well as relevant ESG standards and best practices. This will ensure that the company can take full advantage of the advantages of ESG disclosure while meeting the expectations of stakeholders and promoting the sustainable development of the company.

Disclosure of ESG information is recommended for companies that have achieved an A rating and above, are closely related to environmental protection, and have social benefits. Although the capital costs required for disclosure exist, they are affordable relative to the additional benefits that companies derive from it. First, transparency and disclosure can increase the trust and recognition of a business by investors and stakeholders. This may help companies attract more investment and obtain better financing terms. Secondly, the disclosure of ESG information can improve a company's reputation and brand image, attracting more consumers and partners. Disclosure of ESG information can also help companies manage risks, comply with regulations and norms, and promote their sustainable development. It can also demonstrate their good performance in environmental protection, social responsibility, and governance, and improve their competitiveness and sustainability.

At the same time, enterprises can consider the use of the multi-stage game model, enterprises can make decisions at different points in time according to their specific conditions and consider the potential reactions of other enterprises. Through this method, enterprises can better understand the long-term benefits and potential risks of ESG information disclosure in a dynamic competitive environment and formulate more effective decisions and strategies accordingly. This type of analysis necessitates thorough theoretical exploration and solid empirical evidence to validate the feasibility and precision of its suggestions. By doing so, it more accurately conveys the corporate social value and the prospects for sustainable development evolution.

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