Gading Journal for the Social Sciences
Volume 27, Number 2, 2024, 72-86

Does ESG Disclosure and Sustainable Strategy Influence Future Firm Performance? Evidence from China's Strategic Emerging Industries

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https://doi.org/10.24191/gading.v27i2.457

Received: 19 February 2024
Accepted: 24 June 2024
Date Published Online: 31 October 2024

Abstract: The rise of the ESG concept has provided new opportunities for firms in strategic emerging industries. The study aims to investigate the relationship between ESG disclosure and future firm performance. A sample of 1,198 firms in strategic emerging industries in China from 2018 to 2022 were analysed inclusively. The Chinese government identified strategic emerging industries as vital for the nation's economic growth and competitiveness in the global market. Additionally, the study examines the regulatory role of sustainable strategy in this relationship since it is pivotal as it incorporates the sustainability agenda into the firm's mission and vision. The study shows that ESG disclosure and sustainable strategy positively influence the future firm performance of strategic emerging industries. This paper expands the research on the mechanism between ESG disclosure and future firm performance. It provides policy inspiration for improving the future firm performance of strategic emerging industries and promoting industrial transformation, upgrading and high-quality economic development.

Keywords: ESG disclosure, future firm performance, strategic emerging industries, sustainable strategy

Introduction

Since the inception of the Environmental, Social and Governance (ESG) framework, the practice of the ESG concept has gradually become an effective way to promote sustainable development and is forming a global trend (Al-Hiyari et al., 2023a; CCDC & ICMA, 2023). China has always been a proactive supporter, contributor, and evangelist of sustainable international development. The strategic goals of "carbon peaking and carbon neutrality" and China's 14th Five-Year Plan (2021–2025) have brought key emerging sectors to the forefront of attention (Zeng et al., 2023). The outline of the 14th Five-Year Plan states that the advancement of strategic emerging industries has accelerated the growth of sectors, including biotechnology, new energy vehicles, new materials, high-end equipment, green environmental protection, new energy, aerospace, maritime equipment, and other industries.

According to the State Information Centre data, the added value of China's strategic emerging industries accounted for more than 13% of GDP in 2022, and the target proportion of the 14th Five-

Year Plan and the outline of the long-term goals for 2035 will exceed 17%[1]. These figures demonstrate the growing growth of China's strategic emerging industries, which also meet the objectives of increasing their increment, streamlining their structure, and enhancing their core competitiveness. The development of these industries will have a direct impact on China's economic sustainability and the achievement of carbon emission reduction targets, as well as help the transition of the country from rapid economic growth to high-quality development (Ren et al., 2023; Shen, 2022; Zeng et al., 2023).

Developing strategic emerging industries has become a primary strategy for significant countries to seize the commanding heights of a new round of economic, scientific and technological development (Jacoby et al., 2019). Strategic emerging industries are based on major technological breakthroughs and primary development needs and have a significant leading role in the overall and future development of the economy and society. Thus, strategic emerging industries are pivotal in guiding future economic and social development and are essential to China's economic transformation and upgrade (Zeng et al., 2023). At present, after more than ten years of rapid development, China's strategic emerging industries have given full play to the role of new engines and new drivers of economic development (Wang et al., 2023).

With the increasing demand for ESG information from investors, creditors and other stakeholders, improving ESG performance has become an indispensable way for strategic emerging industries to achieve long-term stable development (Rahman et al., 2023). ESG disclosure involves the performance of firms in environmental protection, social responsibility, and corporate governance (Ahmad et al., 2023; Friede et al., 2015). It is also closely related to the "China 3060 Carbon Plan" in China's practice. Improving ESG performance will not only help meeting the needs of investors and stakeholders (Miralles-Quirós et al., 2019; Ren et al., 2023) but also promote firm transformation and upgrade, achieve carbon emission reduction goals, and promote high-quality economic development (Ahmad et al., 2023).

The development of strategic emerging industries is significant to the stable growth of China's economy and has a far-reaching impact on the country's overall scientific and technological strength and international competitiveness (Chen et al., 2023). In the current stage of economic development, with the acceleration of scientific and technological progress and the adjustment of global industrial structure, strategic emerging industries have been given a more critical strategic position (Al-Hiyari et al., 2023a). Strategic emerging industries require firms to fully consider ESG factors while enhancing their competitiveness and continuously improving their sustainable development capabilities to meet these challenges. The industry's development, however, also faces many obstacles and difficulties, particularly in the areas of environmental management and governance, and social responsibility (Li & Huang, 2022; Wang et al., 2023).

ESG information disclosure and sustainable strategy have become necessary elements for the long-term stable development of firms (Ahmad et al., 2023). With the deepening of the concept of ESG, more investors and stakeholders are incorporating ESG factors into firm evaluation and investment decisions (Li & Huang, 2022). It puts forward higher requirements for firms in strategic emerging industries. Consequently, this paper focuses on the effect of ESG disclosure and sustainable strategy on future firm performance among strategic emerging industries in China.

Using 5,950 firm-year observations, we found that ESG disclosure and sustainable strategy positively influence the future financial performance of strategic emerging industries. The relationship between firm performance and sustainable strategy is crucial for advancing the sustainable development of China's strategic emerging industries and attaining high-quality economic growth (Zeng et al., 2023). This study examines the barriers and assumptions surrounding disclosure by focusing on strategic emerging industries and suggests ways to advance ESG disclosure. Ultimately, by offering theoretical support and presenting its findings, the study hopes to help scholars, decision-makers, and sustainability organisations determine the best course of action for promoting and accelerating the adoption of ESG disclosure in planning and strategy initiatives.

[1] Resource from: National Development and Reform Commission, https://www.ndrc.gov.cn/wsdwhfz/202401/t20240116_1363298.html

The remainder of the paper is arranged as follows. The next section summarises previous research and the development of the theoretical framework and hypotheses. Then, definitions for the variables, the study methodology, and a description of the sampling design are provided. After that, the outcomes of the descriptive and regression analyses are discussed. The last section contains the study's limitations, conclusion, and suggestions for additional research.

Literature Review

Theoretical Framework

Stakeholder theory stipulates that firms exist and have a wide range of stakeholders, including employees, customers, suppliers, governments, and social organisations. Firms must find a balance between various stakeholders and maximise the interests of all parties to ensure the long-term survival and development of the enterprise (Donaldson & Preston, 1995; Paolone et al., 2022). This theory emphasises the importance of considering multiple interests in the decisions and actions of businesses. Firms need to consider the interests of different stakeholders to ensure that their business activities are not only in the interests of shareholders but also in the interests of other stakeholders to achieve overall sustainable development (Gao & Bansal, 2013; Wang et al., 2023).

Resource-based view theory holds that firms are in a resource environment whose development and survival depend on access to and utilisation of external resources (Barney, 1991). Firms must ensure a stable supply of their resources by establishing an access mechanism for external resources to achieve long-term survival and competitive advantage (Barney, 2001; Dangelico & Pontrandolfo, 2013; Runyan et al., 2007). This theory emphasises the interdependence between businesses and the external environment. Firms need to seek external resources actively, and through the establishment of an effective resource allocation mechanism, the external resources into their core competitiveness to improve the performance level of firms (Corbett & Claridge, 2002; Galbreath, 2005; Guillamon-Saorin et al., 2018).

ESG is a comprehensive evaluation system that measures the sustainable development ability of firms (Sharma et al., 2018). In recent years, with the increasing problems of global climate change, social inequality and corporate governance, ESG investment and evaluation methods have been widely used in the fields of capital markets, corporate management and policy formulation (Gao & Bansal, 2013; Zhao et al., 2017).

Stakeholder theory considers ESG factors important in corporate management (Khan, 2022a). Firms need to consider the impact of ESG on various stakeholders and maximise stakeholders through reasonable ESG management to promote the firm performance improvement (Ahmad et al., 2023). The resource-based theory believes that ESG management can not only enhance the reputation and image of firms but also help firms establish good relationships with external stakeholders, thereby creating favourable conditions for firms to obtain and utilise external resources (Vas, 2009; Zahid et al., 2020). Through good ESG performance, firms can obtain more resources to improve their competitiveness and performance (Galbreath, 2005).

In summary, stakeholder and resource-based theories provide different perspectives to explain corporate behaviour and performance and provide proper theoretical support for analysing the impact mechanism of ESG disclosure on firm performance in strategic emerging industries.

Hypotheses Development

In recent years, scholars have conducted much research on the relationship between ESG disclosure and firm performance (Ademi & Klungseth, 2022; Brooks & Oikonomou, 2018; Miralles-Quirós et al., 2019; Yoon et al., 2018). These studies mainly focus on the direct impact of ESG disclosure on firm performance, the relationship between ESG disclosure and the cost of capital, and the relationship between ESG disclosure and stock prices (Alshehhi et al., 2018; Paolone et al., 2022), The existing literature presents conflicting research outcomes regarding this relationship. The growing interest from investors and stakeholders has significantly contributed to the substantial efforts

invested in ESG initiatives (Ahmad et al., 2023). However, empirical studies have produced mixed results, showcasing positive, negative, or neutral associations (Ben Lahouel et al., 2019) attributed to variations in data, samples, timing, and methodologies (Rahman et al., 2021; Wang & Clift, 2009).

Research has shown that a firm's value and performance may both be enhanced by ESG disclosure (Zhao et al., 2018). Positive results and more accessibility are specific to follow from a firm operating well (Friede et al., 2015; Khan, 2022b; Orlitzky et al., 2003). A comprehensive systematic review encompassing 53 peer-reviewed articles from 1984 to 2021 highlights the direct impact of ESG pillars on firm performance. This influence becomes more pronounced as firms' ESG scores exhibit positive progression (Coelho et al., 2023). There is increasing acknowledgement that firm performance is impacted by ESG disclosure. Just one in ten of the more than 2,000 academic papers analysed on the subject of how ESG elements impact firm performance revealed a negative link. The majority of the research showed favourable results (Busch et al., 2018).

Despite all of the advantages of ESG disclosure, research has shown that some studies have not been able to conclusively link ESG disclosure to corporate success (Brooks & Oikonomou, 2018; Ching et al., 2017; Ruan & Liu, 2021), potentially due to overlooking various factors that might influence their relationship (Alshehhi et al., 2018; Friede et al., 2015; Qureshi et al., 2021). Many previous studies have focused on the direct association between ESG and firm performance, neglecting potential effects (Rahman et al., 2021; Zhou et al., 2022). As a result, the nuanced roles of factors such as sustainability strategy have been underexplored in the relationship between ESG and firm performance.

Accordingly, this study aims to fill this gap by proposing and exploring sustainable strategies in the ESG-firm performance relationship. The quality and implementation of a sustainable strategy should align with the firm's internal and external context, given that ESG considerations vary based on organisational size, industry, and location (Rahman et al., 2021). Due to the mixed results, it is worth examining them to gain more significant insights. Furthermore, there are limitations in the studies, specifically on strategic emerging industries. Hence, two hypotheses are proposed below. **Fig. 1** illustrates the conceptual theoretical framework.

Hypothesis 1: There is a positive association between ESG disclosure and firm performance.
Hypothesis 2: There is a positive association between sustainable strategy and firm performance

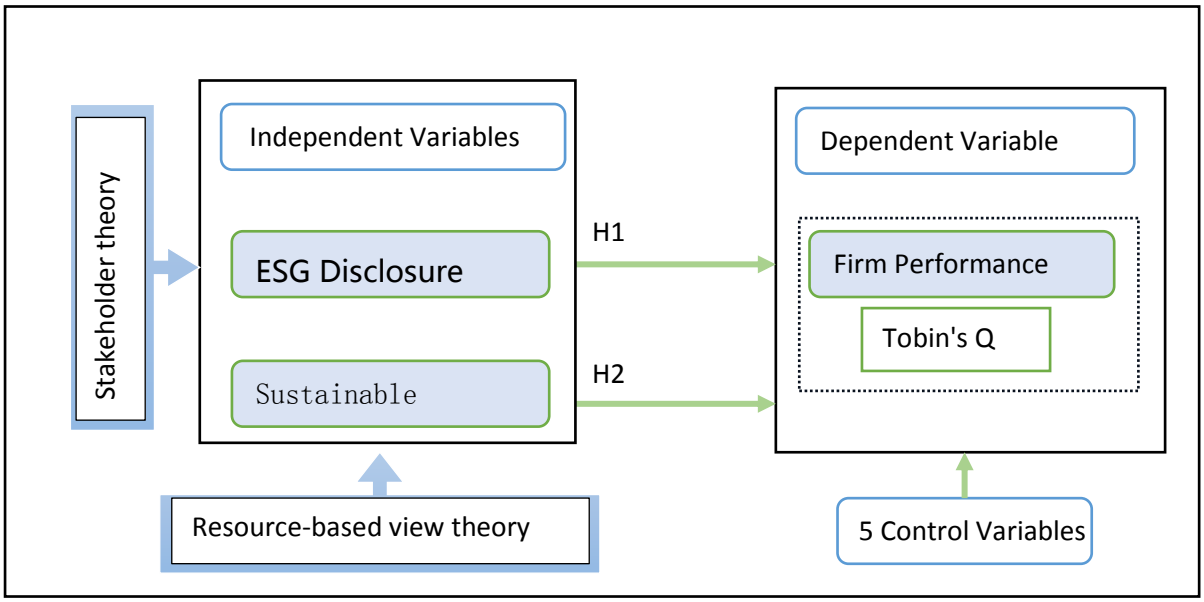

Fig. 1 The conceptual framework of this study

Research Methodology

Data and Sample

This paper selects the constituent stocks of the China Strategic Emerging Industries Composite Index released by the China Securities Index and the Shanghai Stock Exchange in 2023 as the research sample. Firms of strategic emerging industries consisted of nine fields: biotechnology, new energy vehicles, new materials, high-end equipment, green environmental protection, new energy, aerospace, maritime equipment, and other industries. In this paper, STATA software was used for statistical analysis, and the analysis methods included descriptive statistics, correlation analysis, and regression analysis. ESG disclosure and financial data came from the WIND databases, and 5,990 observations of 1,198 firms from 2018 to 2022 inclusive were obtained after excluding the samples of Special Treatment (ST) and ∗ST[2] stocks and firms with serious data deficiencies. The continuous variable data was winsorized at 1% and 99% to avoid the impact of extreme values of individual firms in some years.

Variable Definition

In this study, firm performance as a dependent variable is measured by Tobin's Q, in line with previous studies in the area suggested or used (Bhaskaran et al., 2020; De Lucia et al., 2020; Gull et al., 2022; Rahman et al., 2023; Shakil et al., 2019; Velte, 2017). Tobin's Q is a market-based measure utilised to unveil how the market perceives the value of firms based on their ESG efforts (Karagiorgos, 2010; Mishra & Kapil, 2017). Alongside market performance, Tobin's Q considers the long-term replacement cost of the corporation's total assets, which is vital in sustainable investment practices.

ESG disclosure scores as independent variables are normalised to range between 0 and 10 in the regression to observe how they assess the model's dependent variables. The WIND database has created a strict grading system that evaluates a firm's fundamental ESG performance, risk, and capacity for sustainable operations. The methodology is founded on the fundamental meanings of ESG, conforms to international norms and frameworks, and takes into account the features of Chinese firms.

At the same time, considering the differences between different strategic emerging industries, sustainable strategy is introduced as an independent variable and evaluated through content analysis (Awang et al., 2023). The binary approach measures the presence of a sustainable strategy in its vision and mission, with 1 indicating its existence and 0 indicating its absence (Gao & Bansal, 2013; Rahman et al., 2021). By investigating the presence of a sustainability strategy, the study shines a light on the organisation's intent to integrate sustainable practices into the heart of its strategic planning, thus contributing to a holistic understanding of ESG's influence on firm performance.

This study incorporates control variables to account for potential biases in estimation and accurately assess the influence of ESG disclosure on firm performance to avoid the impact of missing key variables. The control variables are firm size, age, leverage, liquidity, and growth, aligning with prior research (Ching et al., 2017; Junius et al., 2020; Rettab et al., 2009; Shahzad & Sharfman, 2017). All control data were obtained from the WIND database; by integrating these control variables, this study endeavours to disentangle the nuanced interplay between ESG disclosure and firm performance while accounting for the intricate effects of firm characteristics and further control of both firm and year.

Empirical Research Model

Finally, the following panel data models are developed for estimation. Firm performance is measured by TBQ, as many prior studies in the area suggested or used (Gull et al., 2022; Rahman et al., 2023).

[2] "Special Treatment": Indicates financial risks or issues with a stock, subjecting it to trading restrictions. *ST: Variant of ST, indicating prolonged or severe issues with the stock, leading to stricter trading restrictions.

The independent variables are ESG scores (ESG) and Sustainable Strategy (SS). The control variables are firm size (SIZE), leverage (LEV), firm age (AGE), liquidity (LIQ) and growth (GRW). Given that there is a possibility of lag from the influence of ESG disclosure, it may generate benefits in the future. As financial performance is expected to be positively related to sustainability disclosure at least one year after disclosure, a one-year lag between financial performance and all independent variables was used (Junius et al., 2020; Mahoney & Roberts, 2007).

Two analyses were conducted to achieve research objectives. The first examines the effect of ESG disclosure and sustainable strategy on firm performance. The second is to examine the effect of sustainable strategy on future firm performance. We use the lagged value of ESG and SS and control valuables for one, two, and three years to measure the effect on future firm performance. The following equation is the empirical model for variables:

$$TBQ_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 SS_{it} + \beta_3 AGE_{it} + \beta_4 LIQ_{it} + \beta_5 GRW_{it} + \beta_6 SIZE_{it} + \beta_7 LEV_{it} + \varepsilon_{it} \quad \text{(model 0)}$$

$$TBQ_{it} = \beta_0 + \beta_1 ESG_{it-1} + \beta_2 SS_{it-1} + \beta_3 AGE_{it-1} + \beta_4 LIQ_{it-1} + \beta_5 GRW_{it-1} + \beta_6 SIZE_{it-1} + \beta_7 LEV_{it-1} + \varepsilon_{it-1} \quad \text{(model 1)}$$

$$TBQ_{it} = \beta_0 + \beta_1 ESG_{it-2} + \beta_2 SS_{it-2} + \beta_3 AGE_{it-2} + \beta_4 LIQ_{it-2} + \beta_5 GRW_{it-2} + \beta_6 SIZE_{it-2} + \beta_7 LEV_{it-2} + \varepsilon_{it-2} \quad \text{(model 2)}$$

$$TBQ_{it} = \beta_0 + \beta_1 ESG_{it-3} + \beta_2 SS_{it-3} + \beta_3 AGE_{it-3} + \beta_4 LIQ_{it-3} + \beta_5 GRW_{it-3} + \beta_6 SIZE_{it-3} + \beta_7 LEV_{it-3} + \varepsilon_{it-3} \quad \text{(model 3)}$$

Where:

TBQ = Market capitalisation to total assets
SS = Sustainable Strategy is a dummy variable with a value of 1 if the firm incorporates sustainability strategy in its vision and mission and 0 otherwise.
AGE = firm's age since its IPO (in the year)
LIQ = The ratio of current assets to current liabilities
GRW = The annual change in total assets
SIZE = Natural logarithm of total revenue
LEV = The ratio of total liabilities to total assets

For a detailed overview of these variables and their roles in this study, **Table 1** summarises the variables and their corresponding meanings.

Table 1. The Variables Summaries

Variable name	ABV	Description	Source	Reference
Tobin's Q	TBQ	Market Capitalisation to total assets	WIND	(Ahmad et al., 2023; Karagiorgos, 2010; Mishra & Kapil, 2017; Zhou et al., 2022)
ESG score	ESG	Measure ESG combined scores from four key dimensions	WIND	(Rahman et al., 2023; Zahid et al., 2020)
Sustainable Strategy	SS	Value of 1 if the firm incorporates sustainability strategy in their vision and mission, 0 otherwise	Content analyses	(Rahman et al., 2023; Zahid et al., 2020)
Firm Size	SIZE	Natural logarithm of total assets	WIND	(Adnan et al., 2013; Di Tommaso & Thornton, 2020; Eccles et al., 2014; Gull et al., 2023; Naeem et al., 2022)

Leverage	LEV	The ratio of total liabilities to total assets	WIND	(Ben Lahouel et al., 2020; Di Tommaso & Thornton, 2020; Gao & Bansal, 2013; Ren et al., 2023)
Firm Age	AGE	Firm's age since its IPO (in the year)	WIND	(Arayssi et al., 2020; Junius et al., 2020)
Liquidity	LIQ	The ratio of current assets to current liabilities	WIND	(Gao & Bansal, 2013; Ghazali et al., 2022; Wang et al., 2020)
Growth	GRW	The annual change in total revenue	WIND	(Raszkowski & Bartniczak, 2019)

Source: author's calculation

Results and Discussion

Descriptive Statistics

Table 2 shows the descriptive statistics for all the variables. Tobin's Q has an average value of 1.901, greater than 1, indicating that firms in strategic emerging industries may have profitable investment opportunities. ESG has a mean value of 6.132, ranging from 3.71 to 9.50, indicating that the ESG performance of strategic emerging industries is generally reasonable. Furthermore, 34.04% represent the values of sustainable strategy (SS); this suggests that only a third of the sample firms develop and implement sustainable strategies to pursue their sustainable initiatives. The control variables of firms' size (SIZE), leverage (LEV), liquidity (LIQ), growth (GRW) and age (AGE) have mean values of 21.725, 0.413, 2.364, 0.109 and 11.887, respectively. Besides, the skewness and kurtosis statistics reported in Table 1 also show no severe non-normality issue since all the values are below the suggested threshold of ±10 (Wooldridge, 2009; Zahid et al., 2020).

Table 2 Descriptive statistics of variables

Variables	**Obs**	**Min**	**Max**	**Mean**	**Std.Dev**	**Skew.**	**Kurt.**
TBQ	5990	.12	8.42	1.901	1.575	1.985	7.504
ESG	5990	3.71	9.50	6.132	.768	.611	3.732
SIZE	5990	18.081	27.512	21.725	1.371	.62	3.571
LEV	5990	.014	.917	.413	.182	.086	2.224
LIQ	5990	.365	11.456	2.364	1.864	2.525	10.548
GRW	5990	-.281	.895	.109	.192	1.473	6.751
AGE	5990	1	32	11.887	7.197	.58	2.28
Frequencies				YES	NO	%YES	%NO
SS	5990	0	1	2039	3951	34.04%	65.96%

Notes: TBQ is total market capitalisation to total assets; ESG is the total ESG disclosure score; SIZE is the natural logarithm of total assets; LEV is the ratio of total liabilities divided by total assets; LIQ is the ratio of current assets to current liabilities； GRW is the annual change in total revenue; AGE is the firm's age since its IPO, and SS is dummy value of 1 if the firm incorporates sustainability strategy in their vision and mission, 0 otherwise.

Correlation Matrix

Table 3 reports Pearson's correlation matrix for checking whether and how two variables are associated or vary. The bivariate statistics show that ESG, liquidity (LIQ), and growth (GRW) have a significant positive effect. In contrast, firms' size (SIZE), leverage (LEV), and age (AGE) have a significant negative correlation with TBQ. Besides, sustainable strategy (SS) has an insignificant negative correlation with TBQ but a significant positive relationship with ESG.

Table 3 Pearson's correlation matrix

	TBQ	ESG	SS	SIZE	LEV	LIQ	GRW	AGE
TBQ	1							
ESG	0.121***	1						
SS	-0.013	0.340***	1					
SIZE	-0.291***	0.202***	0.473***	1				
LEV	-0.450***	-0.064***	0.111***	0.463***	1			
LIQ	0.403***	0.055***	-0.078***	-0.359***	-0.727***	1		
GRW	0.223***	0.104***	0.051***	0.107***	0.043***	0.007	1	
AGE	-0.267***	-0.003	0.336***	0.409***	0.213***	-0.182***	-0.168***	1

Notes: Asterisks denote statistical significance at the 1% (***), 5% (**), or 10% (*) levels, respectively (1-tailed). TBQ is total market capitalisation to total assets; ESG is the total ESG disclosure score; SIZE is the natural logarithm of total assets; LEV is the ratio of total liabilities divided by total assets; LIQ is the ratio of current assets to current liabilities; GRW is the annual change in total revenue; AGE is the firm's age since its IPO and SS is dummy value of 1 if the firm incorporates sustainability strategy in their vision and mission, 0 otherwise.

Multiple Regression Analysis

Table 4 presents the regression results for four different models, each with ESG and SS as independent variables and SIZE, LEV, LIQ, GRW, and AGE as control variables to predict the effect of ESG disclosure on firm performance. For Model 0, we first estimated the impact of the ESG disclosure and sustainable strategy on firm performance in the current period as a control group with the lagged period. The result shows that sustainable strategy has a positive and significant relationship with TBQ, while ESG disclosure has a negative but insignificant relationship with TBQ. For Model 1, we estimated the impact of the ESG disclosure and sustainable strategy on firm performance lagged one year. The result shows that the last year of ESG disclosure (ESG_{t-1}) and sustainable strategy (SS_{t-1}) have a positive and significant relationship with TBQ.

Table 4. Regression Result

	Model0	Model 1	Model 2	Model 3
	t	t-1	t-2	t-3
ESG	-0.010	0.059**	0.069**	0.017
	(-0.329)	(1.837)	(2.109)	(0.467)
SS	0.216***	0.177**	0.018	0.028
	(3.147)	(1.929)	(0.266)	(0.343)
SIZE	-0.034	0.357***	0.482***	0.149**
	(-0.590)	(4.923)	(5.990)	(1.767)
LEV	-1.784***	-1.298***	0.230	0.687*
	(-6.822)	(-4.185)	(0.713)	(1.505)
LIQ	-0.055**	-0.027	-0.001	0.062**
	(-2.264)	(-0.846)	(-0.030)	(1.899)
GRW	0.530***	1.477***	-0.100	-0.521***
	(5.819)	(13.655)	(-0.942)	(-3.909)
AGE	0.055***	0.200***	0.134***	0.356***
	(5.908)	(16.722)	(4.865)	(15.639)
_CONS	2.730**	-8.307***	-10.837***	-6.767***
	(2.238)	(-5.242)	(-5.934)	(-3.762)
Firm effect	Yes	Yes	Yes	Yes

Year effect	Yes	Yes	Yes	Yes
R^2 (%)	5.3	24.40	16.10	20.40
F-statistic	22.669	79.569	44.665	40.416
P-value	0.000	0.000	0.000	0.000
Total observation	**5990**	**4792**	**3594**	**2396**

Notes: The reported t statistics are in parentheses; Asterisks denote statistical significance at the 1% (***), 5% (**), or 10% (*) levels, respectively (1-tailed). TBQ is total market capitalisation to total assets; ESG is the total ESG disclosure score; SIZE is the natural logarithm of total assets; LEV is the ratio of total liabilities divided by total assets; LIQ is the ratio of current assets to current liabilities; GRW is the annual change in total revenue; AGE is the firm's age since its IPO and SS is dummy value of 1 if the firm incorporates sustainability strategy in their vision and mission, 0 otherwise.

The findings prove that it takes time for ESG performance to be delivered from the beginning to be accepted by various stakeholders, and it has a significant positive impact with a one-year delay. Higher ESG scores are associated with higher future firm performance; thus, Hypothesis 1 is supported. When stakeholders become aware of and accept ESG information during the lag period, they may take positive actions, such as increasing investment, improving trust in products or services, and strengthening partnerships with firms. Therefore, stakeholder theory can help explaining why ESG information significantly impacts TBQ during the lag period.

The findings also prove that sustainable strategies improve firm performance not only in the current period but also in lagged periods. According to RBV, sustainable strategies are valuable resources that contribute to a firm's competitive advantage. These resources are not only beneficial in the short term but also have the potential to provide sustained competitive advantage over time. It is consistent with the principles of the resource-based view theory; thus, Hypothesis 2 is supported. Our findings aligned with prior studies that discovered a strong and positive relationship between future firm performance (Ahmad et al., 2023; Coelho et al., 2023; Zhao et al., 2018).

For models 2 and 3, we further estimated the impact of the ESG disclosure and sustainable strategy on future firm performance, which lagged two and three years. In model 2, ESG_{t-2} still shows a statistically significant positive coefficient of 0.069 at the 5% significance level. However, in model 3, the result indicates that ESG_{t-3} has a positive but insignificant relationship with TBQ. The findings suggest that the significant positive effect of a high ESG score on TBQ gradually becomes negligible with the extension of the year, and sustainable strategy also shows the same trends. Our finding is aligned with (Al-Hiyari et al., 2023b; Wang et al., 2022).

The control variables of firm size (SIZE) and firm age (AGE) showed a significant positive correlation with TBQ across all models, suggesting that larger or longer-lived firms were more likely to have higher TBQ values. Our finding is consistent with (Wang et al., 2022). The growth rate (GRW) positively correlated in Model 1 but not significantly in Models 2 and 3. It may reflect differences in the interpretation of the relationship between growth rate and TBQ in different models. Liquidity (LIQ) showed a positive correlation in Model 3, suggesting that higher liquidity may be associated with higher TBQ values. Leverage (LEV) showed a negative correlation in Model 1 but not significantly in Models 2 and 3. It may imply that higher debt levels are associated with lower TBQ values. However, other models do not show this relationship.

Overall, the R^2 for the four models was significant, with a range between 5.3 and 24.4 per cent, which indicated that the models fit well and accounted for a substantial portion of the variance in TBQ, the F-statistic ranged from 22.669 to 79.569 with a p-value of 0.000, suggesting the overall significance of the model. The results underscore the importance of ESG considerations in shaping firm valuation over longer time horizons and highlight the lasting impact of sustainable practices on firm performance.

Conclusion

Under the "dual carbon" mission to improve industrial transformation and promote high-quality economic development, it is essential to investigate the mechanism between ESG disclosure,

sustainable strategy, and future firm performance in strategic emerging industries. Based on stakeholder and resource-based view theories, this paper studies the mechanism of ESG disclosure affecting the performance of strategic emerging industry firms through sustainable development strategies. Our findings provide evidence to the firms, investors, and regulators on the importance of ESG disclosure, and the conclusions are as follows:

Firstly, the empirical results show that even though ESG disclosure does not form a significant relationship with current firm performance, ESG disclosure has a significant positive effect on future firm performance with lagged one or two periods, indicating that paying attention to and improving ESG performance is conducive to improve firm performance. Firms with strong ESG performance are often seen as demonstrating exemplary performance and public image. The ESG investment, practices, and disclosure can increase net profit and improve a firm's competitive advantage and performance. Moreover, the ESG disclosure among firms helps the government to achieve the strategic goal of "carbon peaking and carbon neutrality" by 2035.

Secondly, the empirical results show that sustainable strategy also has a significant positive effect on TBQ from the current period to the lagged period, and the effect on TBQ is gradually insignificant with the year's extension. Through a sustainable strategy, firms can tap into intangible resources to create lasting and renewable resources, such as brand reputation, customer loyalty, and employee satisfaction, reducing risk exposure and enhancing resilience to external shocks. These resources do not only hold short-term value but also possess the potential to confer a lasting competitive advantage over time. The findings support the view that sustainable strategies are a source of competitive advantage and long-term value creation for firms, consistent with the resource-based view theory.

This paper makes the following argument on strategic emerging industries based on the results of data analysis. Firstly, firms should take the initiative to take responsibility for ESG and integrate it into their strategic planning and decision-making processes to improve firm performance and reduce operational risks. When actively managing and delivering ESG messages, firms need to consider the reaction time and influence of various stakeholders to ensure that they have sufficient recognition and support for the firm's positive behaviour. It also underscores the importance of considering stakeholders in corporate strategic planning and ESG disclosure.

Secondly, firms should fully consider the characteristics of the industry and market demand when formulating a sustainable strategy to ensure its pertinence and operability. In addition, firms need to focus on long-term development to achieve short-term improvement in ESG performance and continuously promote ESG performance improvement. To this end, firms should establish and continuously improve ESG management systems, strengthen communication and cooperation with stakeholders, and promote the in-depth implementation of ESG concepts within enterprises. Only by consistently investing in ESG and improving performance can firms achieve long-term competitive advantage and performance growth and positively contribute to sustainable development.

Finally, government departments and regulators play a vital role in ESG development and should also strengthen policy support and guidance for ESG development, considering the trend of internationalisation (Zainon et al., 2020), Chinese characteristics, and national conditions. The government should introduce more precise regulations and policies to encourage enterprises to improve their ESG performance actively. Regulators should also strengthen the supervision of ESG information disclosure, ensure that enterprises disclose relevant information to the public following regulations, and improve the transparency and credibility of information. Through policy support and regulatory guidance, government departments and regulators can motivate firms to actively participate in sustainable development and promote the development of society as a whole in a more sustainable and greener direction.

Limitations and Suggestions for Future Research

The limitation of this paper is that there may be biases in sample selection, data collection, and analysis methods. Future research can expand the sample range, combining qualitative and quantitative methods, and consider introducing more moderating and mediating variables to deeply explore the relationship between ESG and firm performance and its differences in different industries.

Future research can also further attempt to open the "black box" of the role of various dimensions of ESG disclosure on the performance of firms in strategic emerging industries and explore the direction and impact of individual indicators of the environment (E), social (S), corporate governance (G) and sustainable strategies on the performance of firms in strategic emerging industries.

Co-Author Contribution

The authors confirmed that there is no conflict of interest in this article. Author 1 completed the fieldwork, wrote the introduction and prepared the literature review. Author 2 wrote the research methodology and analysed and interpreted the results statistically. Author 3 conducted the data collection. Author 4 discussed the findings, wrote the conclusion and recommendations for future research, and reviewed the paper.

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