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The impact of ESG rating discrepancies on corporate stock liquidity

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Abstract. In recent years, with the continuous advancement of the dual-carbon goals, sustainable development has become a crucial issue in the global economy and corporate governance. Environmental, Social, and Governance (ESG) ratings have emerged as a focal point for both practitioners and academics. However, discrepancies in ESG ratings pose challenges for investor decision-making and significantly impact corporate governance efficiency and long-term sustainable development strategies. Using a sample of A-share listed companies on the Shanghai and Shenzhen stock exchanges from 2015 to 2022, this study examines the impact and underlying mechanisms of ESG rating discrepancies on stock liquidity. The findings reveal that greater ESG rating discrepancies lead to lower stock liquidity, and this conclusion remains robust after a series of endogeneity and robustness tests. Mechanism tests indicate that ESG rating discrepancies exacerbate corporate information asymmetry, increase business risk, and heighten financing constraints, thereby reducing stock liquidity. Heterogeneity analysis shows that the impact of ESG rating discrepancies on stock liquidity is more pronounced among non-state-owned enterprises, firms operating in regions with a higher degree of marketization, and heavily polluting industries. This study not only enriches research on the relationship between ESG rating discrepancies and capital market performance but also provides empirical evidence for investors, regulatory agencies, and corporate managers to better understand the economic consequences of ESG rating discrepancies.

Keywords: ESG rating discrepancies, stock liquidity, information asymmetry, business risk, financing constraints

1. Introduction

With the deepening of sustainable development concepts and the advancement of green governance, Environmental, Social, and Governance (ESG) ratings have gradually become integrated into corporate management and decision-making systems. The primary objective of ESG ratings is to disclose non-financial information related to environmental, social responsibility, and corporate governance aspects, thereby mitigating information asymmetry between investors and firms. This, in turn, helps investors identify a company's potential value and encourages improvements in corporate environmental and social responsibility practices [1, 2]. As a key indicator of market vitality and operational efficiency, stock liquidity plays a crucial role in capital markets. Adequate stock liquidity not only facilitates market transactions and enhances market efficiency [3] but also reduces corporate financing costs, optimizes corporate governance structures, and ultimately increases firm value [4].

However, as ESG rating systems continue to evolve and the number of rating agencies increases, the issue of rating discrepancies has become increasingly prominent. Due to differences in indicator selection, weighting allocation, and assessment methodologies among third-party rating agencies, as well as inconsistencies in data sources, the ESG ratings of the same company may vary significantly across different agencies. This phenomenon is prevalent on a global scale [5]. In China, institutions such as SynTao Green Finance, Hexun, Bloomberg, China Securities Index Co., Wind, and MioTech provide ESG ratings for A-share listed companies, yet their rating outcomes exhibit considerable variation. ESG rating discrepancies may create confusion for users of rating data and even lead to biases in ESG-driven practices. Existing studies suggest that ESG rating discrepancies weaken the effectiveness and reliability of information disclosure, exacerbate market return volatility, increase corporate financing costs, suppress firm value, and lead to higher stock price synchronicity.

This study makes several potential contributions. First, it expands the research on the economic consequences of ESG rating discrepancies. While existing literature primarily focuses on the impact of ESG rating discrepancies on firm value, green innovation, and financing costs, this study approaches the issue from a capital market perspective, examining its impact on stock liquidity and providing new empirical evidence on the role of ESG rating discrepancies in capital markets. Second, it further refines

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the understanding of the underlying mechanisms through which ESG rating discrepancies affect stock liquidity. Based on the theory of information asymmetry, this study explores how ESG rating discrepancies influence stock liquidity by intensifying information asymmetry, increasing business risk, and exacerbating financing constraints, thereby addressing gaps in existing research regarding mechanism identification. Additionally, this study enriches research on the factors influencing stock liquidity. Previous literature has primarily examined factors such as interactive information quality, the tone of earnings conference call transcripts, analyst coverage, and investor protection, while this study explores the impact of ESG rating discrepancies from the perspective of non-financial information. Third, the findings of this study provide valuable references for policy formulation and practice. The results offer decision-making support for investors using ESG rating data, provide empirical evidence for regulatory agencies to optimize ESG rating systems and improve information disclosure quality, and offer practical guidance for corporate managers in addressing ESG rating discrepancies and enhancing market recognition.

2. Literature review

2.1. Research on the economic consequences of ESG rating discrepancies

The emergence of ESG rating discrepancies primarily stems from two aspects: rating agencies and corporations. From the perspective of rating agencies, different institutions adopt their own evaluation standards, weighting schemes, and data sources, leading to variations in the ratings assigned to the same company. Additionally, differences in information acquisition channels, model algorithms, and subjective judgment further exacerbate rating discrepancies. From the corporate perspective, the quality and transparency of ESG disclosures vary significantly among firms. Selective disclosure or omission of key information in ESG reports results in incomplete data and information asymmetry, making it challenging for rating agencies to provide consistent assessments.

Wu et al. [6] found that ESG rating discrepancies increase the quantity of corporate green innovation but suppress its quality. Zhang et al [7]. discovered that ESG rating discrepancies raise the cost of corporate debt capital. Liu et al. [8] observed that ESG rating discrepancies lead to higher stock price synchronicity. He et al. [9] reported that ESG rating discrepancies enhance firms' voluntary information disclosure levels. Zhao et al. [10] found that ESG rating discrepancies reduce corporate operational resilience, while Gao et al. [11] revealed that ESG rating discrepancies encourage firms to engage in more tax avoidance activities. These findings indicate that existing research on ESG rating discrepancies primarily focuses on third-party institutions and corporate-level studies, with relatively limited attention to capital market impacts, and no consensus has yet been reached.

2.2. Research on the factors influencing stock liquidity

Stock liquidity is a crucial characteristic of capital markets, influenced by factors related to market microstructure, corporate characteristics, and macroeconomic conditions. Liu et al. [12] found that higher economic policy uncertainty leads to lower stock liquidity. Zhao et al. discovered that price limit reforms improved stock liquidity. Zhu et al. [13] observed that financial innovation enhances stock liquidity but also fuels managerial opportunism, resulting in stock price declines. Chen et al. [14] reported that a positive tone in earnings conference call responses facilitates stock liquidity. Gao et al. [15] found that innovative information disclosure effectively improves corporate stock liquidity. Although these studies have provided in-depth insights into the factors affecting stock liquidity, research gaps remain. Current literature primarily focuses on policy environments, market reforms, and information disclosure but pays limited attention to ESG rating discrepancies as a non-financial information variable. While some studies explore the impact of information disclosure on liquidity, they have yet to examine in detail how ESG rating discrepancies exacerbate information asymmetry and, in turn, affect stock liquidity.

3. Theoretical analysis and research hypotheses

3.1. ESG rating discrepancy and stock liquidity

ESG rating discrepancy refers to differences in evaluations of the same firm's Environmental, Social, and Governance (ESG) performance by various rating agencies. This discrepancy directly influences investors' assessments of corporate social responsibility and sustainable development potential, thereby affecting stock liquidity. In China's retail investor-dominated capital market, where information access is limited and information asymmetry between investors and firms is relatively high, investors tend to rely more heavily on third-party rating agencies. To some extent, ESG rating discrepancies reflect diverse market interpretations of a firm's ESG performance, potentially prompting firms to improve the quality of their information disclosure. Additionally, rating discrepancies often attract media and public attention, increasing a firm's visibility in the capital market [16]. Greater media coverage may draw in more investors, particularly short-term traders and retail investors, whose trading activities enhance market activity and improve stock liquidity. Moreover, rating discrepancies may lead to divergent expectations about a firm's future performance among investors, resulting in varying investment strategies. Some investors may take advantage of short-term price fluctuations, strengthening the market's price discovery function and boosting stock liquidity. Based on this reasoning, the following hypothesis is proposed:

H1a: ESG rating discrepancies enhance corporate stock liquidity.

However, when different rating agencies assign significantly divergent ESG ratings to the same firm, investors may struggle to interpret these ratings, exacerbating market information asymmetry [17]. To acquire the necessary information, investors must invest more time and resources and may demand higher stock returns to compensate for the additional costs. Due to time and effort constraints, some investors may choose to avoid such firms altogether, reducing market activity and weakening stock liquidity [18]. Additionally, rating discrepancies can alter the composition of investors and increase market volatility. Different investors react differently to rating discrepancies, potentially causing ESG-oriented investors to exit while attracting short-term arbitrageurs [19]. This phenomenon may also trigger herd behavior among investors, and in cases of substantial negative rating discrepancies, it could even lead to panic selling. Changes in investor composition and heightened market volatility increase trading costs, further impairing market liquidity. Furthermore, from a regulatory perspective, ESG rating discrepancies reflect inconsistencies in market standards for ESG evaluation, which may introduce policy uncertainty. Such uncertainty raises compliance costs and risks for market participants [20], influencing investor expectations regarding future regulations and dampening market activity. Based on this reasoning, the alternative hypothesis is proposed:

H1b: ESG rating discrepancies reduce corporate stock liquidity.

3.2. Mechanisms through which ESG rating discrepancy affects stock liquidity

3.2.1. Information asymmetry

ESG rating discrepancies may affect stock liquidity by increasing information asymmetry. These discrepancies heighten investor uncertainty regarding a firm's actual ESG performance, widening the information gap between investors and corporate management, thereby increasing information asymmetry. In stock markets, information asymmetry makes it difficult for investors to accurately assess stock value, leading to more cautious trading and reduced liquidity. As information asymmetry intensifies, discrepancies in investor valuation of a firm also widen. Some investors, facing high information acquisition costs, may avoid stocks with significant rating discrepancies, which not only erodes market confidence but also reduces trading volume, further restraining stock liquidity. Specifically, when ESG rating discrepancies are large, investors may struggle to accurately evaluate a firm's ESG risks, leading them to either trade less or demand higher risk compensation, ultimately resulting in lower stock liquidity.

3.2.2. Corporate operating risk

ESG rating discrepancies may also impact stock liquidity by increasing corporate operating risk. First, these discrepancies reflect varying market perceptions of a firm's ESG performance, and differences in rating agency criteria may lead to increased firm-specific risk [21]. Firms with large rating discrepancies may be hiding potential issues such as environmental pollution or product quality concerns, prompting creditors, suppliers, and other stakeholders to adopt more stringent risk control measures, such as raising borrowing rates or reducing trade credit financing, thereby increasing corporate financial pressure [22]. Additionally, uncertainty surrounding operating risks influences institutional investor decision-making, potentially leading to reduced trading frequency or capital withdrawal, which decreases market depth. Moreover, liquidity providers in the stock market, when unable to accurately assess a firm's true financial condition, may widen bid-ask spreads to hedge against potential risks, further exacerbating liquidity constraints [23]. Thus, ESG rating discrepancies impact stock liquidity through the operating risk channel, manifesting as rising trading costs, declining market depth, and tightening liquidity constraints.

3.2.3. Financing constraints

ESG rating discrepancies may also indirectly affect stock liquidity through financing constraints. First, uninformed traders often widen bid-ask spreads to offset losses caused by information asymmetry. When rating discrepancies are large, financial institutions and investors may harbor doubts about a firm's ESG performance, leading them to tighten financing conditions or raise financing costs. Additionally, as rating discrepancies become publicly known, investors' risk perceptions heighten, prompting them to demand higher risk premiums and employ wider bid-ask spreads, thereby increasing trading costs and reducing market liquidity [24]. From a supply chain perspective, ESG rating discrepancies may further limit stock liquidity by constraining corporate trade credit financing. When discrepancies are substantial, firms' upstream and downstream partners (e.g., suppliers and customers) may develop concerns about the firm's ESG performance, leading to reduced trade credit limits or shorter payment terms [25]. The tightening of trade credit financing increases firms' short-term financing pressure, restricting operational cash flow and affecting daily business activities and investments. A decline in operational efficiency not only weakens a firm's profitability and market competitiveness but also further affects its stock market performance. Ultimately, financing constraints, through the supply chain channel, exacerbate stock liquidity deterioration.

Based on the above analysis, the following hypothesis is proposed:

H2: ESG rating discrepancies reduce stock liquidity by increasing information asymmetry, exacerbating corporate operating risk, and tightening financing constraints.

4. Research design

4.1. Sample selection and data sources

This study selects data from A-share listed companies on the Shanghai and Shenzhen stock exchanges from 2015 to 2022 and applies the following screening criteria: (1) Excluding ST and *ST companies; (2) Excluding listed companies in the financial and insurance industries; (3) Excluding samples with missing key variables; (4) To mitigate the impact of extreme values, all continuous variables are Winsorized at the 1% level on both ends. After these screening steps, the final sample comprises 22,969 firm-year observations. Firm-level data are obtained from the CSMAR database.

4.2. Variable definitions

The variables used in this study are defined as follows:

4.2.1. Dependent variable: stock liquidity (Amihud)

Referring to the methodology of Wu et al. [6], this study employs the Amihud illiquidity measure (see Equation 1):

$$ILLIQ_{it} = \frac{1}{D_{it}} \sum_{d=1}^{D_{it}} \left(\frac{\backslash r_{i,t,d} \backslash}{V_{i,t,d}} \right) \times 10^8 \quad (1)$$

where D_{it} represents the number of trading days for stock i in year t, $r_{i,t,d}$ denotes the daily return of stock i on day d in year t after considering cash dividend reinvestment, and $V_{i,t,d}$ is the daily trading value (in million RMB) of stock i on day d in year t. The ratio $|r_{i,t,d}|/V_{i,t,d}$ measures the price impact per unit of trading volume. A higher ILLIQ value indicates greater price sensitivity to trading volume, implying higher trading costs and lower stock liquidity. To facilitate interpretation of empirical results, this study uses the inverse of ILLIQ as the measure of stock liquidity, denoted as Amihud. A higher Amihud value indicates greater stock liquidity.

4.2.2. Independent variable: ESG rating discrepancy (ESGdif6)

Following the methodology of He et al. [9], this study selects ESG ratings from six rating agencies: SynTao Green Finance, Hexun, Bloomberg, China Securities Index Co. (CSI), Wind, and MioTech. For ratings provided by SynTao Green Finance, Hexun, Bloomberg, CSI, and Wind, each rating level is assigned a numerical value from 0 to 9, in ascending order. MioTech employs a 27-level rating system, which is adjusted for comparability. The lowest rating is assigned a score of 0, the second-lowest a score of 1, the third-lowest a score of 2, and so forth, with the highest rating assigned a score of 26. This score is then rescaled to a 0–9 range by multiplying it by 9/26. The ESG rating discrepancy is measured as the standard deviation of the ESG ratings assigned by different agencies to firm i in year t. If only one ESG rating is available, the discrepancy is set to 0. The standard deviation of the six assigned ESG ratings after rescaling is used as the measure of ESG rating discrepancy.

4.2.3. Control variables

Following Wu et al. [6] and He [9], this study includes the control variables listed in Table 1, which account for other factors affecting stock liquidity. These include institutional investor ownership (INS), Tobin's Q (TQ), return on assets (ROA), growth capability (GRO), leverage ratio (LEV), firm size (SIZE), listing age (ListAge), CEO duality (Dual), audit quality (Big4), and ownership concentration (TOP1). Additionally, year-fixed effects (YEAR) and industry-fixed effects (IND) are included.

Table 1. Variable definitions

Variable Type	Symbol	Variable Name	Definition
Dependent Variable	Amihud	Stock Liquidity	
Independent Variable	ESGSTD	ESG Rating Discrepancy	
	SIZE	Firm Size	Natural logarithm of total assets at year-end
	LEV	Financial Leverage	Total liabilities / total assets
	ROA	Return on Assets	Net profit / total assets
	GRO	Firm Growth	(Current-year revenue – Previous-year revenue) / Previous-year revenue
Control Variables	TOP1	Ownership Concentration	Shares held by the largest shareholder / total shares
	DUAL	CEO Duality	1 if the chairman and CEO positions are held by the same person, 0 otherwise
	BIG4	Audit Quality	1 if audited by a Big Four accounting firm, 0 otherwise
	INS	Institutional Investor Ownership	Shares held by institutional investors / total shares
	TQ	Tobin's Q	(Market value of equity + Market value of net debt) / total assets

Table 1. Continued

	ListAge	Listing Age	Natural logarithm of (Listing year – Sample year + 1)
	YEAR	Year Fixed Effect	Year dummy variables
	IND	Industry Fixed Effect	Industry dummy variables

4.3. Model design

To examine the impact of ESG rating discrepancy on stock liquidity, the following baseline regression model (1) is established (see Equation 2):

$$Amihud_{i,t} = \alpha_0 + \alpha_1 ESGdif6 + \alpha_2 Controls_{i,t} + \sum YEAR + \sum IND + \varepsilon_{i.t} \quad (2)$$

where i represents firms and t represents years. $Amihud$ denotes stock liquidity, $ESGdif6$ represents ESG rating discrepancy, and α_1 is the key coefficient of interest in the model. Standard errors are adjusted using firm fixed effects.

5. Empirical analysis

5.1. Descriptive statistics

Table 2. Descriptive statistics

Variable	N	Mean	Min	Max	Median	Standard Deviation (SD)
Amihud	22,969	0.158	0.002	5.649	0.029	0.725
ESGdif6	22,969	0.884	0.000	2.828	0.707	0.746
Size	22,969	22.33	20.000	26.37	22.140	1.313
ROA	22,969	0.042	-0.259	0.229	0.041	0.069
Lev	22,969	0.416	0.0580	0.902	0.407	0.201
Growth	22,969	0.174	-0.574	2.311	0.110	0.394
ListAge	22,969	2.106	0.000	3.367	2.303	0.931
Top1	22,969	0.336	0.0840	0.736	0.313	0.146
Dual	22,969	0.298	0.000	1.000	0.000	0.457
Big4	22,969	0.065	0.000	1.000	0.000	0.246
INST	22,969	0.430	0.003	0.909	0.444	0.249
FIXED	22,969	0.200	0.002	0.671	0.168	0.154
TobinQ	22,969	2.104	0.832	8.935	1.652	1.402

As shown in Table 2, the mean value of stock liquidity ($Amihud$) is 0.158, with a relatively large standard deviation (0.725), indicating substantial variation in liquidity levels across firms. Some firms exhibit low stock liquidity, while others have high liquidity. The mean ESG rating discrepancy ($ESGdif6$) is 0.884, with a maximum value of 2.828, suggesting significant differences in ESG rating discrepancies among firms and substantial uncertainty in ESG ratings across different companies.

5.2. Baseline regression results

Table 3 presents the regression results of ESG rating divergence (ESGdif6) on stock liquidity (Amihud). Columns (1) to (3) correspond to the regression results without any control variables, with control variables but without controlling for time and industry fixed effects, and with all control variables included, respectively. In Column (1), the regression coefficient of ESGdif6 is -0.171 and is statistically significant at the 1% level, indicating that greater ESG rating divergence is associated with lower stock liquidity. As shown in Columns (2) and (3), after incorporating control variables and industry and year fixed effects, the regression coefficients of ESGdif6 are -0.094 and -0.098, respectively, both remaining significantly negative at the 1% level. A one-standard-deviation increase in ESG rating divergence corresponds to an average decrease in stock liquidity by approximately 9.83% of the sample standard deviation ($-0.098 \times 0.3354/0.0334$). This finding suggests that market inconsistencies in ESG ratings significantly reduce stock liquidity, supporting the validity of H1b.

Table 3. ESG ratings and stock liquidity: baseline regression

	(1)	(2)	(3)
	Amihud	Amihud	Amihud
ESGdif6	-0.171***	-0.094***	-0.098***
	(-27.16)	(-15.27)	(-16.57)
Size		-0.059***	-0.060***
		(-11.03)	(-11.33)
ROA		0.600***	0.561***
		(7.71)	(7.21)
Lev		0.246***	0.241***
		(8.54)	(8.37)
Growth		-0.085***	-0.085***
		(-7.25)	(-7.22)
ListAge		-0.259***	-0.263***
		(-43.59)	(-44.38)
Top1		-0.053	-0.062*
		(-1.47)	(-1.75)
Dual		-0.036***	-0.034***
		(-3.60)	(-3.34)
Big4		0.041**	0.048**
		(2.14)	(2.47)
INST		0.141***	0.136***
		(6.09)	(5.84)
FIXED		-0.016	-0.021
		(-0.56)	(-0.73)
TobinQ		-0.020***	-0.022***
		(-5.67)	(-6.04)
_cons	0.310***	2.003***	2.042***
	(42.41)	(18.21)	(18.64)
N	22969	22969	22969
IND	YES	YES	YES
YEAR	YES	YES	YES
R-Squared	0.031	0.155	0.157
F	737.440	350.932	354.953

5.3. Endogeneity treatment

5.3.1. Instrumental variable regression

To address the potential bidirectional causality between ESG rating divergence (ESGdif6) and stock liquidity (Amihud), this study employs an instrumental variable regression. The first-stage regression results show that the coefficient of ESG rating divergence is 0.947 and is statistically significant at the 1% level. The F-statistic (961.087) exceeds the empirical threshold, indicating that the instrumental variable is appropriately chosen. The second-stage regression results reveal that the regression coefficient of ESGdif6 is -0.027 (p<0.05), suggesting that even after addressing endogeneity concerns, ESG rating divergence still significantly reduces stock liquidity.

Table 4. ESG ratings and corporate stock liquidity – instrumental variable regression

	(1)	(2)
	ESGdif6	Amihud
Esgdiss_IV	0.947***	
	(93.36)	
ESGdif6		-0.027**
		(-2.05)
Size	0.096***	-0.073***
	(21.61)	(-12.83)
ROA	-0.211***	0.635***
	(-3.34)	(8.16)

Table 4. Continued

Lev	0.047*	0.238***
	(1.92)	(7.97)
Growth	-0.041***	-0.101***
	(-4.27)	(-8.61)
ListAge	0.068***	-0.272***
	(13.73)	(-44.13)
Top1	0.070**	-0.112***
	(2.40)	(-3.13)
Dual	0.004	-0.024**
	(0.45)	(-2.36)
Big4	-0.007	0.049**
	(-0.47)	(2.55)
INST	-0.020	0.127***
	(-1.08)	(5.48)
FIXED	0.026	-0.039
	(0.85)	(-1.05)
TobinQ	0.039***	-0.033***
	(12.39)	(-8.47)
_cons	-2.342***	
	(-25.37)	
N	22969	22969
IND	YES	YES
YEAR	YES	YES
R-Squared	0.496	0.143
F	961.087	320.902

5.3.2. Propensity Score Matching (PSM)

To mitigate endogeneity concerns arising from omitted variables, this study conducts a robustness test using the Propensity Score Matching (PSM) method. ESG rating divergence may be influenced by other corporate characteristics, which in turn could affect stock price synchronicity. To reduce this potential bias, the sample is matched using the PSM approach, followed by a re-estimation of the regression model on the matched data. Specifically, following the methodology of Zhang et al., the median of ESG rating divergence is first calculated to classify the sample into two groups: a high ESG rating divergence group (assigned a value of 1) and a low ESG rating divergence group (assigned a value of 0). Next, using all control variables as covariates, a 1:1 nearest-neighbor matching method is applied. Column (1) of Table 5 reports the regression results based on the PSM-matched sample, showing that the coefficient of ESGdif6 is -0.015 and remains statistically significant at the 5% level. This indicates that even after controlling for differences in corporate characteristics, ESG rating divergence still significantly reduces stock liquidity, consistent with the previous findings.

5.3.3. Lagged explanatory variables

Table 5 reports a regression coefficient of -0.015 for ESG rating divergence, which is statistically significant at the 5% level. Additionally, to account for lag effects, the explanatory variable is lagged by one and two periods for regression analysis. The results show that both the one-period lagged and two-period lagged ESG rating divergence variables ($L.ESGdif6$ and $L2.ESGdif6$) have a significantly negative impact on stock liquidity, confirming the long-term effect of ESG rating divergence on stock liquidity.

Table 5. ESG ratings and corporate stock liquidity – endogeneity treatment

	(1)	(2)	(3)
	PSM	One-Period Lagged Explanatory Variable	Two-Period Lagged Explanatory Variable
	Amihud	Amihud	Amihud
ESGdif6	-0.015**		
	(-2.25)		
L.ESGdif6		-0.002***	
		(-6.45)	
L2.ESGdif6			-0.002***
			(-5.07)

Table 5. Continued

Size	-0.055***	-0.017***	-0.018***
	(-9.91)	(-69.00)	(-56.64)
ROA	0.370***	-0.038***	-0.045***
	(4.75)	(-11.06)	(-10.58)
Lev	0.145***	0.012***	0.016***
	(4.75)	(9.19)	(9.20)
Growth	-0.052***	0.001	0.001
	(-4.30)	(1.55)	(1.24)
ListAge	-0.159***	-0.001***	-0.002***
	(-24.84)	(-3.21)	(-3.43)
Top1	-0.024	0.018***	0.019***
	(-0.65)	(11.04)	(8.97)
Dual	0.002	0.001	0.000
	(0.21)	(1.35)	(0.10)
Big4	0.040**	0.005***	0.005***
	(2.08)	(5.78)	(4.43)
INST	0.099***	0.014***	0.017***
	(4.14)	(13.08)	(11.72)
FIXED	-0.056	0.004**	0.006***
	(-1.48)	(2.22)	(2.89)
TobinQ	-0.027***	-0.005***	-0.005***
	(-6.84)	(-29.70)	(-21.73)
_cons	1.663***	0.406***	0.430***
	(14.19)	(80.88)	(65.52)
N	11,239	18,016	14,354
IND	YES	YES	YES

5.4. Robustness Tests

To further verify the robustness of the regression results, this study conducts four types of robustness tests.

(1) Adding Individual Fixed Effects: Column (1) of Table 6 shows that after adding individual fixed effects, the coefficient of ESG rating divergence (ESGdif6) remains -0.001 and is still significant at the 1% level, indicating that controlling for individual fixed effects does not affect the original conclusion.

(2) Replacing the Explanatory Variable: Column (2) of Table 6 reports the results when changing the measurement method of the explanatory variable. Specifically, ESG rating divergence is measured using the standard deviation of ESG scores from four rating agencies: SynTao Green Finance, China Chengxin, Wind, and MioTech (e.g., ESGdif4). The results still show a significant negative correlation at the 1% level.

(3) Double Clustering Effect Test: Column (3) of Table 6 shows that after clustering at both the individual and industry levels, the results remain consistent. The coefficient of ESG rating divergence is -0.081 and is significant at the 1% level.

(4) Excluding the Impact of the Pandemic: Column (4) of Table 6 presents the results after excluding samples from 2020 and beyond. The findings remain robust, with the ESG rating divergence coefficient at -0.081, still significant at the 1% level.

Table 6. Endogeneity Treatment and Robustness Tests

	(1)	(2)	(3)	(4)
	Adding Individual Fixed Effects	Changing the Measurement Method of the Explanatory Variable	Double Clustering Effect (Clustering by Individual and Industry)	Excluding the Impact of the Pandemic
	Amihud	Amihud	Amihud	Amihud
ESGdif6	-0.001***		-0.094***	-0.081***
	(-4.08)		(-17.79)	(-8.76)
ESGdif4		-0.001***		
		(-5.67)		
Size	-0.015***	-0.017***	-0.059***	-0.081***
	(-17.96)	(-68.99)	(-14.27)	(-9.69)
ROA	-0.028***	-0.029***	0.600***	0.896***
	(-6.64)	(-8.53)	(10.63)	(7.60)

Table 6. Continued

Lev	0.007***	0.021***	0.246***	0.325***
	(2.65)	(15.93)	(10.60)	(7.60)
Growth	0.001*	0.000	-0.085***	-0.110***
	(1.92)	(0.43)	(-9.55)	(-6.44)
ListAge	0.010***	-0.000	-0.259***	-0.464***
	(7.07)	(-0.58)	(-29.07)	(-49.76)
Top1	0.035***	0.023***	-0.053	-0.275***
	(7.07)	(14.36)	(-1.47)	(-5.09)
Dual	0.001*	0.000	-0.036***	-0.034**
	(1.95)	(0.52)	(-3.47)	(-2.20)
Big4	0.001	0.005***	0.041***	0.095***
	(0.48)	(5.93)	(2.83)	(3.09)
INST	0.013***	0.015***	0.141***	0.363***
	(4.12)	(14.33)	(5.35)	(10.35)
FIXED	0.005	0.000	-0.016	-0.089**
	(1.34)	(0.36)	(-0.68)	(-2.08)
TobinQ	-0.005***	-0.006***	-0.020***	-0.031***
	(-17.48)	(-35.76)	(-6.93)	(-5.59)
_cons	0.340***	0.408***	2.003***	2.942***
	(18.94)	(80.83)	(21.49)	(17.04)
N	17456	18016	22969	14366
IND	YES	YES	YES	YES
YEAR	YES	YES	YES	YES
ID	YES	NO	NO	NO
R-Squared	0.674	0.417	0.155	0.247
F	66.756	725.069	95.475	391.819

6. Further Analysis

6.1. Mechanism Testing

This study explores the potential channels through which ESG rating divergence (ESGdif6) affects stock liquidity by analyzing the mechanisms of information asymmetry, corporate operational risk, and financing constraints. Therefore, following Jiang Ting [26], this study conducts a test of H2 (see Equation 3):

$$Med_{it} = \beta_0 + \beta_1 ESGdif6_{i.t} + \beta_2 Controls_{i,t} + \epsilon_{it} \quad (3)$$

where Med represents the mechanism variable, specifically referring to information asymmetry (ASY), corporate operational risk (RISK), and financing constraints (SA), and β_1 is the key coefficient of interest.

6.1.1. Information asymmetry mechanism

Column (1) of Table 7 shows that under the information asymmetry mechanism, the coefficient of ESG rating divergence is -0.040 and is significant at the 1% level. This indicates that divergence in ESG ratings exacerbates information asymmetry, thereby suppressing stock liquidity. From the perspective of information collection costs, ESG rating divergence increases the difficulty for investors in processing information, requiring them to allocate more resources to assess a company's ESG performance [24], which reduces trading willingness and weakens market activity. From the perspective of transaction costs, information asymmetry leads liquidity providers to widen bid-ask spreads to hedge against uncertainty risks, increasing transaction costs and further dampening liquidity. From the perspective of market participants' behavior, information asymmetry may induce adverse selection, where investors with information disadvantages reduce trading or exit the market due to concerns about being exploited by more informed investors, ultimately decreasing stock liquidity.

6.1.2. Corporate operational risk mechanism

Column (2) of Table 7 shows that under the corporate operational risk mechanism, ESG rating divergence has a significantly positive impact on corporate operational risk (RISK), with a coefficient of 0.01, significant at the 5% level. This suggests that ESG divergence may increase corporate operational risk, affecting long-term sustainability. From the perspective of risk exposure,

different ESG ratings reflect varying levels of environmental, social, and governance risks, increasing investor uncertainty regarding a company's future performance [21]. From the perspective of risk premium, ESG rating divergence may lead investors to demand a higher risk premium to compensate for potential operational risks, thereby driving up corporate financing costs [18]. From the perspective of market reaction, heightened operational risk weakens investor confidence, leading to reduced trading activity and consequently lowering stock liquidity.

6.1.3. Financing constraints mechanism

Column (3) of Table 7 shows that under the financing constraints mechanism, ESG rating divergence has a significantly positive impact on financing constraints (SA), with a coefficient of 0.014, significant at the 1% level. This indicates that ESG divergence may exacerbate corporate financing constraints. From the perspective of financing costs, ESG rating divergence increases investor uncertainty regarding a company's future outlook, prompting financial institutions and investors to demand higher risk premiums, thereby raising corporate financing costs [25]. From the perspective of capital liquidity, increased financing constraints limit a company's operating capital and investment capacity, affecting profitability and market performance, which in turn weakens stock liquidity [24]. From the perspective of market trading, heightened financing constraints may lead to reduced stock trading activity, as investors, concerned about a company's financial stability, reduce transactions or exit the market, further decreasing stock liquidity. ESG rating divergence, by intensifying financing constraints, raises financing costs and restricts corporate capital liquidity, ultimately undermining stock liquidity.

Overall, the mechanism test results indicate that ESG rating divergence affects stock liquidity through three main channels: information asymmetry, operational risk, and financing constraints. Under the information asymmetry mechanism, ESG divergence amplifies investors' cognitive differences regarding corporate information, thereby affecting market liquidity. Under the corporate operational risk mechanism, ESG divergence increases operational risks, influencing stock risk premiums. Under the financing constraints mechanism, discrepancies in ESG performance may increase financing difficulties, thereby affecting corporate capital liquidity.

Table 7. Mechanism testing

	(1)	(2)	(3)
	Information Asymmetry Mechanism	Corporate Operational Risk Mechanism	Financing Constraints Mechanism
	ASY	RISK	SA
ESGdif6	-0.040***	0.001**	0.014***
	(-11.06)	(2.43)	(6.40)
Size	-0.338***	-0.000	0.085***
	(-121.88)	(-0.42)	(48.45)
ROA	-0.394***	-0.249***	-0.498***
	(-9.83)	(-38.60)	(-19.73)
Lev	0.409***	-0.019***	-0.083***
	(27.59)	(-8.19)	(-8.86)
Growth	-0.026***	0.010***	0.006*
	(-4.25)	(10.13)	(1.68)
ListAge	0.020***	-0.001***	-0.163***
	(6.42)	(-2.79)	(-83.99)
Top1	0.350***	-0.023***	0.074***
	(19.06)	(-8.16)	(6.37)
Dual	-0.018***	0.002**	0.016***
	(-3.43)	(2.51)	(4.99)
Big4	-0.045***	-0.001	0.104***
	(-4.56)	(-0.53)	(16.67)
INST	0.242***	-0.010***	-0.063***
	(20.27)	(-5.44)	(-8.33)
FIXED	0.016	-0.023***	0.041***
	(1.04)	(-10.00)	(4.33)
TobinQ	-0.157***	0.004***	0.035***
	(-80.69)	(13.27)	(28.55)
_cons	7.208***	0.066***	-5.454***
	(126.29)	(7.45)	(-151.44)
N	22969	21160	22969
IND	YES	YES	YES
YEAR	YES	YES	YES

Table 7. Continued

R-Squared	0.560	0.113	0.319
F	2205.470	207.140	769.891

6.2. Heterogeneity analysis

6.2.1. Property rights nature

From the perspective of enterprise ownership, State-Owned Enterprises (SOEs) tend to place greater emphasis on ESG under policy guidance and have relatively abundant financial and resource support. In contrast, non-SOEs, operating under market competition pressure, are more sensitive to ESG investments, making them more affected by ESG discrepancies. As shown in Table 8, columns (1) and (2), ESGdif6 exhibits a significant negative correlation with stock liquidity in both SOEs (-0.031) and non-SOEs (-0.117), with a stronger effect in non-SOEs. This suggests that discrepancies in ESG performance have a greater impact on non-SOEs.

6.2.2. Degree of marketization in regions

Regarding the degree of marketization, investors in highly marketized regions tend to focus more on corporate sustainability. Inconsistencies in ESG performance in such regions are more likely to trigger risk-averse behavior among investors, thereby increasing liquidity constraints for enterprises. As shown in Table 8, columns (3) and (4), the coefficient of ESGdif6 is -0.107 in highly marketized regions and -0.073 in less marketized regions. Both coefficients are significantly negative, but the impact is stronger in highly marketized areas. This indicates that in competitive and well-developed capital markets, ESG discrepancies have a more pronounced negative effect on corporate liquidity.

6.2.3. Industry pollution attributes

From an industry perspective, heavily polluting industries face stricter environmental regulations and social scrutiny, making investors more likely to adjust their investment decisions based on ESG information. When there are significant ESG performance discrepancies, investor confidence in heavily polluting enterprises may decline, leading to reduced stock liquidity. As shown in Table 8, columns (5) and (6), the coefficient of ESGdif6 is -0.120 for heavily polluting enterprises, compared to -0.069 for non-heavily polluting enterprises, indicating that ESG discrepancies have a more significant impact on heavily polluting firms.

Table 8. Heterogeneity testing

	(1)	(2)	(3)	(4)	(5)	(6)
	State-Owned Enterprises	Non-State-Owned Enterprises	Highly Marketized Regions	Less Marketized Regions	Heavily Polluting Enterprises	Non-Heavily Polluting Enterprises
	Amihud	Amihud	Amihud	Amihud	Amihud	Amihud
ESGdif6	-0.031***	-0.117***	-0.107***	-0.073***	-0.120***	-0.069***
	(-4.46)	(-13.79)	(-12.33)	(-8.50)	(-12.05)	(-9.20)
Size	-0.038***	-0.078***	-0.058***	-0.060***	-0.062***	-0.054***
	(-7.23)	(-9.48)	(-6.98)	(-8.91)	(-6.63)	(-8.93)
ROA	0.515***	0.639***	0.675***	0.499***	0.640***	0.542***
	(5.42)	(6.12)	(6.03)	(4.70)	(5.02)	(5.80)
Lev	0.101***	0.331***	0.239***	0.235***	0.273***	0.212***
	(3.41)	(7.91)	(5.44)	(6.34)	(5.58)	(6.28)
Growth	-0.037***	-0.100***	-0.108***	-0.059***	-0.098***	-0.075***
	(-2.91)	(-6.11)	(-6.09)	(-3.92)	(-4.87)	(-5.52)
ListAge	-0.194***	-0.302***	-0.281***	-0.238***	-0.303***	-0.217***
	(-28.01)	(-34.80)	(-31.40)	(-30.56)	(-30.77)	(-30.42)
Top1	-0.040	-0.162***	-0.021	-0.127***	0.001	-0.103**
	(-1.01)	(-3.16)	(-0.40)	(-2.68)	(0.02)	(-2.39)
Dual	-0.015		-0.031**	-0.041***	-0.053***	-0.021*
	(-1.01)	(-1.64)	(-2.22)	(-2.88)	(-3.34)	(-1.67)
Big4	0.055***	-0.000	0.047	0.035	0.044	0.040*
	(3.26)	(-0.01)	(1.49)	(1.51)	(1.39)	(1.74)

Table 8. Continued

INST	0.010	0.136***	0.080**	0.216***	0.140***	0.136***
	(0.29)	(4.54)	(2.44)	(6.59)	(3.79)	(4.74)
FIXED	-0.029	-0.059	0.043	-0.044	-0.086	-0.000
	(-1.12)	(-1.23)	(0.84)	(-1.27)	(-1.63)	(-0.01)
TobinQ	-0.018***	-0.013***	-0.019***	-0.019***	-0.020***	-0.020***
	(-4.27)	(-2.78)	(-3.73)	(-3.84)	(-3.38)	(-4.71)
_cons	1.482***	2.477***	2.027***	1.982***	2.176***	1.810***
	(13.58)	(14.63)	(11.82)	(14.21)	(11.27)	(14.41)
N	7,953	15,016	12,469	10,500	10,674	12,295
IND	YES	YES	YES	YES	YES	YES
YEAR	YES	YES	YES	YES	YES	YES
Intergroup Coefficient Difference Test P-Value	0.025		0.003		0.022	
R-Squared	0.135	0.164	0.161	0.149	0.171	0.137
F	103.248	245.806	199.683	153.151	183.272	162.950

7. Conclusion and implications

Using a sample of A-share listed companies on the Shanghai and Shenzhen stock exchanges from 2015 to 2022, this study examines the impact of ESG rating divergence on stock liquidity and its underlying mechanisms. The findings reveal that greater ESG rating divergence is associated with lower stock liquidity, and this conclusion remains robust after a series of endogeneity and robustness tests. Mechanism analysis indicates that ESG rating divergence exacerbates corporate information asymmetry, increases operational risk, and heightens financing constraints, ultimately leading to a decline in stock liquidity. Heterogeneity analysis further shows that the impact of ESG rating divergence on stock liquidity is more pronounced among non-state-owned enterprises, firms in highly marketized regions, and heavily polluting industries. These findings offer several key insights.

From an investor's perspective, investors should enhance their ability to assess ESG information by examining data from multiple rating agencies, cross-referencing corporate ESG reports, and considering industry-specific factors for a comprehensive evaluation. Additionally, investors need to balance ESG considerations with liquidity risks by including stocks with higher ESG rating consistency in their portfolios to mitigate liquidity-related uncertainties. Although ESG rating divergence may trigger short-term market fluctuations, companies with strong ESG performance tend to exhibit greater long-term sustainability. Therefore, investors should adopt a long-term investment perspective to avoid misjudgments caused by short-term rating fluctuations.

From a corporate management perspective, ESG rating divergence not only affects stock liquidity but may also expose potential risks such as environmental violations or governance deficiencies, posing higher demands on corporate managers. Companies should strengthen ESG disclosure and communication by regularly publishing ESG reports that provide detailed information on environmental, social, and governance performance to alleviate market concerns. Furthermore, firms should optimize ESG strategies and risk management by integrating ESG goals into daily operations and establishing effective risk mitigation mechanisms. Since ESG rating divergence may exacerbate financing constraints, companies should enhance their ESG performance to improve their access to financing, achieve higher ESG ratings, reduce financing costs, and attract long-term investors.

From a regulatory perspective, ESG rating divergence reflects inconsistencies in rating standards and insufficient information disclosure. Regulatory bodies should promote the standardization of ESG rating systems by developing a unified ESG disclosure framework and rating criteria to reduce discrepancies among rating agencies. Additionally, regulators should strengthen oversight of corporate ESG disclosures by requiring firms to provide regular ESG reports and ensuring the accuracy and completeness of disclosed information through rigorous evaluations. Given that ESG rating divergence may contribute to market volatility, regulatory authorities should guide the market in adopting a rational approach to ESG ratings through policy interventions and investor education, thereby fostering the healthy development of capital markets.

References

[1] Xu, X., Zhang, Z., & Zhao, P. (2022). Recent advancements in corporate ESG information disclosure research. *Rural Finance Research*, (8).

[2] Fang, X., & Hu, D. (2023). Corporate ESG performance and innovation: Evidence from A-share listed companies. *Economic Research Journal*, (2).

[3] Majeed, M. T., & Yan, C. (2022). ESG performance and firm value: The moderating role of market competition. *Journal of Business Ethics*, *175*, 1–20.

[4] Wen, J., & Feng, G. (2021). Stock liquidity, equity governance, and the performance of state-owned enterprises. *China Econo mic Quarterly*, 21(4), 1301–1322. https://doi.org/10.13821/j.cnki.ceq.2021.04.09

[5] Billio, M., Costola, M., Hristova, I., Latino, C., & Pelizzon, L. (2021). Inside the ESG ratings: (Dis)agreement and performan ce. *Corporate Social Responsibility and Environmental Management*, *28*(5), 1426–1441.

[6] Wu, F., Hu, H., Lin, H., & Ren, X. (2021). Corporate digital transformation and capital market performance: Empirical evide nce from stock liquidity. *Management World*, (7), 130–144.

[7] Zhang, Y., Yang, H., & Zhang, X. (2023). ESG rating divergence and the cost of debt capital. *Financial Review*, *15*(4), 22–43, 124.

[8] Liu, X., Yang, Q., & Hu, J. (2023). ESG rating divergence and stock price synchronicity. *Chinese Soft Science*, (8), 108–120.

[9] He, T., Li, Y., & Wang, Z. (2023). Does ESG rating divergence enhance voluntary information disclosure of listed companie s? *Accounting and Economic Research*, 37(3), 54–70. https://doi.org/10.1631/j.cnki.31-2074/f.2023.03.006

[10] Zhao, Y., Sun, Y., & Feng, T. (2024). How does supplier ESG rating divergence affect corporate operational resilience? *Chin a Industrial Economics*, (11), 174–192. https://doi.org/10.19581/j.cnki.ciejournal.2024.11.010

[11] Gao, Y., & Liang, Z. (2025). ESG rating divergence and corporate tax avoidance. *Finance and Accounting Monthly*, *46*(1), 6 4–69. https://doi.org/10.19641/j.cnki.42-1290/f.2025.01.009

[12] Liu, Y., & Du, M. (2020). Economic policy uncertainty, monetary policy, and stock market liquidity: An empirical analysis b ased on the TVP-VAR model. *Journal of Dalian University of Technology (Social Sciences)*, *41*(5), 42–50. https://doi.org/10. 19525/j.issn1008-407x.2020.05.006

[13] Zhu, F., Wu, W., & Yang, Y. (2023). ETFs, stock liquidity, and stock price crash risk. *Journal of Financial Research*, (6), 169–186.

[14] Chen, Y., Xiao, Z., & Feng, L. (2025). Reply tone and stock liquidity: Mitigation or deterioration? *Finance and Accounting Monthly*, *46*(3), 114–120. https://doi.org/10.19641/j.cnki.42-1290/f.2025.03.018

[15] Gao, H., & Gu, M. (2015). Analysis of factors affecting stock liquidity in low-carbon industries: An empirical study based on stock price indexes. *Social Sciences Review*, *30*(3), 47–51. https://doi.org/10.16745/j.cnki.cn62-1110/c.2015.03.043

[16] Dyck, A., Lins, K. V., Roth, L., & Wagner, H. F. (2019). Do institutional investors drive corporate social responsibility? Inte rnational evidence. *Journal of Financial Economics*, *131*(3), 693–714.

[17] Serafeim, G., & Yoon, A. (2022). Stock price reactions to ESG news: The role of ESG ratings and disagreement. Harvard B usiness School Working Paper.

[18] Du, X., & Yu, C. L. (2021). ESG rating disagreement and stock liquidity: Evidence from the Chinese market. *Journal of Business Ethics*, *173*, 1–20.

[19] Baker, M., & Wurgler, J. (2006). Investor sentiment and the cross-section of stock returns. *Journal of Finance*, *61*(4), 1645–1680.

[20] Leuz, C., & Wysocki, P. D. (2016). The economics of disclosure and financial reporting regulation: Evidence and suggestions for future research. *Journal of Accounting Research*, *54*(2), 525–622.

[21] Christensen, D. M., Serafeim, G., & Sikochi, A. (2022). Why is corporate virtue in the eye of the beholder? The case of ES G ratings. *The Accounting Review*, *97*(1), 147–175.

[22] Li, Z., & Feng, L. (2022). Corporate ESG performance and access to trade credit. *Journal of Finance and Economics*, (12), 151–165.

[23] Boulton, T. J., & Braga-Alves, M. V. (2017). The skin in the game effect and retail investors: Evidence from the Lending C lub. *Journal of Financial Markets*, *35*, 103–118.

[24] Cen, L., Dasgupta, S., Elkamhi, R., & Pungaliya, R. S. (2016). Reputation and Loan Contract Terms: The Role of Principal Customers. *Review of Finance*, *20*(2), 501-533.

[25] Gibson Brandon, R., Krueger, P., & Schmidt, P. S. (2021). ESG Rating Disagreement and Stock Returns. *Journal of Financia l and Quantitative Analysis*, 56(7), 2455-2490.

[26] Jiang, T. (2022). Mediating and moderating effects in causal inference empirical research. *China Industrial Economics*, (5), 100–120.

[27] Chen, G., & Han, H. (2010). Value effect test of voluntary information disclosure. *Research on Financial Issues*, (5), 60–68.

[28] Li, X., Liang, R., & Li, Y. (2023). Does ESG affect stock liquidity? — A dual perspective based on ESG ratings and rating disagreement. *International Financial Research*, (11), 75–86. https://doi.org/10.16475/j.cnki.1006-1029.2023.11.007

[29] Ni, J., & Kong, L. (2016). Environmental information disclosure, bank credit decisions, and debt financing costs: Empirical ev idence from heavily polluting industries listed in China's A-share market. *Economic Review*, (1).

[30] Song, K., Xu, L., Li, Z., & Wang, F. (2022). Can ESG investment promote liquidity creation in banks? — Also discussing t he moderating effect of economic policy uncertainty. *Financial Research*, (2), 61–79.

[31] Yu, P., & Zhong, R. (2009). Can individual investor sentiment predict market returns? *Nankai Business Review*, (1), 96–101.

[32] Zhang, Z., Li, Y., Zhang, Y., & Liu, X. (2014). Testing indirect indicators of stock liquidity in the Chinese stock market: E mpirical analysis based on bid-ask spreads. *Economics (Quarterly)*, (1), 233–262.

[33] Akerlof, G. A. (1970). The market for "lemons": Quality uncertainty and the market mechanism. *The Quarterly Journal of Ec onomics*, *84*(3), 488–500.

[34] Boehmer, E., & Wu, J. (2013). Short selling and the price discovery process. *Review of Financial Studies*, *26*(2), 287–322.

[35] Cheng, B., Ioannou, I., & Serafeim, G. (2014). Corporate social responsibility and access to finance. *Strategic Management Jo urnal*, *35*(1), 1–23.

[36] Fazzari, S. M., Hubbard, R. G., & Petersen, B. C. (1988). Financing constraints and corporate investment. *Brookings Papers on Economic Activity*, *1988*(1), 141–206.

[37] Glosten, L. R., & Milgrom, P. R. (1985). Bid, ask, and transaction prices in a specialist market with heterogeneously informe d traders. *Journal of Financial Economics*, *14*(1), 71–100.

[38] Hong, H., & Kacperczyk, M. (2009). The price of sin: The effects of social norms on markets. *Journal of Financial Econom ics*, *93*(1), 15–36.

[39] North, D. C. (1990). *Institutions, institutional change, and economic performance*. Cambridge University Press.