The Value Effect of ESG Ratings during the COVID-19 - Empirical Evidence from Chinese A-Share Market

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Abstract. Since 2020, the scale of ESG responsible investment in China has developed rapidly, and during the epidemic, the city was affected by the closure of roads. Although it is difficult to influence consumers' choice in the product market in the short term, investors in the stock market can "vote with their feet" in a timely manner, so how do investors perceive the ESG rating of the company? What is their perception of a company's ESG rating? This paper examines the role of ESG ratings in China's A-share market during the crisis, using the Xin Guan epidemic as an entry point, and concludes that (1) ESG ratings are significantly and positively correlated with short-term cumulative stock excess returns, and that company carbon intensity plays a moderating role in ; (2) in the long run, higher ESG ratings reduce stock price volatility; and (3) the epidemic enhances the correlation between ESG ratings and company stock price volatility. correlation level between ESG ratings and company share price volatility.

Keywords: ESG ratings; value effects; excess returns; quasi-natural experiments.

1. Introduction

Since the last century, the global resource scarcity problem has been highlighted and the inherent demand for green and sustainable development has been increasing, along with the gradual increase of investors' awareness in environmental protection and social responsibility, the concept of responsible investment has entered investors' vision. As a non-traditional financial performance investment concept and evaluation criteria, ESG focuses on the company's performance and corresponding social responsibility to stakeholders such as environment, social responsibility and corporate governance.

In early 2020, the New Crown Pneumonia outbreak forced many companies to lay off employees and even broke their capital chains. While the government took measures to protect people's health and maintain a functioning society, companies played an indispensable role in guiding society and stabilizing the economy. In order to share the social responsibility of fighting the epidemic and ensuring long-term stability of earnings, are investors also paying more attention to environmental, social responsibility and corporate governance (ESG) performance in addition to company profits during the epidemic period?The overall size of China's ESG responsible investment market by year in the December 2022 China Responsible Investment Report. After the outbreak, the total market size bottomed out at over RMB 24.6 trillion in 2022, an increase of nearly 80% from 2020.

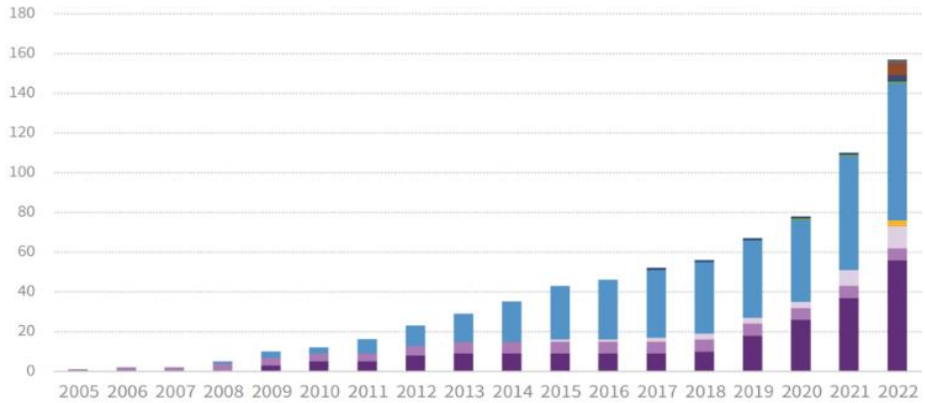

Figure 1. Growth of China A-share ESG Index (Source: Wind Data Terminal).

Although it is difficult to influence consumers' choices in the product market in the short term due to road closures since the epidemic, investors in the stock market can "vote with their feet" in time, so how do stock market investors view the company's move? In this paper, we try to examine the value effect of ESG rating release through theoretical analysis and empirical testing, and answer the above questions by taking the short-term excess returns obtained by investors as the short-term value effect.

2. Theoretical analysis and research hypothesis

Yan (2013) summarizes the research methods of market reaction as direct research and indirect research. This paper draws on such research methods to examine whether the release of a company's ESG rating can be transmitted to stakeholders through market mechanisms, generating both short- and long-term value effects. The short-term value effect is directly examined by using the cumulative excess return (CAR) index of individual stocks to examine the market reaction to the disclosure of the company. The long-term value effect is mainly measured by the stock price volatility after the release of ESG rating information to measure the company's resilience to risk after receiving an outbreak shock.

According to agency theory and information asymmetry theory, financial information is not sufficient to reflect the full information that conveys a company's performance (Wong et al., 2011), ESG ratings provide more information about the company and help reduce information asymmetry between the company and investors. On the other hand, companies with good ESG performance are more willing to disclose information, which enhances the transparency of information about the company and reduces the uncertainty faced by investors (Dhaliwal et al., 2011). Good ESG performance plays a positive signaling role (Zhang Zhaoguo et al., 2013). In times of epidemics, the role of ESG ratings comes to the fore, with investors showing greater confidence in companies with higher ESG scores. shan et al. (2020) argue that companies with higher employee satisfaction are more resilient to negative market shocks. alda (2019) finds that investors are more favorable to companies with better corporate social responsibility performance, especially when financial markets are in recession, and this effect is more pronounced (Braune et al., 2019).Ding et al. (2020) find that better ESG performance during an epidemic makes workers, suppliers, and customers more willing to make adjustments to support the firm in times of distress. Therefore, this paper makes the following hypothesis:

Hypothesis 1: The higher the ESG rating, the higher the cumulative excess return at the time the ESG rating is issued.

As carbon emission reduction regulations continue to be tightened, a company's carbon emissions will gradually become the most important environmental information for stakeholders, but companies that fail to implement carbon emission reduction in a limited way will have to purchase carbon emission allowances and be penalized by regulators. Therefore, the company's carbon emission intensity varies, and the company will face different risks related to carbon emissions. Companies in low carbon emission industries have lower carbon emission-related risks, companies have better competitive advantages, and high ESG ratings are more risk-averse for companies, with more significant value effects on companies.

Sub-hypothesis 1a: Carbon emissions intensity plays a moderating role in the value effect of ESG ratings.

Good ESG performance is the moral and reputational capital accumulated by the company, which can play a certain insurance effect, and the "insurance effect" of ESG can help the company fight against certain external shocks. When a company faces a deteriorating external environment, which is prone to customer loss, financing difficulties, and stock price declines, a company with good ESG performance has established strong cooperation and trust with its stakeholders, and is therefore better able to gain stakeholder support to weather the storm (Lins et al, 2017). Therefore, in the event of a "black swan event" such as a new crown epidemic, companies with high ESG ratings will trigger the

"insurance effect" of ESG by virtue of the trust they have gained from stakeholders before the epidemic, forming a protective mechanism for the company during the crisis.

Hypothesis 2: A high ESG rating improves the company's risk tolerance and stabilizes the stock price.

3. Testing the short-term value effect of ESG ratings

3.1 Sample selection and data sources

In this paper, listed companies with ESG ratings from China Securities are used as the research sample, and the research years are selected as 2020-2022 during the epidemic period. And the exclusion is based on the following criteria: (1) exclude listed companies that issue interim announcements (earnings forecasts, equity distribution plans, etc.), quarterly or annual reports on the day the ratings are issued; (2) delete the sample of companies that also issue B or H shares, the sample of financial companies, the sample of companies with missing data and the ST category. The study sample is finally left with 12905 valid observations from 2673 companies. The ESG rating data in this paper are obtained from the Wind ESG rating database, and the individual stocks and other financial data are obtained from the CSMAR database. To eliminate the effect of extreme values, this paper Winsorizes the 1% bounds on the continuous type variables involved.

3.2 Variable definition

To test hypothesis 1 and examine the short-term value effect of ESG ratings, this paper uses the cumulative excess return on equity investment of sample listed companies as the explanatory variable. This paper refers to the study of Chen, Longnan and Yao, Zhengchun (2000), and takes the date of ESG rating announcement as the event date. Due to the prevalence of early information leakage in the capital market, there may be early reaction and slow reaction problems, this paper selects both (-3, 3), (-5, 5) and (-10, 10) as the research window periods.

Specifically, firstly, this paper uses the daily returns from the 130th trading day before the event date to the 10th trading day before the event date to estimate the αi and βi of individual stocks through the market model, and then uses (Equation 1) to calculate the expected return, the actual return of individual stocks minus the expected return to obtain the individual stock excess return ARit , and finally the excess return of the window period is summed to obtain the cumulative excess return.

$$R0_{it} = \alpha_i + \beta_{it} Rm_t \quad (1)$$

The explanatory variable is the ESG rating score, which is assigned from 8 to 1 according to the latest ESG classification standard (updated in March 2022), AA, A, BBB, BB, B, CCC, CC, and C. The moderating variable is the industry carbon emission intensity (CE), which is measured and ranked according to the existing research by Xue-ting Li (2017), based on the carbon emissions of different industries. If the company is from a high carbon emission industry, the value is 1, otherwise the value is 0.

Table 1. Variable Descriptions.

	Variable Name	Variable Symbols	Variable Explanation
Dependent variable	Cumulative Excess Rate of Return	CAR_{it}	The sum of the difference between the actual and expected return during the time window
Independent variable	ESG Composite Rating	ESG_{it}	ESG rating scores of listed companies by third-party rating agencies
Control variables	Earnings per share	EPS	Net income/number of common shares
	Fixed assets ratio	PPE	Fixed Assets/Total Assets

	Book-to-market ratio	MB	Company's total book assets at the end of the previous year / total market value of shares
	Nature of shareholding	State	Dummy variable, state-owned company takes the value of 1 otherwise takes 0
	Change of hands rate	ToverTlY	Number of shares traded in the company in the previous year / average number of shares outstanding for the year
	Company Size	SIZE	Natural logarithm of the company's total assets
	Corporate Financial Risk	LV	Gearing ratio, liabilities/total assets

3.3 Model setting and result analysis

In order to test the short-term market response of ESG ratings, referring to Mian (2012), this paper constructs a panel regression model with cumulative excess return as the explanatory variable and ESG rating score as the explanatory variable:

$$Car_{it} = a + b_0\, ESG_{it} + b_1\, Controls_{it} + £_{it} \quad \text{(Model)} \tag{2}$$

Where i denotes the listed company, t denotes time, CAR_{it} is the cumulative excess return over the window period, ESG_{it} is the ESG rating score of the company, and Controls denotes a set of control variables.

Adding a dummy variable for carbon emissions intensity to verify the moderating effect of carbon emissions intensity:

$$Car_{it} = a + b_0\, ESG_{it} + b_1\, Controls_{it} + b_2\, CE_{it} + b_3\, ESG_{it} * CE_{it} + £_{it} \quad \text{(Model)} \tag{3}$$

In order to visualize the short-term market reaction to the release of ESG ratings of listed companies during the window period, this paper plots the change in cumulative excess returns of listed companies before and after the release of ESG ratings.

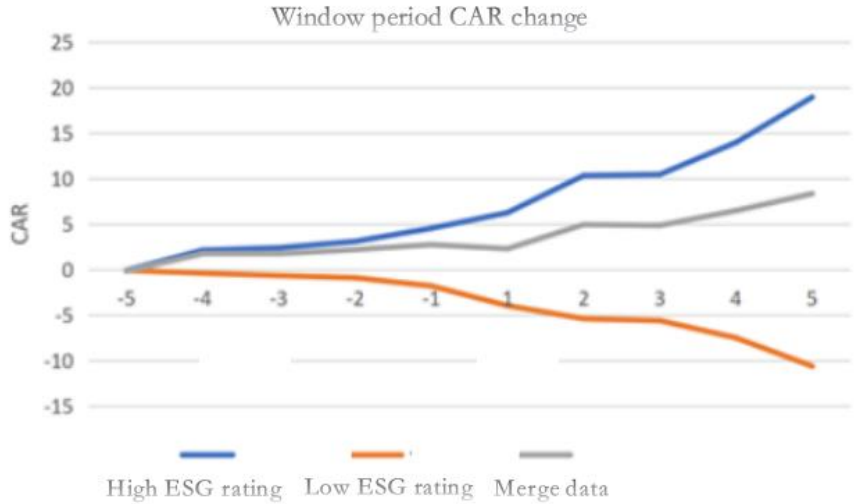

Figure 2. Cumulative Excess Returns of Listed Companies in Window Period (-5, 5).

This paper performs a multiple regression analysis based on (Model 2), and the results are presented in Tables 2. the coefficients of the core Independent variable ESG rating are significant at the 10% and above level in the three windows of (-3, 3), (-5, 5) and (-10, 10), indicating that the higher the ESG rating is, the higher its cumulative excess return is, supporting the subhypothesis 1b proposed in this paper. among the control variables, in line with existing studies (Shen, Hongtao et al., 2019; Luo, Jinhui, 2013) are generally consistent, indicating that the market reacts strongly to the financial indicators of companies and investors prefer companies with good market performance.

Table 2. Multiple linear regression analysis.

	(1)	(2)	(3)
Window period	[-3,3]	[-5,5]	[-10,10]
ESG	0.0010*	0.0019**	0.0098***
	(1.65)	(2.65)	(3.96)
EPS	0.0011**	0.0085***	0.0166***
	(2.64)	(5.20)	(5.07)
PPE	0.0022***	0.0137***	0.0590***
	(2.96)	(2.77)	(4.90)
MB	0.0014**	0.0327***	1.255***
	(2.63)	(10.52)	(7.10)
State	-0.0199**	-0.0042***	-0.0123**
	(-2.65)	(-2.68)	(-2.25)
ToverTlY	-0.0064	0.0011	-0.0027*
	(-1.35)	(1.32)	(-1.65)
SIZE	-0.0648*	-0.0050***	-0.0097**
	(-5.33)	(-5.52)	(-2.01)
LV	-0.0009	-0.0066	-0.0071*
	(-1.21)	(-1.47)	(-1.69)
Constant	-0.0233***	0.0715***	0.0926***
	(-2.95)	(3.27)	(3.98)
Industry	Control	Control	Control
Observations	12905	12905	12905
R2	0.046	0.150	0.392
F	7.56	21.90	45.09

Note: ***p<0.01,**p<0.05,*p<0.1; () in is the t-value calculated based on robust standard errors

To test the moderating role of industry differences in carbon emissions in the value effect of ESG ratings, the results of (Model 3) are shown in Table 3. The coefficients of the core Independent variable ESG*CE ratings are significantly negative at the 5% level or higher in the (-3, 3), (-5, 5) and (-10, 10) windows, respectively, indicating that companies in low carbon emission industries obtain better value effects by obtaining high ESG ratings relative to companies in high carbon emission industries, supporting subhypothesis 1b proposed in this paper.

Table 3. Moderating effect of carbon emission intensity on the value effect of ESG ratings.

	(1)	(2)	(3)
Window period	[-3,3]	[-5,5]	[-10,10]
ESG	0.0011**	0.0020**	0.0131**
	(2.46)	(2.47)	(-2.36)
ESG*CE	-0.0010**	-0.0031**	-0.0120***
	(-2.14)	(-2.14)	(-3.14)
CE	0.0084	0.0070**	0.01
	(1.06)	(2.02)	(0.01)
Controls	Control	Control	Control
Constant	0.0522**	0.0470**	0.0023**
	(1.85)	(2.55)	(2.36)
Industry	Control	Control	Control
Observations	12905	12905	12905
R2	0.0191	0.0092	0.0122
F	7.59	4.65	5.27

Note: ***p<0.01,**p<0.05,*p<0.1; () in is the t-value calculated based on robust standard errors

3.4 Robustness tests

Listed companies with high ESG ratings were used as the experimental group, and a control group with low ESG ratings was matched using PSM to overcome sample self-selection bias. The matched sample is subjected to multiple regression analysis using (Model 2), with the explanatory variable ESG rating as a dummy variable, taking 1 if it is higher than the mean value of ESG rating in the full sample industry, and 0 otherwise. Test results show that ESG rating is significantly and positively correlated with excess returns in all three windows, supporting the hypothesis 1 proposed in this paper.

4. Testing the long-term value effect of ESG ratings

The sample with high ESG scores screened in Section 2 was used as the experimental group, and the control group with low ESG scores was matched by propensity score matching (PSM), and then double difference model (DID) was used for significance testing.

4.1 Variable definition and model setting

Referring to Zhao-Yang et al. stock price volatility was selected as the explanatory variable in this section to measure the firm's risk tolerance during the epidemic period, as shown in Eq:

$$STD=\sqrt{\frac{1}{n-1}\sum_{t=1}^{n}[R_{it}-E(R_{it})]^2} \quad (4)$$

Where STD is stock price volatility, R is the daily individual stock return of the company considering reinvestment of cash dividends, i denotes the company, j denotes the year, and t denotes the date. The Independent variable are high ESG rating (Treated) and annual ESG rating score (ESG), with Treated as a dummy variable above the annual ESG mean of the industry of the sample companies taking 1, otherwise taking 0.

To test hypothesis 2 and examine the long-term value effect of ESG rating releases, the following model was set up:

$$STD_{it} = a + b_0\ Treated_{it} + b_1\ Controls_{it} + £_{it} \quad \text{(Model)} \quad (5)$$

$$STD_{it} = a + b_0\ ESG_{it} + b1 Controls_{it} + £_{it} \quad \text{(Model)} \quad (6)$$

4.2 Using Propensity Score Matching (PSM) Select

The regressions before matching may have serious endogeneity problems leading to biased estimation results. To reduce endogeneity problems while also testing the market response to ESG rating releases, this paper will conduct regressions through the PSM-DID model. By propensity score matching this paper selects the above control variables as suitable covariates for the model; the equilibrium test shows that the differences between the treatment and control group means after matching of all covariates are not significant, and the differences between all covariate means are significantly smaller than the differences between the means before matching; the results of the common support hypothesis test are shown in Figure 3, which shows that although the deviations of the kernel density curves of both samples before and after matching are are larger, the differences in the means after matching become smaller and the overall curves are closer together, indicating that this matching has some effect.

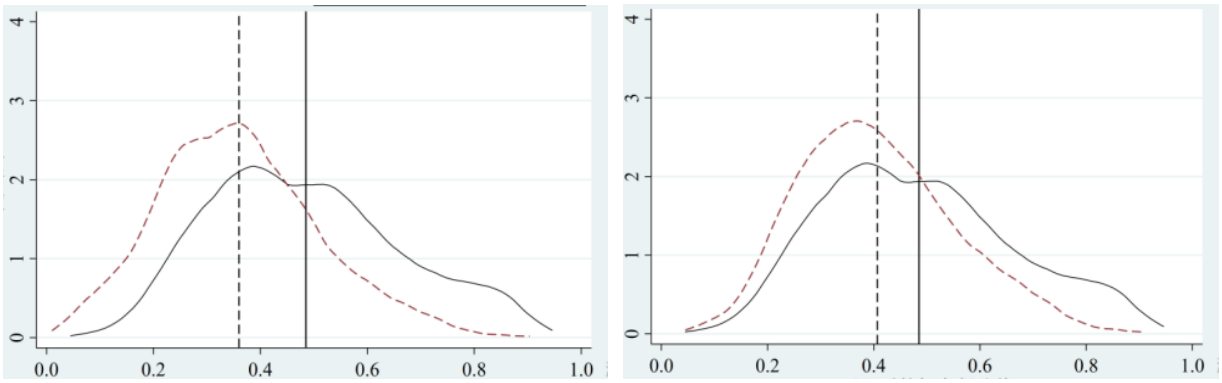

Figure 3. Kernel density of propensity scores before and after matching.

Table 4 below shows the regression results of the long-term value effect of ESG ratings, using (model 5) for double difference regression, column (1) shows the results of the regression test for the full sample, and column (2) shows the results of the regression test for the sample that participated in PSM, the test results show that both high and low ESG ratings (Treated) are significantly negatively related to stock price volatility, proving that hypothesis 2 holds.

Table 4. Impact of ESG Ratings on Company Stock Price Volatility.

	(Model 5)		(Model 6)	
STD	(1) Before matching	(2) After matching	(3) Before matching	(4) After matching
Treated	-0.0011*** (-6.94)	-0.0011*** (-6.35)		
ESG			-0.0040** (-6.36)	-0.0005*** (4.21)
LV	0.0037*** (7.87)	0.0039*** (6.97)	0.0036*** (7.52)	0.0036*** (6.98)
EPS	-0.0001** (-2.21)	-0.0001*** (-1.42)	-0.0001 (1.51)	-0.0001*** (4.12)
SIZE	-0.0004*** (-5.15)	-0.0005*** (-5.37)	-0.0004*** (-4.64)	-0.0004*** (4.91)
State	-0.0011*** (-6.19)	-0.0010*** (-5.29)	-0.0010** (-5.98)	-0.0010** (-2.14)
ToverTlY	0.0013*** (10.74)	0.0031*** (8.40)	0.0013** (10.56)	0.0011*** (4.00)
MB	-0.0042*** (-12.14)	-0.0042*** (-10.69)	-0.0042*** (-12.12)	-0.0042*** (4.90)
PPE	0.0011 (1.51)	0.0011 (1.51)	0.0012 (1.50)	0.0011 (1.51)
Cons	-0.1124*** (-4.19)	-0.0350*** (-3.09)	-0.0331*** (-6.68)	-0.0355*** (-5.01)
Time	Control	Control	Control	Control
Industry	Control	Control	Control	Control
N	4868	3199	4868	3199
Adj-R2	0.0879	0.0908	0.0972	0.0898
F	18.37	19.99	20.29	18.69

Note: ***p<0.01,**p<0.05,*p<0.1; () in is the t-value calculated based on robust standard errors

4.3 Robustness tests

Robustness tests were conducted using a pre-epidemic sample, the sample period was selected as 2017-2019, and the sample was screened using the same method used to screen the sample in the previous section and matched by PSM, and the results showed that ESG ratings and stock price

volatility were significantly negatively related, and the results of the mechanism test indicated that carbon emission intensity (CE) plays a moderating role in the effect of ESG ratings on stock price volatility.

5. Summary and outlook

5.1 Full summary

Firstly, we analyzed whether the ESG rating release of a company can quickly affect the share price to obtain excess returns without considering other circumstances, and then concluded that excess returns can be obtained within the window of 3, 5 and 10 days of the rating release, indicating that the ESG rating release in the short term Without considering other factors, the excess returns can be obtained for company investors simply because of the rating release, and the higher the rating, the greater the excess returns. Then, the impact of ESG rating release of listed companies on company stock price volatility during the epidemic period is explored with the same sample, and it is found that high ESG ratings can improve the company's risk tolerance and reduce stock volatility during the market turbulence during the epidemic period.

After the outbreak of the new crown epidemic, sustainable investment in the capital market has gradually become mainstream, and more and more investors both at home and abroad have started to pay attention to ESG responsible investment. According to the results of this paper, ESG rating can have a positive impact on the excess return of stock investment and stock price volatility. Therefore, company management should first pay attention to the ESG performance of the company, integrate ESG concept into the development and management of the company, strengthen the performance of the company in three ESG indicators, i.e., environmental performance, social responsibility and corporate governance, continuously standardize corporate governance and internal control, and improve their ESG risk management and ESG performance. Regulators should also establish and improve ESG information disclosure mechanisms, guide the construction of domestic ESG evaluation systems, and create a favorable institutional environment for domestic ESG development.

5.2 Research shortcomings and research outlook

In this paper, we do an overall empirical analysis of A-shares, and we do not analyze the value effect of ESG ratings by sub-sectors, total market capitalization, etc., but only analyze the value effect of ESG ratings of Benshir institutions. Based on the shortcomings of this paper, we propose the following prospect for future research: the disturbing factors of ESG ratings' value effects on different types of companies, which may be related to the company's own characteristics, the characteristics of the industry in which the company is located, the characteristics of information disclosure, and the characteristics of the external environment. Future research can use case and group empirical studies to study specific influencing factors in order to correctly determine the possible interference of ESG ratings in the development process.

References

[1] Shen, Hongtao, Li, Shuangyi, Lin, Honghui, Wang, Xu. Rethinking the value relevance of ESG ratings based on risk perspective [J]. Finance and Accounting Monthly, 2022(05):11-19.

[2] Poter M.E. Kramer M.R. Strategy and Society: The Link between Competitive Advantage and Corporate Social Responsibility [J].Harval Business Review. Harval Business Review, 2006, 84(12):59-100.

[3] Cornell and Shapiro.Corporate Stakeholders and Corporate Finance [J].Financial Management, 1987: Spring.

[4] Dhaliwal,D,S., Li,O.Z. and Tsang, A. Voluntary Nonfinancial Disision and the Cost of Equality from an Event Study [J].Proceedings of the International Proceedings of the International Assionciation for Business and Socity,2009,20(9):17-22.

[5] Li Y, Gong M, Zhang X, et al. The impact of environmental, social, and governance disclosure on firm value: the role of CEO power [J]. The British Accounting Review, 2018, 50(1):60-75.

[6] Garcia AS, Orsato R J. Testing the institutional difference hypothesis: A study about environmental social, governance, and financial performance [J]. . Business Strategy and the Environment, 2020, 29(8):3261-3272.

[7] Bae K.H, El Ghoul S, Gong Z. J, et al. Does CSR matter in times of crisis? Evidence from the COVID-19 pandemic [J].Journal of Corporate Finance, 2021(2). 101876.

[8] Ning X, Xiao W-Zhou Fan. The impact of the epidemic on ESG investment [J]. Economic Management Digest, 2020, (20): 11-12.

[9] Cheema-Fox A, Laperla B R, Serafeim G,et al. Corporate Resilience and Response During COVID-19[J].SSRN Electronic Journal,2020.

[10] Shan C, Tang D Y. The Value of Employee Satisfaction in Disastrous Times: Evidence from COVID-19[J]. Social Science Electronic Publishing, 2020.

[11] Yan Lifang. Research on the relationship between corporate social responsibility information disclosure and market response [D]. Soochow University, 2013.

[12] Poter M.E. Kramer M.R. Strategy and Society: The Link between Competitive Advantage and Corporate Social Responsibility [J].Harval Business Review. Harval Business Review, 2006, 84(12):59-100.

[13] Zhu Nai-Ping, Zhu Li, Kong Yusheng, Shen Yang. A study on the synergistic impact of technological innovation investment, social responsibility commitment on financial performance [J]. Accounting Research, 2014(02):57-63+95.

[14] Ding W, Levine R, Lin C, et al. Corporate Immunity to the COVID-19 Pandemic [J]. NBER Working Papers, 2020.

[15] Li Hongyu, Lu Zhiqiang, Yao Haixin. The mechanism of social responsibility on corporate performance--a theoretical explanation based on social capital [J]. Soft Science, 2009, 23(10):133-137.

[16] Yang, Qingxiang, Yu, Lin, Song, Li. A study on internal control disclosure and market reaction--empirical evidence from listed companies in Shanghai, China [J]. Nankai Management Review, 2012, 15(01):123-130.

[17] Feng Liyan, Xiao Xiang, Cheng Xiao Ke. The effect of social responsibility on corporate risk--an analysis based on China's economic environment [J]. Nankai Management Review, 2016, 19(06):141-154.

[18] Ma Yin, Li Yan. A study on the impact of internal governance structure of listed companies on firm value [J]. Value Engineering, 2019, 38(35):1-4.

[19] Shen, Hongtao, Huang, Nan. Can carbon emission trading mechanism improve corporate value [J]. Finance and Trade Economics, 2019, 40(01):144-161.