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ESG RATING DIVERGENCE AND CORPORATE BUSINESS RISK

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Abstract

Focusing on China's publicly listed companies from 2015 to 2022, we analyze how ESG rating divergence (ESGD) affects corporate business risk. We found a significant positive relationship between ESGD and corporate business risk. The rating divergence increases corporate business risk by exacerbating corporate financing constraints, demising investor confidence, and harming corporate reputation. We further investigate the differential impact of different degrees of ESGD on corporate business risk and reveal a double-threshold effect - when enterprises' ESGD is between the two threshold levels, the impact is less strong. Further heterogeneity analysis finds that the impact of ESGD on business risk is smaller in SOEs and for enterprises with timely accounting information disclosure, in organizations with good ESG performance and audited by Big 4 accounting firms. Our findings suggest that ESGD can weaken a firm's market competitiveness. Moreover, our study has important policy and practice implications for companies, investors, and regulatory agencies and enhances our understanding of sustainability-related firms' competitiveness.

Keywords: *ESG rating, corporate business risk, financing constraints, investor confidence, corporate reputation*

JEL Classification: C12, G32, M14, Q56

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1 INTRODUCTION

The ESG (Environmental, Social, and Governance) framework traces its conceptual foundations to the 1970s, with its formal conceptualization occurring in 2004 through the United Nations Environment Programme (UNEP). This institutional clarification established ESG as a comprehensive corporate accountability paradigm, mandating organizational commitment to three core areas: environmental stewardship, social responsibility fulfillment, and corporate governance enhancement. To measure the enterprises' performance in terms of ESG and the efforts they have made over time, ESG evaluation systems have emerged. There are more than 30 major ESG data providers in the world, and those with greater international influence, such as MSCI, Thomson Reuters, Bloomberg, and Sustainalytics, have their own rating systems to evaluate the companies' ESG performance. Today, ESG ratings serve as an indicator of corporate sustainability performance. In the financial market, investors often incorporate these ratings into their decision-

making processes, while firms utilize them to guide governance reforms and value-enhancing initiatives. Consequently, the reliability of ESG ratings is paramount, as they influence both investment strategies and corporate behavioral adjustments.

Nevertheless, with the participation of multiple agencies in the rating business' ESG performance, there are divergence of different agencies in the selection of indicators, metrics and weighting, and the differences in term of corporate information disclosure (Hajek et al., 2024). Divergent ESG ratings are gradually becoming an issue. ESG rating divergence (ESGD, thereafter) denotes significant discrepancies in ESG assessments assigned to identical firms by different rating providers, and the prevalence of ESGD not only weakens the validity and reliability of ESG data but also affects the judgment and decision-making of market participants. As the influence of ESG continues to expand, investors and companies rely more and more on ESG rating results, but the divergence of rating results from different rating agencies is objective, making ESG data users feel that the ESG performance is uncertain. Our study tries to understand this rating divergence and investigate whether the ESGD has an impact on corporate business risk. Prior studies have shown that firms' ESG practices could contribute to firms' overall competitiveness by improving financial performance, managing risks, enhancing resilience and attracting investors[1]. In such cases, ESGD could undermine a company's competitiveness.

Focusing on China publicly listed companies between 2015 and 2022, we try to achieve the following objectives: First, to examine whether ESGD exacerbates corporate business risk; second, to investigate the channels through which ESGD influences corporate business risk; third, to explore whether the impact of ESGD varies across different types of companies; and finally, to employ threshold regression analysis to study the differential effects on corporate business risk when divergence falls within different ranges.

The remaining paper is arranged as follows: Section 2 reviews the theoretical foundations, synthesizes existing literature on ESGD and corporate business risk, and derives testable research hypotheses. Section 3 provides research methodology, data sources, and key variable constructions, as well as empirical model specification. Section 4 presents key findings, and conducts robustness checks to validate these findings. Section 5 examines three potential transmission mechanisms through which ESGD influences business risk, performs heterogeneity analysis across firm types, and implements threshold regression analysis. Finally, section 6 concludes with policy implications for corporate managers, investors, and regulatory bodies, along with insights into future research.

[1] See recent studies in this area by Xu et al., 2024; Nian et al., 2025; and Zhou et al., 2025.

2 THEORETICAL BACKGROUNDS

2.1 Literature Review

(1) Existence of ESGD

While ESG ratings have gained widespread adoption in academic research, significant concerns persist regarding rating divergence across agencies. Berg et al. (2022) conducted a correlation analysis of ratings from six prominent ESG rating providers, revealing pairwise correlations ranging from 0.38 to 0.71, with a mean correlation of just 0.54. Notably, some subcomponent ratings exhibited negative correlations, highlighting substantial methodological inconsistencies. Similarly, Gibson et al. (2021) examined S&P 500 firms' ESG ratings from seven providers, reporting an average inter-rater correlation of 0.46. Their analysis further identified the governance dimension as exhibiting the greatest divergence, while environmental ratings demonstrated relatively higher consistency.

Generally, such rating divergence can be caused by two types of factors: the technical side, i.e., divergence caused by different agencies' rating criteria, and the information source, i.e., divergence caused by different information disclosures. For the technical side, Berg et al. (2022) decompose disagreement into scope differences, metric differences, and weight differences, which contribute 38%, 56%, and 6%, respectively. Kotsantonis & Serafeim (2019) summarize the four reasons that generate disagreement: flawed data, misleading benchmark, interpolation of data, and insufficient information. For the divergence brought about by the information source, Christensen et al. (2022) find that more ESG information disclosure actually leads to a greater ESGD, which is explained by the fact that more disclosure seems to simply give more information to the rating agencies, allowing them to have different opinions and different interpretations. Kimbrough et al. (2022) examined the effect of voluntary ESG reporting on ESGD and found that for companies that voluntarily submit ESG reports, ESG rating agencies have lower divergence, and in particular, disclosures on environmental and social information reduce divergence.

(2) The consequences of ESGD

While academic consensus regarding the determinant of ESGD remains exclusive, its economic consequences for both investors and firms have been empirically documented. Christensen et al. (2022) demonstrate that ESGD not only correlates with increased return volatility and amplified price movements but also induces greater reliance on internal financing among affected firms. Serafeim and Yoon (2023) establish that while ESG ratings generally possess predictive power for future ESG-related market reactions, such predictive capacity is significantly attenuated by rating divergence—a finding corroborated by Billio et al. (2021) in the context of stock price

predictability. Further examining equity markets, Yu et al. (2023) identify ESGD as an exacerbating factor for stock price crash risk. Avramov et al. (2022) reveal that elevated ESG uncertainty corresponds with heightened perceived market risk, increased risk premiums, and reduced investor demand, potentially manifesting in augmented alpha and beta coefficients within capital asset pricing frameworks. Gibson et al. (2021) suggests that there is an ESG divergence risk premium, documenting a positive association between ESGD and stock returns. Finally, Abhayawansa & Tyagi (2021) further contend that ESGD amplifies information asymmetry, thereby impairing investment decision-making processes. The prevailing empirical evidence consistently indicates that ESGD generates adverse economic effects across multiple financial dimensions.

(3) Literature on corporate business risk

Corporate business risk can be affected by both internal and external factors. For example, Arif & Lee (2014) argued that when the external macroeconomy is more prosperous, firms are less likely to invest in projects with higher risks and returns, and therefore higher levels of risk. The study by Jo & Harjoto (2014) found that external analysts' attention helps to reduce firms' business risk. According to Goetz et al. (2016), geographical decentralization reduces banks' business risk. For internal factors, Anderson & Reeb (2003) find that when founding families occupy the position of majority shareholders, who are assumed to be non-diversified investors, firms have higher operational risk. Dong et al. (2010) find that firms rich in equity incentives are characterized by a greater tendency for managers to select risky projects and a greater tendency to prefer debt financing in their sources of financing, which makes the firms significantly riskier. Furthermore, Kini & Williams (2012) show that tournament-style incentives motivate managers to make more risky investments. Compared to firms with male CEOs, female CEO-led firms are less leveraged, have less volatile revenues, and have a higher chance of surviving the transition from male to female CEOs (vs. male to Female CEOs), according to Faccio et al. (2016). Baker & Wurgler (2013) argued that managerial overconfidence is highly likely to bring more risk to the firms. He et al. (2019) found, based on a hand-collected dataset of CEOs' multidimensional career experiences, that the richer the CEO's experience, the more risk-taking the firm engages in, enhances the firm's value creation.

(4) The cause of ESGD and its impact

Technical reasons and information source reasons account for most of the research on the causes of ESGD. From a technical perspective, divergence arises due to differences among rating agencies in processing and evaluating a company's ESG information. From an information source perspective, divergence stems from the reports provided by companies. Since various ESG-related reports serve as critical sources of information for rating agencies to assess companies, the current

lack of standardized reporting frameworks has led to inconsistent report quality across companies, which constitutes another significant reason for the ESGD.

Many scholars have argued that such ESGD has a negative economic impact primarily reflected in adverse effects on company stock prices and broader market inefficiencies. In the study of factors influencing corporate business risk, scholars have extensively explored both internal and external factors. However, ESGD has not yet garnered sufficient attention in this body of research. Given the growing influence of third-party ESG assessments in investment decision-making processes, the substantial cross-agency divergence in ESG ratings has emerged as a critical issue warranting scholarly investigation. Specifically, do they signal potential business risks within companies? What impacts do they have on companies and investors, and through what mechanisms?

2.2 Theoretical argument and research hypotheses

(1) ESGD and corporate business risk

ESG ratings represent a systematic assessment that evaluates company's performance in three critical areas: the environmental impact, the social responsibility, and the governance quality, which reflects the enterprise's sustainable development capability, and investors gradually incorporate the ESG performance of an enterprise into their investment decisions in order to fully understand the enterprise. Many rating agencies at home and abroad have already evaluated the ESG performance of enterprises, and market participants will take the ESG ratings of enterprises as the main reference basis for understanding the ESG performance of enterprises, however, the differences in information disclosure among enterprises and rating systems by various rating agencies have led to the emergence of divergent these ratings, which implies that there are different views of different rating agencies on the same enterprise in terms of ESG performance.

Overall, ESGD could have several impacts on company's business risk. First, ESGD increases market uncertainty, and divergence tends to signal the presence of more risk and uncertainty, and investors have to consider more risk factors (Avramov et al., 2022; and Gibson et al., 2021). Second, ESGD worsens the degree of market information. Corporate ESG disclosure should be used as incremental information for external use, and good ESG performance can alleviate corporate information asymmetry, the persistence of ESGD reduces the reliability of ESG-related information, making it difficult for external parties not only to question corporate ESG performance, but even to discern the truth of the information about ESG outside the ESG. Third, ESG ratings increase the difficulty of decision-making for the stakeholders. Investors in the market may suspend their investment behavior due to emotional instability, and management may make accurate judgments due to the difficulty of understanding the true ESG performance (Chatterji et al., 2016), which could impact corproate business decisions as well as associated business risk. In addition, Christensen et al (2022) document that the outside world will think that enterprises with large differences in ESG ratings may have the possibility of "bleaching green", which would lead

to an increase in the company's debt financing, raising question on on the enterprise's operations and solvency.

H1: ESGD increases corporate business risk.

(2) Financing constraint mechanisms

Financing constraints directly affect the ability of firms to raise capital. When firms face higher financing constraints, it may lead to poorer capital liquidity and limited investment capacity, restricting the daily operation and expansion of firms. A strong ESG performance—achieved through corporate social responsibility initiatives and the disclosure of robust environmental and governance data—can mitigate information asymmetries in capital markets (Jo et al., 2015). The persistent divergence in ESG ratings exacerbates informational friction between firms and external stakeholders. This discrepancy intensifies information asymmetry, particularly for capital providers, who face significant uncertainty in evaluating firm sustainability performance, reducing their willingness to borrow, which in turn affects firms' technological innovation and market competitiveness, and makes them lack sufficient coping capacity in the face of changes in the external environment.

Firms with high rating divergence have difficulty in gaining recognition from investors, governments and partners, and even more difficulty in obtaining external financing (Christensen et al., 2021). Facing higher financing constraints, firms are unable to obtain sufficient funds to support daily business activities, which reduces the operational efficiency of the firms, while firms may bear higher financing costs and adopt more aggressive financial strategies, which further increases the operational risks of the firms. Facing the problem of higher financing constraints will not only affect the problem of capital allocation, but also enterprises are more likely to borrow from banks or private borrowing, increasing the risk of financial leverage, and are more prone to mismanagement and other situations (Ferreira et al., 2019). It has been shown that an important reason for enterprise underinvestment is financing constraints (Campello & Larrain, 2016), and for startups and manufacturing enterprises, underinvestment and decline will negatively impact the firm production and operation (Edgerton, 2010), which further affects the trading activities between the enterprise's upstream and downstream partners, and ultimately impacts the safety and stability of the industry chain (Zhang & Liu, 2024), and enterprise operations are also negatively affected by the unstable industry chain.

H2a: ESGD raises business risk by exacerbating financing constraints.

(3) Investor confidence mechanisms

Investor confidence shows the optimistic or pessimistic attitude of investors towards the future economic situation and financial market development. When investor confidence is strong, they are more willing to invest and promote the prosperity of the market and increase value of the company, and when investor confidence is not enough, they will reduce the investment or withdraw

from the market, resulting in market weakness and the decline of the stock price. Studies have shown that investor sentiment positively impacts enterprise investment size. and if investors are overly optimistic, managers will adopt an expansive investment strategy in order to maximize the current stock price and to achieve sustainable corporate growth (Goyal & Yamada, 2004; Malcolm et al., 2004). Further, information transparency affects investor decision-making. When there are large ESGD among companies in the market, reflecting the divergences of evaluations of ESG performance, too many different voices may confuse investors, which in turn reduces investor confidence in the company' ESG performance.

In terms of the cause for the divergence, ESGD indicates to some extent the poor quality of corporate disclosure, which greatly affects investor decision-making. Most of the current research on ESG rating disagreement shows that it will bring negative impacts to the firms, firms with large disagreement will not only cause investors to question, but also firms with large ESG rating disagreement will receive more attention from the media, and when investors notice the firm's ESG rating disagreement, the mutual impacts will be further lowered when their confidence. Lower investor confidence may be further transmitted to the product market, reducing consumer confidence, affecting the market demand of enterprises, and thus increasing the enterprise business risk. When facing lower investor confidence, the enterprise's investment decision will become more conservative, reduce the investment in new projects or new technologies, the enterprise's external environment is in constant change, conservative investment decisions will lead to the enterprise to lose more opportunities, and difficult to adapt to the external environment, which makes the enterprise business risk increase.

H2b: ESGD reduces investor confidence thereby increasing corporate business risk.

(4) Corporate reputation mechanisms

The importance of corporate reputation in the current market environment cannot be ignored, it is the overall perception of stakeholders for the company, that includes the its current business process and past behavior, and results of all the comprehensive embodiment of the public psychological transformation, social recognition and credibility assessment of the manifestation of the results (Mai et al., 2021), and the enterprise's short-term interests, long-term development and sustained success, a good reputation can positively enhance business performance (Dowling, 2006). Roberts & Dowling (2002) pointed out that a better reputation enhances the firm's competitiveness. Firms tend to build reputation by gaining public recognition and sending positive signals, but disagreement, on ESG ratings for example, undermine such efforts. Corporate reputation can influence customer loyalty, and a good corporate reputation can give a company sustained competitiveness. Good corporate reputation is important as it can help firms to obtain investment, attract customers, expand market share, and earn more profits.

However, ESG rating disagreement could damage corporate reputation, and sending a negative signal compared to that of corporate ESG performance, and the uncertainty of ratings by third-

party rating agencies implies undesirable consequences that affect the public's perception of corporations. Based on the market pressure theory, this will trigger widespread concern among stakeholders, and a large amount of media attention and hype, damaging the reputation of the company, increasing the market pressure on the company and affecting the management's behavioral decisions, which in turn affects the company's day-to-day operations. This in turn could be transmitted to the product market, so that the consumer's consumption of the enterprise products and services, affecting the enterprise's revenue and profits. Furthermore the enterprise's customers are unwilling to continue to cooperate, resulting in customers loss or even flow to competitors, while the damage to the reputation of the employees for the enterprise's recognition of the decline in the enterprise's operational efficiency, will result in an increase in the enterprise business risk.

H2c: ESGD damages firms' reputation and thus increases the business risk.

3 METHODOLOGY AND DATA

3.1 Data sources

This study collects information on all domestic listed companies in Shanghai and Shenzhen stock exchange in China between 2015 and 2022. For ESG ratings, we utilize data from five rating providers: Hua Zheng, Wind, Hexun, Bloomberg, and CNRDS (China Research Data Service Platform). The company's financial information is based on the CSMAR database. Following the literature, we further screen the data: (1) Exclusion of samples with abnormal trading status (ST, PT, or *ST listed companies); (2) Removal of financial and insurance sector firms; (3) Elimination of observations with missing values for key variables; (4) Exclusion of firms with only one available ESG rating score (preventing calculation of standard deviation).

The final sample comprises 25,745 firm-year observations. To avoid the influence of outliers, we winsorized all continuous variables at 1%. All regression results incorporate firm-level cluster adjustments.

3.2 Model construction and variable definition

$$Risk_{i,t}=\alpha_0+\alpha_1 ESGD_{i,t}+\alpha_3 Controls_{i,t}+Firm+Year+\varepsilon_{i,t} \quad (1)$$

The variable being explained is the business risk (Risk). The degree of fluctuation of ROA is used to measure the business risk: ROA fluctuates more widely when business risks are higher. To isolate firm-specific performance from industry-wide effects, we also follow method in John et al. (2008) and compute industry-adjusted ROA as the difference between a firm's ROA and the median ROA of its sector in each fiscal year[2]. In year t, the business risk is: t, t+1 and t+2 three-year ROA standard deviation. This value= is multiplied by 100 to get business risk used in our study (Faccio et al., 2011).

[2]Consider the tenure of executives in China is generally three years, we select three years as the observation period for calculation.

The main explanatory variable is ESGD. In this paper, ESG scores published by five rating agencies are selected to construct ESGD. The rating scores of the remaining four agencies range from 0-100, except for Wind, whose rating score range is between 0-10, so Wind's rating data is first multiplied by 10 to make it comparable with the other rating agencies. In this paper, we refer to Avramov et al.'s (2022) measure of rating divergence, where one standard deviation is formed for each two agencies rating a firm, (up to 10 standard deviations can be formed for five rating agencies; samples that cannot form standard deviations have been excluded), and the mean of all the standard deviations is calculated for the particular firm, which is used as the firm's ESGD for the year. The advantage of this treatment is that it maximizes the use of available rating information. Specifically, taking the calculation of ESGD for Company A in 2022 as an example, assume that five institutions rated it in 2022. The standard deviation is calculated for each pair of ratings, resulting in 4 + 3 + 2 + 1 = 10 standard deviations. The average of these 10 standard deviations is then computed, and this average represents Company A's ESGD for 2022. Regarding the calculation of the standard deviation, assuming there are two scores, A and B, the standard deviation is $\sqrt{\frac{(A-\frac{A+B}{2})^2+(B-\frac{A+B}{2})^2}{2-1}}=\frac{|A-B|}{\sqrt{2}}$.

Drawing upon established determinants of corporate risk exposure documented in existing research, our empirical model incorporates the following control variables at the firm level: firm size (Size), gearing ratio (Lev), current ratio (Liquid), cashflow ratio (Cashflow), firm growth (Growth), financial leverage (FL), independence (Indep), shareholding of the first largest shareholder (Top1), Tobin's Q (TobinQ), number of years on the market (ListAge), and top three management pay (TMTPay). The variables are defined as shown in Appendix 1.

4 EMPICIAL RESULTS

4.1 Descriptive statistics

Our sample comprises 25,745 firm-year observations after applying the aforementioned data screening procedures. Table 1 illustrates the descriptive statistics for all key variables used in our study. The dependent variable, corporate business risk, exhibits substantial cross-sectional variation with a mean of 0.038, ranging from 0.000 to 0.327. The distribution is right-skewed, as evidenced by the mean exceeding the median. The primary explanatory variable, ESGD (ESGD), demonstrates significant dispersion across observations, with a mean of 21.850 (Min = 5.462, Max = 34.950), reflecting considerable heterogeneity in multi-agency ESG assessments. The distributional characteristics of other variables demonstrate concordance with previously documented empirical regularities.

Tab. 1 – Descriptive statistical analysis. Source: own research

Variable Name	N	Mean	SD	Min	Med	Max
Risk	25745	0.038	0.045	0.000	0.023	0.327
ESGD	25745	21.850	4.807	5.462	22.155	34.950
Size	25745	22.324	1.313	19.779	22.141	26.497
Lev	25745	0.421	0.202	0.052	0.412	0.933
Liquid	25745	2.409	2.226	0.223	1.693	15.796
Cashflow	25745	0.049	0.068	-0.181	0.048	0.267
Growth	25745	0.165	0.435	-0.677	0.099	4.124
FL	25745	1.227	0.862	-1.892	1.035	9.099
Indep	25745	37.808	5.413	28.570	36.360	60.000
Top1	25745	33.169	14.545	7.856	30.826	74.180
TobinQ	25745	2.116	1.509	0.800	1.642	16.647
ListAge	25745	2.179	0.839	0.000	2.303	3.401
TMTPay	25745	14.720	0.680	12.785	14.671	16.874

4.2 Base model

Table 2 reports in detail the base model regression results of ESGD on firms' business risk. Columns (1)-(4) show the results of stepwise inclusion of fixed effects and control variable, respectively, and the coefficients of our key interest, ESGD, are all significantly positive at the 1%. After controlling the impact of other factors, ESGD and Risk are still significantly positively correlated at the 1%, suggesting that the divergence of ESG ratings are associated with higher level of business risk, supporting the H1, both from the outside perspective - the existence of divergence based on the asymmetry of information, which makes it more difficult for outsiders to understand the enterprise, trust the enterprise; or from the internal point of view-it increases the difficulty of managerial decision-making, which makes it more difficult for outsiders to understand and trust the enterprise. Furthermore, as ESG principles gain prominence in financial markets, investors have become increasingly dependent on corporate ESG rating in investment decisions. Our empirical results reveals a positive relationship between cross-agency ESGD and firm-level business risk, suggesting that rating inconsistencies may undermine the informational value of ESG assessments, investors do not only focus on the rating results given by specific agencies when analyzing a certain enterprise, but also notice the size of rating divergence of the enterprise by multiple rating agencies, and take it as a reference for decision-making, reducing the possibility of decision-making errors.

Others, the coefficients of enterprise size (Size), gearing ratio (Lev) and listing age (ListAge) are significantly positive, indicating that enterprise with larger size, with higher gearing ratio, with older age, tend to have more business risk. Also, the coefficient of Independence (Indep) is significantly positive, indicating that the independent directors do play an effective role. Our results also show that firm liquidity (Liquid) is significantly negative associated with business risk,

which shows the strong short-term solvency of the enterprise could lower the business risk faced by the enterprise. We also find that amount shares of the largest shareholder have a negative impact on business risk. This may be due to the fact that when faced with the complexity of the outside world, decision-making efficiency is higher, which can help to reduce the business risk.

Tab. 2 – The impact of ESGD on corporate business risk. Source: own research

	(1)	(2)	(3)	(4)
	Risk	Risk	Risk	Risk
ESGD	0.064***	0.073***	0.032***	0.062***
	(7.197)	(8.059)	(3.653)	(7.076)
Size			-0.557***	0.809***
			(-9.886)	(5.151)
Lev			1.801***	2.049***
			(4.246)	(3.594)
Liquid			-0.064***	-0.116***
			(-2.596)	(-3.409)
Cashflow			-0.896	1.283**
			(-1.303)	(2.163)
Growth			0.155*	-0.426***
			(1.664)	(-4.896)
FL			-0.203***	-0.162***
			(-5.827)	(-5.208)
Indep			0.029***	0.017*
			(3.566)	(1.668)
Top1			-0.032***	-0.017**
			(-9.296)	(-2.031)
TobinQ			0.229***	0.057
			(6.490)	(1.346)
ListAge			0.215***	0.745***
			(3.467)	(4.523)
TMTPay			0.043	-0.194
			(0.549)	(-1.609)
Constant	2.422***	2.262***	13.594***	-14.990***
	(12.631)	(11.474)	(10.694)	(-4.258)
Firm FE	NO	Yes	NO	Yes
Year FE	NO	Yes	NO	Yes
N	25745	25261	25745	25261
Adj_R^2	0.0046	0.4529	0.0550	0.4643

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$， t-values in parentheses, regression results adjusted for firm-level clustering.

4.3 Robustness testing

(1) Instrumental variable (IV)

The relationship between ESGD and firms' business risk may suffer from endogeneity due to the existence of mutual causality, i.e., the rating agencies, due to the different rating indicators selected and the weights assigned to them, for firms with higher business risk, the problems may be manifested in a multitude of aspects of the firms, and thus the information captured by the rating agencies is greater, leading to greater divergence. Recognizing possible endogeneity issues, we implement an instrumental variable estimation strategy to ensure causal identification. In this paper, ESGD with a one-period lag is selected as an instrumental variable to be tested. The results are shown in Table 3, and the coefficient of ESGD is still significantly positive at 1%, which is consistent with the main results shown in Table 3.

Tab. 3 – Instrumental variable approach. Source: own research

	(1) First	(2) Second
	ESGD	Risk
l.ESGD	0.114***	
	(15.22)	
ESGD		0.225***
		(4.21)
Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
N	22861	22861
F	231.61	15.11

(2) Propensity score matching method (PSM)

To avoid the potential self-selection bias in our empirical analysis, we implement a propensity score matching (PSM) robustness test. The original data are stratified into treatment and control groups based on the 3rd quartile of ESGD. Using all control variables as covariates, we perform kernel matching, 1:4 nearest-neighbor matching, and martingale distance matching. As shown in the Table 4 columns (1)–(3), the ESGD remains statistically positively significant at the 1% level across all matching methods (nearest-neighbor, kernel, and martingale). This consistency confirms the robustness of our findings to potential sample selection issues.

(3) Replacement of the measurement of the main variables

First, to ensure robustness, we alternate the measurement window for ROA volatility—using a 3-year window in our primary analysis and a 5-year window for sensitivity testing. As presented in Table 4 column (4), the ESGD coefficient remains positive and statistically significant at the 1%,

corroborating findings in our base model. This consistency across alternative specifications reinforces the reliability of our conclusions.

Second, replacing the explanatory variables, using the standard deviation of all ESG scores for each firm in the robustness test. The regression results are shown in column (5) of Table 4, where the positive impact of ESGD on firms' business risk is still hold at the 1% level.

Tab. 4 – Propensity Score Matching and Replacement Main Variables Measure. Source: own research

	(1)	(2)	(3)	(4)	(5)
	Risk	Risk	Risk	Risk2	Risk
	Nearest neighbor matching	Nuclear matching	Martensitic match		
ESGD	0.071***	0.062***	0.076***	0.050***	
	(6.702)	(7.087)	(7.664)	(6.710)	
ESGD2					0.056***
					(6.972)
Size	1.026***	0.805***	1.148***	1.308***	0.817***
	(5.829)	(5.115)	(6.023)	(8.494)	(5.200)
Lev	2.097***	2.078***	2.048***	-0.213	2.064***
	(3.087)	(3.645)	(2.995)	(-0.394)	(3.617)
Liquid	-0.116***	-0.117***	-0.151***	-0.142***	-0.116***
	(-2.718)	(-3.436)	(-3.566)	(-4.011)	(-3.413)
Cashflow	0.868	1.220**	-0.145	0.538	1.267**
	(1.214)	(2.045)	(-0.206)	(1.108)	(2.135)
Growth	-0.690***	-0.433***	-0.793***	-0.076	-0.432***
	(-6.228)	(-4.915)	(-6.941)	(-1.121)	(-4.977)
FL	-0.200***	-0.162***	-0.168***	-0.094***	-0.162***
	(-5.378)	(-5.234)	(-4.583)	(-3.838)	(-5.198)
Indep	0.018	0.017*	0.011	0.010	0.017*
	(1.405)	(1.646)	(0.839)	(1.169)	(1.652)
Top1	-0.020**	-0.017**	-0.018*	0.000	-0.017**
	(-1.970)	(-2.025)	(-1.782)	(0.030)	(-2.055)
TobinQ	0.024	0.058	0.081	0.060	0.059
	(0.475)	(1.366)	(1.551)	(1.461)	(1.384)
ListAge	0.784***	0.737***	0.831***	-0.086	0.732***
	(4.098)	(4.484)	(4.219)	(-0.523)	(4.449)
TMTPay	-0.204	-0.197	-0.240	-0.475***	-0.199*
	(-1.302)	(-1.628)	(-1.496)	(-4.494)	(-1.650)
Constant	-19.190***	-14.830***	-21.484***	-18.825***	-15.098***

	(-4.674)	(-4.199)	(-5.043)	(-5.760)	(-4.278)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	17510	25233	16890	25261	25261
Adj_R^2	0.4548	0.4644	0.4677	0.6698	0.4641

(4) Oster test

In order to exclude possible omitted variables from influencing the results, we also checked our empirical findings following Oster's (2019) test. Table 5 illustrates the test results, the Oster bounds for the coefficients of the independent variables are [0.056, 0.062] do not contain 0 and fall within the 95% confidence interval [0.0449.0793], while the delta value is 2.235, which means that the unobserved variables have at least twice as much impact as the observed variables in order to make the Beta 0. This means that it is unlikely that there are unobserved variables as important as the observed variables to significantly affect the results of this paper, proving that there is no significant effect of unobserved variables on the results of this paper, and it is not likely that there are any significant effects of unobserved variables. This means that it is unlikely that there are unobserved variables have a significant influence on our results.

Tab. 5 – Oster test results. Source: own research

Parameter Assumption	
1.3R^2； delta=1	Beta=0
(1) Oster Boundary [0.056, 0.062]	(2) delta value 2.235

(5) Other robustness tests

First, high-dimensional fixed effects, given that the corporate business risk in the same industry may be affected by macro policies and other industry factors in different cycles, which in turn interferes with the conclusions of this paper, this paper controls the industry-year cross-multiplication fixed effects of the main regression model. The results are shown as the column (1) of Table 6, and the coefficient of ESGD is significantly positive at the 1%, consistent with the conclusions of the previous study.

Second, more control variables are included. Following both - Kimbrough et al.(2022) and Christensen et al.(2022), the mean value of firms' ESG scores (ESG) is also included as a control variable, and the total number of rating agencies (Num) is also included in order to avoid the effect of the number of rating agencies. The results are shown in Table 6 column (2), and the coefficient of ESGD on firms' business risk remains significantly positive at 1%.

Third, to mitigate potential confounding effects from extreme macroeconomic events—specifically China's 2015 stock market crash, and the 2019 COVID-19 pandemic—we exclude post-2015 and post-2019 observations and re-estimate our baseline model. As reported in Table 6 column (3), the coefficient for ESGD retains its positive sign and significance level. This

consistency across multiple robustness checks (including window adjustments and sample restrictions) further validates the reliability of our findings.

Tab. 6 – High-dimensional fixed effects and other robustness tests. Source: own research

	（1）	（2）	(3)
	Risk	Risk	Risk
ESGD	0.082***	0.048***	0.102***
	(8.702)	(5.141)	(6.019)
Size	0.716***	0.853***	0.630**
	(4.516)	(5.415)	(2.332)
Lev	2.085***	1.914***	1.534*
	(3.711)	(3.370)	(1.746)
Liquid	-0.107***	-0.116***	-0.211***
	(-3.302)	(-3.426)	(-4.062)
Cashflow	1.480**	1.352**	0.180
	(2.574)	(2.287)	(0.232)
Growth	-0.354***	-0.417***	-0.529***
	(-4.211)	(-4.819)	(-4.201)
FL	-0.150***	-0.162***	-0.057
	(-4.856)	(-5.204)	(-1.043)
Indep	0.015	0.018*	0.021
	(1.466)	(1.763)	(1.460)
Top1	-0.017**	-0.016**	-0.036***
	(-2.067)	(-1.976)	(-2.580)
TobinQ	0.085**	0.057	-0.005
	(1.969)	(1.339)	(-0.067)
ListAge	0.901***	0.794***	1.769***
	(5.353)	(4.781)	(5.454)
TMTPay	-0.207*	-0.164	0.069
	(-1.752)	(-1.364)	(0.362)
Num		-0.306**	
		(-2.500)	

MESG		-0.036***	
		(-3.910)	
Constatn	-13.552***	-13.441***	-16.631***
	（3.826）	(-3.740)	(-2.766)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Year*Ind	Yes	No	No
N	25089	25261	11484
Adj_R^2	0.4902	0.4650	0.6637

5 ADDITIONAL TEST RESULTS

5.1 Mediation effect test

To test the mediation effect, we run the following model,

$$MV_{i,t}=\beta_0+\beta_1 ESGD_{i,t}+\beta_2 Controls_{i,t}+Year+Firm+\varepsilon_{i,t} \quad (2)$$

where MV refers to the mediating variable and the rest of the variables are consistent with the main regression.

(1) Constraints on financing

This study employs the SA index to proxy for firm-level financing constraints, where higher values indicate more severe constraints. As presented in Table 7 column (1), the coefficient for ESGD is positive and statistically significant at the 1%, suggesting that rating inconsistencies exacerbate financing constraints. This result supports our Hypothesis H2a, wherein heightened financing constraints—induced by ESGD—ultimately amplify business risk exposure. When rating agencies disagree on corporate ESG performance, stakeholders will question the enterprise's sustainability, make more cautious decisions, and suspend or abandon investments, making it difficult for the enterprise to obtain the support of its stakeholders, thus exacerbating the financing constraints of the enterprise, and increasing the enterprise business risk.

(2) Investor confidence mechanism

This paper uses the total of daily turnover rate within the year to measure the investor confidence. When investor confidence is high, it will purchase more shares of the enterprise, and increase the stock turnover rate, i.e., the larger its value is, it indicates that the higher the investor confidence, and vice versa indicates that the lower the investor confidence is. From Table 7 column (2), the results show that ESGD is significantly negative at 1% level, indicating that ESGD significantly

reduces investor confidence, thus increasing the risk of enterprise operation, verifying the hypothesis of this paper, H2b. When investors rely on the results given by rating agencies to make decisions, they will face different views given by different agencies, which, on the one hand, makes investment decisions more difficult and damage to investor confidence, they will require higher financing costs; on the other hand, investors may be the enterprise's customers or consumers, damage to their confidence will increase the difficulty of the enterprise's operations, more likely to fall into operational difficulties, making the business risk rise.

(3) Corporate reputation mechanism

To measure corporate reputation, we construct a proxy variable as the natural logarithm of annual positive media coverage (online and print) plus one, where higher values reflect stronger reputation. Column (3) of Table 7 reports a statistically significant negative coefficient for ESGD at the 1% level, indicating that rating inconsistencies erode corporate reputation. This result supports Hypothesis H2c, wherein reputational damage serves as a transmission channel through which ESGD amplifies business risk. Firms with greater ESGD attract outsiders' attention (the media and the public), however, this may not a good thing. When firms attract attention due to divergence in ESG performance, the outside world tends to have a negative perception of the firm, which seriously damages the firm's reputation. When the reputation is damaged, the enterprise will have to face more external pressure, and the mistakes in behavioral decisions may be magnified, increasing the pressure on the enterprise's operation and making the situation more difficult.

Tab. 7 – Mediation effect test. Source: own research

	(1)	(2)	(3)
	SA	OsY	Rep
ESGD	0.001***	-2.281***	-0.004***
	(6.723)	(-2.679)	(-3.783)
Size	0.016***	-41.994***	0.330***
	(4.002)	(-3.683)	(18.912)
Lev	0.003	223.890***	-0.051
	(0.378)	(5.161)	(-0.853)
Liquid	0.003***	5.782	-0.003
	(6.294)	(1.538)	(-0.586)
Cashflow	-0.014**	265.097***	0.174**
	(-2.117)	(5.181)	(2.390)
Growth	-0.004***	16.963**	0.095***
	(-4.171)	(2.463)	(9.228)

FL	0.000	-0.915	-0.011**
	(1.294)	(-0.271)	(-2.232)
Indep	0.000	1.052	0.004***
	(0.245)	(1.179)	(2.981)
Top1	0.000	-6.758***	-0.005***
	(1.364)	(-9.310)	(-4.712)
TobinQ	0.013***	21.032***	0.128***
	(15.289)	(5.568)	(25.245)
ListAge	-0.066***	-1060.009***	-0.197***
	(-21.204)	(-47.438)	(-7.746)
TMTPay	-0.004**	29.288***	0.038***
	(-2.374)	(2.946)	(2.736)
Constant	-3.990***	3559.874***	-3.304***
	(-45.470)	(13.291)	(-8.394)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	25745	25261	24214
Adj_R^2	0.2297	0.5387	0.7837

5.2 Analyzing heterogeneities

(1) Timeliness of accounting information disclosure

Timely accounting information disclosure requires enterprises to collect, process and transmit accounting information on time to meet the needs of its users; outdated information may lose its decision-making value or even mislead information users. In addition to improving transparency and credibility, timely accounting information disclosure reduces information asymmetry, and enable stakeholders to understand the enterprise operation in a timely matter and increase their trust in enterprise. Follow this argument, we divide enterprises into two groups according to the median time of accounting information disclosure, and the results are shown in Table 8, columns (1) and (2). From the table, we observe that when the accounting information disclosure of enterprises is not timely, the coefficient of ESGD on the business risk of enterprises is greater than that of enterprises that disclose information in a timely manner. When external stakeholders are faced with ESGD of enterprises and cannot obtain timely accounting information disclosure of enterprises, it will trigger external skepticism and lose the trust of external stakeholders in

enterprises, thus ESGD has a greater impact on enterprise business risk in enterprises that do not make timely accounting information disclosure.

(2) Corporate ESG Performance

When two firms have the same divergence size, one of them may fluctuate above or below 80 points, while the other fluctuates above or below 40 points, and the ESGD's impact on business risk may depend on the firm's ESG performance. To address this possibility, we employ the average ESG rating from five agencies as a composite measure of corporate ESG performance. To examine heterogeneous effects, we stratify the sample into high- vs. low ESG groups based on the median ESG value. As reported in Table 8, columns (3) and (4), the impact of ESGD on business risk exhibits significant variation across subgroups. While ESGD shows no statistically significant effect for high-ESG firms, it demonstrates a strongly positive association (at the 1%) for low-ESG firms. The possible reason for this is that enterprises with overall high ESG ratings across different rating agencies are doing an excellent job in most of the indicators compared to the ones with low ratings, therefore the effect of ESGD on the enterprise's business risk for these firms is not significant.

Tab. 8 – Heterogeneity analysis of accounting disclosure timeliness and corporate ESG performance. Source: own research

	(1)	(2)	(3)	(4)
	Risk	Risk	Risk	Risk
	Untimely	In time	Good ESG performance	Poor ESG performance
ESGD	0.083***	0.025**	0.006	0.153***
	(6.667)	(2.242)	(0.634)	(9.021)
Size	1.303***	0.581**	0.609**	0.568***
	(5.662)	(2.304)	(2.237)	(2.609)
Lev	1.712**	0.872	-0.781	2.581***
	(2.010)	(1.013)	(-0.862)	(3.305)
Liquid	-0.134**	-0.104**	-0.029	-0.172***
	(-2.256)	(-2.323)	(-0.643)	(-3.471)
Cashflow	1.530*	0.900	3.059***	0.268
	(1.649)	(1.080)	(4.075)	(0.324)
Growth	-0.490***	-0.251*	0.303**	-0.554***
	(-3.972)	(-1.760)	(2.143)	(-5.033)
FL	-0.192***	-0.117**	-0.100*	-0.121***

	(-4.377)	(-2.364)	(-1.749)	(-3.000)
Inde	0.017	0.023*	0.029***	0.011
	(1.148)	(1.692)	(2.728)	(0.714)
Top1	-0.014	-0.006	0.002	-0.025**
	(-1.035)	(-0.544)	(0.203)	(-2.018)
TobinQ	0.105	0.063	0.171***	0.059
	(1.545)	(1.172)	(2.917)	(0.994)
ListAge	0.686**	0.830***	-0.207	1.469***
	(2.570)	(3.629)	(-0.970)	(4.862)
TMTPay	-0.465***	0.119	0.413***	-0.102
	(-2.606)	(0.728)	(2.606)	(-0.537)
Constant	-21.650***	-14.832***	-17.417***	-13.960***
	(-4.107)	(-3.033)	(-2.864)	(-2.687)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
P-Value	0.000		0.000	
N	12457	11587	12024	12406
Adj_R^2	0.4981	0.4429	0.5536	0.5228

(3) Ownership structure

Firms' ownership structure may influence the relationship between ESGD and firms' business risk, especially state-owned companies (SOEs) vs. non-SOEs. Additionally, one of the uniqueness characteristics of Chinese public listed firm is that Chinese companies generally have a very concentrated ownership structure. These large block holders are mostly state institutions with more than half of the listed Chinese firms being state-owned (SOE). Hass et al. (2016) show that this concentrated ownership negatively influences the information environment of listed firms and the monitoring functions of the board. Furthermore, in a recent study, Ning et al. (2024) shows that the unique compensation structure on top executive in SOEs in China causes a decrease in corporate social performance. In this sense, both weaker corporate governance structure and compensation structure, SOEs are less sensitive to ESGD.

In this paper, we divided firms into SOEs and non-SOEs according to the nature of the actual control of the firms. Table 9 columns (1) and (2) report the regression results of ESGD on firms' operating risk under different ownership structures, and that the results show that ESGD's impact on the business risk of non-SOEs is larger than those of SOEs. Considering SOEs have

considerably more social responsibilities than those of non-SOEs, and with higher influence by government policies, ESGD has a smaller impact on SOEs' business risk.

(4) Auditing standards

International Big 4 accounting firms have more stringent auditing standards and processes, and can provide more high-quality auditing services for enterprises and outsiders, this paper regresses according to whether or not the accounting firms employed by enterprises are international Big 4 grouping regression, and Table 9 columns (3) and (4) illustrate the findings. The results reveal a significant heterogeneity between ESGD and business risk across auditor types. The coefficient for ESGD is statistically insignificant for Big 4-audited firms, whereas it remains significantly positive at the 1% level for non-Big 4 audited firms. This differential effect suggests that engagement with premium audit partners mitigates the business risk implications of ESG rating inconsistencies, potentially through enhanced reporting quality and stakeholder confidence.

Tab. 9 – Property Heterogeneity and Whether it is Audited by the Big Four. Source: own research

	(1)	(2)	（3）	（4）
	Risk	Risk	Risk	Risk
	State enterprise	Non-state enterprise	Big 4	Non-Big 4
ESGD	0.041***	0.078***	-0.022	0.064***
	(3.036)	(6.426)	(-0.804)	(7.044)
Size	-0.206	0.900***	-0.509	0.919***
	(-0.703)	(4.434)	(-0.991)	(5.648)
Lev	5.003***	0.861	3.411**	1.974***
	(4.772)	(1.190)	(2.014)	(3.344)
Liquid	0.027	-0.142***	-0.027	-0.116***
	(0.339)	(-3.490)	(-0.278)	(-3.322)
Cashflow	0.929	1.053	1.813	1.192*
	(1.033)	(1.319)	(1.175)	(1.938)
Growth	-0.504***	-0.357***	0.128	-0.475***
	(-4.227)	(-3.053)	(0.424)	(-5.299)
FL	-0.154***	-0.179***	0.038	-0.171***
	(-3.782)	(-3.410)	(0.443)	(-5.236)
Indep	0.025**	0.010	-0.006	0.018*

	(1.977)	(0.636)	(-0.215)	(1.666)
Top1	-0.009	-0.026*	-0.015	-0.019**
	(-0.796)	(-1.896)	(-0.555)	(-2.203)
TobinQ	0.067	0.089*	-0.029	0.070
	(0.928)	(1.666)	(-0.290)	(1.584)
ListAge	0.342	1.093***	-0.224	0.769***
	(1.001)	(4.706)	(-0.386)	(4.480)
TMTPay	-0.208	-0.005	0.443	-0.125
	(-1.314)	(-0.030)	(1.458)	(-0.981)
Constant	5.878	-18.737***	8.225	-18.303***
	(0.977)	(-3.911)	(0.800)	(-4.993)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
P-Value	0.040		0.064	
N	7823	14889	1514	23694
Adj_R^2	0.4814	0.4856	0.5433	0.4658

5.3 Threshold analysis

In order to more carefully analyze the different impacts on business risk when ESGD is in different ranges, this paper takes ESGD as the threshold variable and obtains the threshold test results and threshold estimation results through the “repetitive self-sampling method” for 300 times. As shown in Table 10, from the threshold test results, there are two thresholds of 13.943 and 28.775. The results of the double threshold regression are shown in Table 11, where the coefficient of ESGD is larger than the coefficient when ESGD is smaller than the first threshold of 13.943 and larger than the second threshold of 28.775 when ESGD is between the first and second thresholds.

A possible reason for the existence of the threshold is the interaction between ESGD and “incremental” information[3]. When the ESGD is smaller than the first threshold, the ESGD of enterprises exists, and at the same time, the ESG ratings are more homogeneous, which can't provide incremental information for the outside world, and the negative impact of divergence will

[3] This incremental information could be at firm level, news from media, NGO report or direct survey to the company, etc. When the divergence moderately increases, that is, when it lies between the first and second thresholds, the escalation in divergence compels market participants to proactively gather "incremental information" to enhance the accuracy of their decision-making. Within this range, the positive effects of "incremental information" counteract some of the negative impacts brought about by the divergence, resulting in a reduction in the coefficient. However, as the divergence continues to expand and surpasses the second threshold, the extreme divergence incites market panic that far outweighs the beneficial role of additional incremental information.

be transmitted to other aspects, for example, the questioning of the performance of enterprises' ESG leads to the reduction of the authenticity of other information. The existence of disagreement not only provide “incremental” information, but also has a negative impact on information outside ESG, which means that the disagreement of ESG ratings at this stage has a greater impact on the business risk of enterprises.

When the ESGD is between the first and second thresholds, although the divergence has increased, the homogeneity of the results given by the rating agencies has decreased, and the “incremental” information plays a certain role, at this stage, the size of the divergence of the ESG ratings of enterprises is within the range of the outside world's tolerance. At this stage, the size of corporate ESGD is within the range that outsiders can “tolerate”, and in the face of divergence, outsiders will be more cautious, comprehensively analyze the information from multiple sources, and the “incremental” information mitigates the impact of divergence, resulting in a statistically significant attenuation of the estimated coefficient linking ESGD to firm-level business risk.

When the ESGD is greater than the second threshold, this rating divergence of the enterprise is too large, even if it can provide some incremental information, it cannot offset the greater impact of the ESGD, and the outside world is skeptical about the company’s ESG performance. China's stock market investors more retail investors, limited analytical ability, in the face of greater divergence more will cause panic, at the same time such enterprises because it can attract more attention, will also be more concerned about the media reports, and the media to divergence unusually large enterprises to report, will be the enterprise's concern, once there is work not done properly will be amplified, at the same time when the outside world to face the report, the negative attitude between the public and will interact with each other and produce more unstable emotions, thus the coefficient of ESG rating disagreement on enterprise business risk is elevated again.

Tab. 10 – Threshold test results. Source: own research

Threshold variables	Threshold number	Threshold value	F	P	Boundary value		
					10%	5%	1%
ESGD	first threshold	13.943	43.82	0.000	9.500	11.049	12.562
	Second threshold	28.775	12.22	0.023	8.266	9.599	13.125

Tab. 11 – Threshold effect regression results. Source: own research

	(1)
	Risk
ESGD	0.132***
（ESGD≤13.943）	(4.070)
ESGD	0.059***
（13.943＜ ESGD≤28.775）	(3.771)
ESGD	0.104***
（ESGD＞28.775）	(7.344)
Controls	Yes
Constant	-13.255***
	(-2.724)
Firm FE	Yes
Year FE	Yes
N	12054
R^2	0.0753

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

This study examines the impact of ESGD on corporate business risk using a sample of publicly listed Chinese companies between 2015 and 2022. It is found that, firstly, the study reveals that greater divergence in ESG ratings is strongly associated with elevated business risk at the firm level, and this finding persists after conducting extensive robustness checks; the mechanism test finds that ESGD increases enterprise operation risk by exacerbating the financing constraints of the enterprise, lowering the investor confidence, and damaging the enterprise reputation; secondly, the heterogeneity analysis finds that, among the SOEs and the enterprises with timely accounting disclosure, the impact of ESGD on enterprise operation risk is smaller. Second, the heterogeneity analysis finds that in SOEs and firms with timely accounting disclosure, the impact of ESGD on business risk is small, however, in firms with good ESG performance and audited by the Big 4, the impact of ESGD is insignificant; third, there is a double-threshold effect of ESGD on business risk, and when the value of ESGD is smaller than the first threshold and larger than the second threshold,

the impact of ESGD on business risk is larger than the value of ESGD at the first and second thresholds. When the value of ESGD is smaller than the first threshold and larger than the second threshold, the effect of ESGD on business risk is larger than the effect when the value of ESGD is between the first and second thresholds, which is due to the interaction of "incremental information" and disagreement.

Emerging markets such as China, have less stringent ESG regulation as well as enforcement compared to that of developed market (Vasiu & Elena, 2024). In addition, ESG rating agencies in emerging markets may face challenges in collecting data, that may affect the accuracy and consistency of ESG evaluation (Berg et al., 2022). In such a case, there may be less firm-level information contained in the ESG rating, so does the ESGD. On the contrary, our study shows that ESGD reflects important firm level information and is positively associated with firm level risks. While ESG rating and disclosure in China are still at a relatively early stage, our study provides empirical evidence on related issues in emerging markets and supports the development of sustainable practices in ESG disclosure (Singhania et al., 2024)."

6.2 Recommendations

This study carries significant implications for policy formulation and practical decision-making among regulators, corporate entities, and investment professionals. Specifically, our empirical findings provide policymakers with an overview of the risk associated with diverging ESG ratings at the firm level. In order to reduce this divergence, there is a need to standardize the disclosure of ESG information. Regulation in this area could focus more on disclosure requirements and enforcement to ensure that ESG related information is disclosed in a timely and accurate manner. The company may benefit from developing a close working relationship with various ESG rating agencies in light of the fact that divergences in ESG ratings increase the risk for the company. Furthermore, firms should be aware of the methods and information used by various rating agencies. Our study provides valuable insights regarding the variations in ESG ratings issued by different agencies, helping investors evaluate firm-specific risks stemming from rating divergence and thereby enhancing their financial decision-making.

6.3 Limitations of the research in this paper

A number of limitations have been identified in our study, including the following: First, in the ESG rating areas, there are a wide variety of rating agencies offering ESG ratings as different levels. We consider only a few ESG rating agencies in our current study, including CSI, Wind, Hexun, Bloomberg and CNRDS. Secondly, our study argues that firms could reduce ESGD by providing additional information. However, our study did not investigate which and what type of information could enhance ESG disclosure quality and reduce rating divergence. Research in the

future might focus on incremental information. Lastly, we examine business risk as measured by the accounting information of a company. It is possible that ESGD will reveal further corporate risks, such as greenwashing and fraud, which do not fall within the scope of our study.

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Appendix 1– Variable Definition Table

Variable Name	Symbol	Variable Definition
Corporate business risk	Risk	Standard deviation of industry-adjusted ROA from past three years
ESG rating divergence	ESGD	Average value of all “raters' divergences”
Company size	Size	Natural logarithm of total assets at year-end
Asset-liability ratio	Lev	Total liabilities at year-end/total assets at year-end
Current ratio	Liquid	Current assets/current liabilities
Cashflow ratio	Cashflow	Net cash flows from operating activities / total assets

Corporate Growth	Growth	Operating income for the current year / Operating income for the previous year - 1
Financial leverage	FL	(Net profit + income tax expense + finance costs) / (Net profit + income tax expense)
Independent	Indep	Number of independent directors/directors
Ownership (%) the largest shareholder	Top1	Number of shares held by the largest shareholder / Total number of shares
Tobin Q	TobinQ	Market capitalization/total assets
Number of years listed	ListAge	Natural logarithm of current year minus listed year plus 1
Remuneration of the top three members of management	TMTPay	Natural logarithm of total compensation of the top three executives

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