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Interactive information disclosure and non-penalty regulatory review risk

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ABSTRACT

Using monthly data from the Shenzhen Stock Exchange's 'Hudongyi' platform and comment letters from December 2014 to December 2018, this study investigates the influence of interactive information disclosure on non-penalty regulatory review risk. The findings reveal that the richness and activeness of interactive information disclosure are positively associated with regulatory review risk. Moreover, the non-penalty regulatory review is effective as it significantly reduces the probability of receiving a comment letter in the subsequent three periods. The timeliness of interactive information disclosure is negatively associated with regulatory review risks. Additionally, we find that newspaper media coverage partially mediates the relationship between interactive information disclosure and regulatory review risk. For companies with low levels of internal governance, in low-competitive industries, and state-owned companies, the positive relationship between the number of investor questions and regulatory review risk is strengthened. These findings enrich the literature on the determinants of regulatory review risk and the economic consequences of interactive information disclosure in emerging markets.

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1. Introduction

Given the maturity of, and improvement in, China's capital market over recent years, the front-line regulatory model of exchanges based on investor demand has become increasingly important. In China's current regulatory system, administrative punitive supervision (represented by a penalty notice) and non-administrative punitive supervision (represented by a comment letter review) are common supervisory measures. Comment letters, an important means of non-penalty regulatory reviews in the capital market, allow exchanges to supervise the market. Although a comment letter review mainly requires listed companies to disclose additional information, it is not an administrative penalty; the market fully recognizes such regulatory actions.

To further strengthen awareness of the main responsibility of information disclosure by listed companies, the Shenzhen Stock Exchange implemented information disclosure through the train system in 2014 and published comment letters and company response letters on its website. Since the Shenzhen Stock Exchange sent its first comment letter in December 2014,

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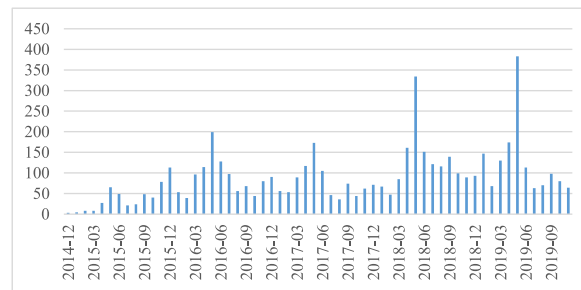


Fig. 1. Comment letters sent by the Shenzhen Stock Exchange each month.

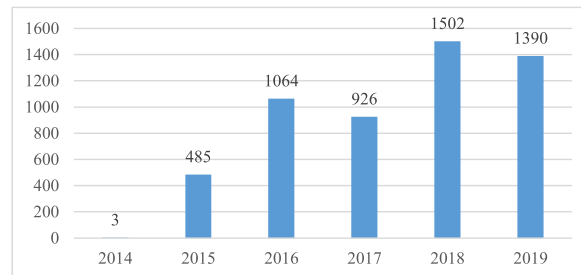


Fig. 2. Comment letters sent by the Shenzhen Stock Exchange each year.

the number of comment letters and the frequency of non-penalty regulatory reviews have continued to increase (Figs. 1 and 2). As of November 2019, the Shenzhen Stock Exchange had sent 5370 comment letters.

Once the Shenzhen Stock Exchange sends a comment letter to a listed company, it is required to submit a written response and make a public disclosure. If the company response letter is unresolved or unclear, the Shenzhen Stock Exchange will send another comment. Recent studies have found that the comment letter regulatory review process may negatively impact a company and cause strong adverse market reactions (Cassell et al., 2013; Gietzmann and Isidro, 2013; Kubick et al., 2016), including reducing investors' trust. Comment letters reduce investor trust and signal 'bad news', which means that the company may fail to meet investor expectations. As a semi-governmental institution, the Shenzhen Stock Exchange's public condemnation and exposure methods may have negative effects on listed companies, and these effects have a strong influence and binding force.

A comment letter may also prompt other supervisory agencies (such as auditing firms) to strengthen their monitoring of a company (Bens et al., 2016), which also leads to negative investor perceptions, draws the regulator's attention to other substantive issues, and can uncover additional irregularities and deficiencies (Francis, 2011; Ryans, 2016; Brown et al., 2018). The announcement of a comment letter indicates that the quality of the company's information disclosure has been called into question by regulatory reviewers, consequently affecting stakeholders' judgments and trust in the company's intrinsic value. Following this, extensive time and effort are required to resolve such issues (Hesarzadeh and Bazrafshan, 2018).

Hence, rational companies try to avoid regulatory review risks and unnecessary hassles. The existing literature (Cassell et al., 2013, 2019; Cunningham et al., 2017) has identified several factors that affect regulatory review risks, including firm size, profitability, and auditor size. However, companies cannot control many of these factors at a reasonable cost in the short term (Hesarzadeh and Bazrafshan, 2019).

The interactive information disclosure platform 'Hudongyi', established by the Shenzhen Stock Exchange in 2011, is a comprehensive online platform on which listed companies can voluntarily and interactively disclose and release information in order to manage investor relationships (Wang et al., 2020). This important institutional innovation brings about interactive information disclosure to Chinese capital markets. Additionally, the 'Hudongyi' platform helps listed companies effectively communicate with investors and establish good investor relations. Participating investors obtain high-quality information that effectively reduces information asymmetry. Whether and how interactive information disclosure affects regulatory review risk is worthy of further study.

This study shows that: (1) Hudongyi is considered a high-quality platform owing to its Q&A feature and characteristics, including low noise, openness, completeness, and authenticity. Additionally, regulatory reviewers use content from the platform to investigate companies; (2) the richness and activeness of interactive information disclosure are positively associated with regulatory review risks in the current period. Furthermore, the non-penalty regulatory review is effective as it significantly reduces the probability of receiving a comment letter in the next three periods; (3) a company's delayed response to investors on the 'Hudongyi' platform leaves a bad impression on investors and regulatory reviewers. Hence, a

negative association exists between poor timeliness of interactive information disclosure and regulatory review risk in the current period; (4) newspaper media coverage has a partial mediation effect on the richness and activeness of interactive information disclosure and regulatory review risk; (5) for companies with high levels of internal governance, the positive relationship between the number of investor questions and regulatory review risk weakens. For companies in low-competitive industries or state-owned companies, the positive relationship between the number of investor questions and regulatory review risk is stronger.

This study contributes to the literature in three ways. First, it enriches the research scenarios for web-based disclosure. Existing research is predominantly based on information dissemination media in developed markets, such as company websites, Twitter, and conferences (Orens et al., 2010; Blankespoor et al., 2014; Heinrichs et al., 2019). However, little is known about information dissemination media in the capital markets of emerging economies. Wang et al. (2020) used data from 'Hudongyi' to explore the impact of uncertain economic policy on voluntary disclosure. Unlike Wang et al. (2020), this study links web-based interactive disclosure in emerging markets with regulatory review risk for the first time and thus provides a reference for further exploring relevant economic rules in the future.

Second, this study adds value to the literature on the determinants of regulatory review risk in emerging markets. The most recent research on regulatory review risk comes from developed countries, and no literature focuses on the factors influencing regulatory reviews in the Chinese stock exchange. This study expands and enriches relevant research on the factors influencing regulatory reviews when interactive information disclosure is available and includes developing countries for the first time.

Third, this study enriches research on the economic consequences of newspaper media. Research on the impact of newspaper media on corporate governance focuses on financial fraud (Dyck et al., 2010), mergers and acquisitions (Liu and McConnell, 2013), executive compensation (Core et al., 2008; Kuhnen and Niessen, 2012), insider trading (Dai et al., 2015; Rogers et al., 2016), and earnings management (Engelberg and Parsons, 2011). However, there is limited evidence on how dissemination in newspaper media affects the beliefs of regulators. This study is the first to find that newspaper media has a partial mediation effect on the relationship between interactive disclosure and regulatory review risk. Moreover, unlike this research, existing studies have not addressed the channel through which interactive disclosure affects regulatory review risk.

The remainder of this paper is organized as follows: Section 2 discusses the institutional background; Section 3 provides a literature review; Section 4 presents the data and research design; Section 5 reports the empirical results; Section 6 discusses the robustness tests; Section 7 presents additional analysis; Section 8 presents the conclusions.

2. Institutional background

2.1. The 'Hudongyi' platform

Established by the Shenzhen Stock Exchange in 2011, 'Hudongyi' is an interactive and comprehensive information platform on which listed companies can voluntarily disclose information, engage in interactive information release, and manage investor relations. This is an important institutional innovation in interactive information disclosure within Chinese capital markets. On the 'Hudongyi' platform, investors can ask listed companies questions related to their operations and management, and the platform staff can promptly screen, sort, and send these questions to the concerned company. Since it is an open network platform, the interactive process between investors and listed companies is presented in a text form and can be read by investors and regulatory reviewers; this ensures that even investors and regulatory reviewers that have not participated in the interaction can optimize information behavior and improve information capabilities.

The data from the 'Hudongyi' platform is different from those of Weibo and Guba because the unique institutional background of the 'Hudongyi' platform ensures high quality and low noise in its data. A company's answer to investor questions only involves disclosed matters. The interactive process is only applicable to listed companies that provide public market information based on investor needs. Additionally, the stock exchange is responsible for the management of the platform and monitors the interaction between investors and companies. Thus, it effectively ensures the integrity and authenticity of the interaction record, which enables the information acquisition behavior of the 'Hudongyi' platform users to be unaffected by misinformation or other interference, such as rumors.

2.2. Regulatory review processes in China

In response to disclosure defects, related activities, and contents of the announcement, the Shenzhen Stock Exchange, following the Chinese information disclosure regulations, sends a comment letter that includes a request for managers to submit a written response and make a public disclosure. Some comment letters require intermediary agencies, such as accounting firms, law firms, asset appraisal companies, financial advisors, or sponsoring agencies to provide official verification on relevant matters. Additionally, some comment letters require the independent directors of a company to provide such verification.

The comment letter review process in China differs from the United States and Australia. First, in terms of the process of publicly disclosing comment letters, the U.S. Securities and Exchange Commission (SEC) discloses comment letters and company response letters simultaneously, whereas, in China, they are disclosed in a step-by-step manner. For example, since May 12, 2005, the U.S. SEC has publicly disclosed comment letters and company response letters together after the review is

completed. Before January 1, 2012, comment letter correspondence was publicly disclosed at least 45 days after the review; since then, comment letter correspondence is disclosed at least 20 business days following review completion (Dechow et al., 2016). In Australia, the emergence of unexplained variations in trading activity may denote listing rule violations, causing the Australian Securities Exchange (ASX) to submit a standardized set of questions to the company of interest requesting any information expected to have a material impact on the price or value of the entity's equity in compliance with listing rule 3.1 (Gong, 2007). When a reply is received from a company, it is disclosed alongside the query via an announcement to the market. Hence, the market is only informed of the exchange query once the firm submits its reply (Drienko and Sault, 2013). Unlike in the United States and Australia, comment letters and company response letters in China are disclosed chronologically, thereby allowing the market to learn about the review process in a step-by-step manner.

Second, the severity of the comment letter review differs between China and the United States. In China, the Shenzhen Stock Exchange requires companies to respond to comment letters within a prescribed time. If a company needs to postpone its response, it must present a written application to the supervisory authority and provide external disclosure. Additionally, some comment letters require intermediary agencies (such as accounting firms and law firms) to verify related matters, and some comment letters require independent directors of the company to provide professional verification opinions on relevant matters. If the company does not respond or fails to provide a reasonable explanation, the exchange may initiate follow-up supervision measures, including on-site investigations and the submission of evidence to the Securities Regulatory Commission. However, the U.S. SEC does not have a set process to follow up on future filing revisions until the firm's next periodic review (Bozanic et al., 2017).

3. Literature review

The literature indicates that the regulatory review process may negatively impact a company and cause strong negative market reactions. Cassell et al. (2013) suggested that the regulatory review process diverts substantial time and resources away from regular operations. Gietzmann and Isidro (2013) found that institutional investors reduce equity holdings when firms receive SEC Comment Letters, and these negative reactions are highest for low-turnover institutional investors, whom Gietzmann and Isidro (2013) used to represent informed investors that are more willing to incur costs to closely monitor firms. Kubick et al. (2016) showed that investors assign lower valuations to firms in the years following a comment letter release. Gietzmann and Pettinicchio (2014) considered comment letters to be early warning signals of regulatory action. Their findings indicate that auditors increase fees both during the period in which the comment letter is received and after.

Regarding regulatory review process determinants, Cassell et al. (2013) found that factors like low profitability, high operational complexity, weaknesses in governance, and engaging a small audit firm are positively associated with receiving a comment letter. Boone et al. (2013) examined the likelihood of receiving comments, costs of resolution, rule-based nature, and the extent of management estimates required by specific accounting standards. They found that comments are more likely for rule-based standards and standards involving estimates, as deficiencies are easier for a reviewer to identify, and the SEC reviewer may request information about the manager's estimates behind a disclosure. Rosati et al. (2020) showed that breached firms are more likely to receive SEC comment letters following a cyber security incident than non-breached firms. In contrast to regulatory capture theory, Heese et al. (2017) and Chen et al. (2020) presented new evidence showing that firms' political connections positively predict comment letter reviews and the substantive characteristics of such reviews, including the number of issues evaluated and the seniority of SEC staff involved. Furthermore, Naughton et al. (2018) found that foreign firms are subject to less SEC monitoring than domestic companies. Hesarzadeh and Bazrafshan (2018) revealed that corporate reporting readability reduces regulatory review risk. Firms with more aggressive tax planning (lower GAAP (Generally Accepted Accounting Principles) and cash effective tax rates) are more likely to receive comment letters with tax-related questions (Kubick et al. 2016), and the relationship between CEO ability and regulatory review risk is generally negative (Hesarzadeh and Bazrafshan, 2019). Additionally, Gunny and Hermis (2020) found that the SEC is less likely to issue 10-K comment letters when busy. In contrast to the previous literature, this study adds to the nascent literature on the influencing factors of comment letters to a non-U.S. economy and complements extant research on the determinants of comment letters by including interactive information disclosure in its analysis.

As the 'Hudongyi' platform allows voluntary information disclosure, previous studies on the economic consequences of voluntary information disclosure found that it reduces uncertainty, capital costs (Dhaliwal et al., 2011; Easley and O'Hara, 2004; Healy et al., 1999; Healy and Palepu, 2001; Mazumdar and Sengupta, 2005), and information asymmetry, while increasing liquidity of stocks (Beyer et al., 2010). Allaya et al. (2018) reported that voluntary disclosures positively affect long-term debt. Bamber and Cheon (1998) argued that voluntary disclosure increases proprietary costs and competition. Therefore, voluntary disclosure involves a trade-off between the expected benefits and negative consequences (Hooghiemstra, 2012).

Theoretically, interactive information disclosure in the 'Hudongyi' platform may influence regulatory review risk because regulatory reviews consume the regulator's resources (Brown et al., 2018), which is important, given that the time and attention of regulatory reviewers are limited. Therefore, regulatory reviewers are likely to look for heuristic clues (i.e., cognitive processing shortcuts) to determine the reliability of financial statements (Cassell et al., 2019). Furthermore, studies in cognitive neurology and psychology have shown that while presenting people with a factual statement, manipulations that make it easier to mentally process can alter the judgment of truth and the evaluation of the author's intelligence (Bennett, 2010). The Q&A on the 'Hudongyi' platform has high-quality characteristics including low noise, openness, completeness, and authenticity. Compared to reading professional materials (e.g., financial reports), the information provided on 'Hudongyi'

is easier for investors and regulatory reviewers to understand. There is a positive association between the richness and activeness of interactive information disclosure and regulatory review risk.

4. Data and research design

4.1. Sample and data

The data for this study included three parts: comment letter data, interactive platform data, and company financial data. The Shenzhen Stock Exchange has published comment letters in its 'Regulatory Information Disclosure' column since 2014, which requires companies to respond to comment letters quickly. Since the first comment letter from the Shenzhen Stock Exchange was sent on December 4, 2014, this study uses all the available data from then until December 31, 2018. Correspondingly, this study uses Python to capture 105,840 Q&A records of investors and listed companies from the Shenzhen Stock Exchange's Hudongyi platform. This study uses firms' financial data from the CSMAR (China Stock Market & Accounting Research) database and excludes listed companies that had missing data and those from the financial and insurance industries. Finally, to reduce the impact of extreme values, all continuous variables were winsorized to the 1st and 99th percentiles of their distributions. As a result, this study has 5,655,804 firm-month observations.

4.2. Measure of interactive information disclosure

Interactive information disclosure is the independent variable in this study. We used $\ln\text{Number}$ to measure interactive information disclosure, which is measured as follows:

$$\ln\text{Number} = \ln(1 + \text{Number}) \quad (1)$$

where the numbers represent the number of investor questions. This study uses indicator (1) to measure the richness and activity of interactive information disclosure.

4.3. Measure of regulatory review risk

Following extensive prior literature (e.g., Cassell et al., 2013; Cunningham et al., 2017), this study focuses on capital market supervision and measures non-penalty regulatory review risk using the probability of receiving a comment letter (CL) from the Shenzhen Stock Exchange. Specifically, CL is set at 1 if the company receives a comment letter in the month t , and 0 otherwise.

4.4. Control variables

Following Cassell et al. (2013), this study controls for the determinants of a firm being selected for a regulatory review, including the log of total assets ($\ln\text{Size}$), company age (Age), percentage of independent board members (Ibd), types of opinions issued by the audit firm (Opinion), operating income growth rate (Grow), return-on-assets ratio (Roa), CEO duality (Dual), financial leverage (Lev), net profit (Loss), external auditor size (Big4), and state-owned enterprises (Soe). $\ln\text{Size}$, Growth ,

Table 1
Description of variables.

Variable	Description
<i>Dependent variable</i>	
CL	Dummy variable; 1 if the company received a comment letter in the month t , and 0 otherwise
<i>Main independent variables</i>	
$\ln\text{Number}$	$\ln(1 + \text{Number})$, and Number is the number of investor questions
<i>Control variables</i>	
$\ln\text{Size}$	The natural log of the company's total assets (in ten thousand Yuan)
Age	The number of months the company has been listed on the Stock Exchange
Ibd	The percentage of independent board members, defined as the number of outside directors divided by the total number of directors
Opinion	Dummy variable; 1 if audit opinion is a standard unqualified opinion, and 0 otherwise
Grow	Operating income growth rate is equal to (operating income single quarter amount for the current period of this year - operating income last quarter amount) / (operating income last quarter amount)
Roa	Net profit/average total assets, and average total assets is equal to (ending balance of total assets + opening balance of total assets) / 2
Dual	Dummy variable; 1 if CEO and chair is the same person, and 0 otherwise
Lev	Total debt as a percentage of total assets
Loss	Dummy variable; 1 if net profit is negative in month t , and 0 otherwise
Big4	Dummy variable; 1 for the Big4 firms and 0 otherwise
Soe	Dummy variable; 1 if the firm is under state control, and 0 otherwise

Roa, *Lev*, and *Loss* all use data from the previous quarter, whereas *Ibd*, *Opinion*, *Dual*, *Big4*, and *Soe* use year-end data from the previous year. Table 1 presents the definitions of all the variables.

4.5. Regression model

As previously mentioned, regulatory review risk is the dependent variable, which is captured by the probability of receiving a comment letter (*CL*). Furthermore, the interactive information disclosure is the main independent variable, as captured by *lnNumber*. This study assesses the association between interactive information disclosure and regulatory review risk using the following logistic regression:

$$\Pr[CL_{i,t} = 1] = \text{logistic}(\alpha_0 + \alpha_1 \ln Number_{i,t} + \alpha_2 \Sigma Controls_{i,t} + \alpha_3 \Sigma Industry_{i,t} + \alpha_4 \Sigma Month_{i,t} + \epsilon_{i,t}) \tag{2}$$

where subscript *I* denotes the firm and *t* denotes the month. In addition, this study controls for industry- and month-fixed effects.

5. Empirical results

5.1. Descriptive statistics

Table 2 shows the descriptive statistics and mean difference *t*-test for the sample firms. For ease of interpretation, *lnNumber* is reported in raw (unlogged) form. Panel A in Table 2 presents the descriptive statistics. The mean value of *CL* is 5.3%, meaning that 5.3% of the companies in the sample have received comment letters. The mean value of *Number* is 19.554, meaning that the average number of questions asked by investors is 19.554 per month for each company.

For the control variables, these firms have an average age of 9.231 years (110.774 months), operating income growth rate of 33.3%, *ROA* of 2.2%, and financial leverage of 39.7%. The mean *Ibd* value is 37.867%, indicating that the number of outside directors divided by the total number of directors is more than one-third, which is in line with the regulations of the China Securities Regulatory Commission (CSRC). The mean value of *Dual* is 0.338, indicating that the ratio of CEOs who are also chairs on the board of directors is 33.8%. Furthermore, we find that 19.2% of the sample companies are SOEs, 2.2% of firms'

Table 2
Descriptive statistics and mean different *t*-test for the sample firms.

Panel A: Descriptive statistics						
	N	Mean	St.Dev	Min	Median	Max
<i>CL</i>	55,804	0.053	0.225	0	0	1
<i>Number</i>	55,804	19.554	30.659	1	11	1170
<i>lnSize</i>	55,804	1.178	1.078	-1.020	1.105	4.337
<i>Age</i>	55,804	110.774	80.189	2	83	293
<i>Ibd</i> (%)	55,804	37.867	5.453	33.333	36.364	57.143
<i>Opinion</i>	55,804	0.944	0.230	0	1	1
<i>Grow</i>	55,804	0.333	0.972	-0.685	0.124	7.259
<i>Roa</i>	55,804	0.022	0.042	-0.154	0.017	0.162
<i>Dual</i>	55,804	0.338	0.473	0	0	1
<i>Lev</i>	55,804	0.397	0.207	0.048	0.380	0.927
<i>Loss</i>	55,804	0.159	0.366	0	0	1
<i>Big4</i>	55,804	0.022	0.148	0	0	1
<i>Soe</i>	55,804	0.192	0.394	0	0	1

Panel B: Mean different <i>t</i> -test			
	CL = 0 (N = 52,843)	CL = 1 (N = 2961)	MeanDiff
	Mean1	Mean2	
<i>Number</i>	19.475	20.960	-1.485**
<i>lnSize</i>	1.182	1.113	0.069***
<i>Age</i>	109.637	131.062	-21.425***
<i>Ibd</i> (%)	37.853	38.117	-0.263**
<i>Opinion</i>	0.950	0.835	0.116***
<i>Grow</i>	0.333	0.333	0.000
<i>Roa</i>	0.023	0.010	0.013***
<i>Dual</i>	0.338	0.332	0.007
<i>Lev</i>	0.395	0.434	-0.039***
<i>Loss</i>	0.153	0.274	-0.121***
<i>Big4</i>	0.023	0.016	0.007***
<i>Soe</i>	0.194	0.169	0.024***

Note. This table presents the descriptive statistics of the variables used in the main analysis. *** and ** show significance at the 0.01 and 0.05 level, respectively. See Table 1 for the variable definitions.

external auditors are Big 4 companies, 94.4% of firms obtain an unmodified audit opinion, and 15.9% of firms have a negative net profit.

Panel B in Table 2 shows the mean difference *t*-test results for the sample firms. Of the 55,804 firm-month observations used in the analysis, 5.3% (2961 firm-month observations) received a comment letter, which is lower than those of the studies that have examined the capital markets in Iran (20%) and the United States (30%) (e.g., Cassell et al., 2013; Cassell et al., 2019; Cunningham et al., 2017; Hesarzadeh and Bazrafshan, 2018, 2019). Panel B in Table 2 shows that the mean values of *Number* are approximately 19.475 and 20.960 for non-comment letter observations and comment letter observations, respectively. This difference is statistically significant, indicating that the number of questions asked by investors may be greater for comment letter observations than for non-comment letter observations. Generally, *Size*, *Opinion*, *RoA*, *Big4*, and *Soe* are lower for comment letter observations than for non-comment letter observations. Furthermore, *Age*, *Ibd*, *Lev*, and *Loss* are higher for comment-letter observations than for non-comment-letter observations.

Table 3 shows the Pearson's correlations between the variables used in the main analysis. The panel shows that the richness and activeness of interactive information disclosure (*lnNumber*) are positively and significantly correlated with *CL* (0.009). This shows that a higher level of interactive information disclosure correlates with a higher level of regulatory intervention, which is consistent with our expectations.

5.2. Primary results

The main investigations are concerned with the association between interactive information disclosure and regulatory review risks. This study estimates the regression of regulatory review risk, as captured by *CL*, on interactive information disclosure, as captured by *lnNumber*. The control variables (*Controls*) and fixed effects of month and industry were included in the regression. Table 4 provides evidence of the relationship between *ln(Number)* and *CL*.

Column (1) in Table 4 shows the logistic regression results of Model (2) without control variables, in which the independent variable is the number of investor questions (*lnNumber*). Columns (2), (3), and (4) show the logistic regression results of Model (2), including the control variables. The difference between columns (2), (3), and (4) is the industry-fixed effects and month-fixed effects.

Evidence suggests that *lnNumber* generally plays a statistically meaningful role in determining the *CL*. Specifically, in columns (1), (2), (3), and (4) of Table 4, the coefficients of *lnNumber* are positive and significant at 0.01, indicating that a higher *lnNumber* is associated with a higher *CL*. In other words, these companies are more likely to receive comment letters. Thus, the richness and activity of interactive information disclosure are positively associated with regulatory review risk.

Interactive information disclosure may affect regulatory risk in multiple ways. On the one hand, the more information a company discloses through the 'Hudongyi' platform, the easier it is for regulators to review the company. On the other hand, the characteristics of the 'Hudongyi' platform (i.e., low noise, openness, completeness, and authenticity) enable easier comprehension than professional materials (financial reports of listed companies, etc.) for investors and regulatory reviewers. Therefore, the content on the 'Hudongyi' platform provides heuristic clues to regulatory reviewers. Hence, the richness and activity of interactive information disclosure are positively associated with regulatory review risk.

Evidence indicates that *CL* is negatively associated with *lnSize*; therefore, small companies are more likely to receive comment letters. This study found that *CL* can be explained by *opinions*. Furthermore, the findings show that companies with higher *Ibd*, *Lev*, and *loss* levels are more likely to receive comment letters. These findings are generally consistent with prior studies (e.g., Cassell et al., 2013), which showed that corporate characteristics and corporate governance are significantly associated with comment letters. The explanatory power of the variables is approximately 8%.

Table 3

Correlation matrix.

	CL	lnNumber	lnSize	Age	Ibd	Opinion	Grow	RoA	Dual	Lev	Loss	Big4	
<i>lnNumber</i>	0.009**	1											
<i>lnSize</i>	-0.015***	0.121***	1										
<i>Age</i>	0.060***	-0.015***	0.391***	1									
<i>Ibd</i>	0.011**	0.008**	-0.066***	-0.043***	1								
<i>Opinion</i>	-0.113***	0.004	0.053***	-0.111***	-0.004	1							
<i>Grow</i>	0	0.009**	0.105***	0.024***	-0.008*	0.009**	1						
<i>RoA</i>	-0.069***	0.061***	0.041***	-0.154***	-0.022***	0.227***	0.129***	1					
<i>Dual</i>	-0.003	0.044***	-0.098***	-0.183***	0.116***	0.019***	0	0.034***	1				
<i>Lev</i>	0.043***	-0.014***	0.464***	0.355***	-0.035***	-0.164***	0.038***	-0.282***	-0.064***	1			
<i>Loss</i>	0.074***	-0.011**	-0.114***	0.141***	0.039***	-0.217***	-0.118***	-0.576***	-0.045***	0.186***	1		
<i>Big4</i>	-0.011***	0.017***	0.210***	0.104***	0	0.036***	0.022***	0.043***	-0.037***	0.078***	-0.016***	1	
<i>Soe</i>	-0.014***	-0.006	0.263***	0.429***	-0.070***	0.029***	-0.037***	-0.096***	-0.228***	0.250***	0.104***	0.042***	1

Note.***, **, and * show significance at the 0.01, 0.05, and 0.1 levels, respectively. See Table 1 for the variable definitions.

Table 4
Regressions of the probability of receiving a comment letter (CL) on the number of investor questions (*lnNumber*).

	(1)	(2)	(3)	(4)
<i>lnNumber</i>	0.177*** (6.531)	0.240*** (9.231)	0.187*** (6.861)	0.188*** (6.904)
<i>lnSize</i>		-0.445*** (-7.476)	-0.519*** (-8.341)	-0.525*** (-8.199)
<i>Age</i>		0.035*** (18.597)	0.001 (0.041)	-0.004 (-0.263)
<i>lbd</i>		0.012 (1.597)	0.014* (1.835)	0.016** (2.060)
<i>Opinion</i>		-0.283*** (-3.110)	-0.301*** (-3.270)	-0.315*** (-3.360)
<i>Grow</i>		-0.004 (-0.197)	-0.005 (-0.244)	-0.003 (-0.123)
<i>Roa</i>		-0.479 (-0.757)	-0.097 (-0.143)	-0.181 (-0.267)
<i>Dual</i>		-0.096 (-1.250)	-0.109 (-1.383)	-0.103 (-1.304)
<i>Lev</i>		0.236 (1.116)	0.677*** (3.054)	0.609*** (2.704)
<i>Loss</i>		0.148** (2.075)	0.210*** (2.817)	0.209*** (2.807)
<i>Big4</i>		-0.343 (-0.852)	-0.341 (-0.816)	-0.227 (-0.545)
<i>Soe</i>		0.080 (0.349)	0.148 (0.628)	0.141 (0.588)
<i>Month FE</i>	yes	no	yes	yes
<i>Industry FE</i>	yes	yes	no	yes
<i>Obs.</i>	49,732	49,732	49,732	49,732
<i>Pseudo R²</i>	0.074	0.028	0.080	0.081

Note. This table presents the results of the logistic regression estimation using Eq. (2) Robust standard errors clustered by the company identifier. The dependent variable is the regulatory review risk (CL). The richness and activeness of interactive information disclosure are measured using *lnNumbers* in Columns (1), (2), (3), and (4). Control variables are included in the model. *Industry FE* and *month FE* reflect industry and month fixed effects. The key results are highlighted in bold. The *t*-values are shown in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Table 1 provides a description of the variables.

6. Robustness tests

6.1. The entropy balancing technique

We acknowledge that our baseline results are subject to the concern that firms with more investor questions in the ‘Hudongyi’ platform may have different characteristics than firms with fewer investor questions, and firms with more delay time may have different characteristics than firms with less delay time. To address this issue, we conducted our main analysis by employing a weighted sample derived using entropy balancing (EB), which is a relatively new matching technique. EB balances covariates more efficiently than common propensity score methods and weight control sample units to achieve a covariate balance while adjusting for random and systematic inequalities in the variable distributions between the treatment and control groups (Hainmueller, 2012).

EB offers several benefits. First, it is more flexible than PSM, which imposes weights of 0 (i.e., discards the unit) or 1 (i.e., matches the unit) and does not use unmatched units in subsequent analyses. Entropy balancing allows observation weights to vary, thus retaining information that improves efficiency in subsequent tests. Second, EB’s use of continuous weights ensures that the three order moments (e.g., mean, variance, and skewness) of covariate distributions are similar across treatment and control samples, resulting in near-perfect covariate balance, while PSM does not.

Specifically, we constructed a dummy variable, *Treated_A*, and divided our sample into two groups. *Treated_A* = 1 when the number of investor questions in the ‘Hudongyi’ platform is more than the median of the full sample (treatment group); *Treated_A* = 0 when the number of investor questions in the ‘Hudongyi’ platform is less than the median of the full sample (control group).

We used EB to calculate weights for every control observation such that their first, second, and third moments are equal to those of the treated observations, and effectively compare firms in the treatment group to those in the control group that are weighted to have similar covariates. Table A1 in the Appendix presents the mean, standard deviation, and skewness of both unweighted covariates after applying entropy-balanced weights to the control group.

After weighting to balance covariates, a multivariate analysis was used for proper treatment effect inferences. The main regression results reported in Table 5 employed entropy-balanced weights. The relationship between the richness and activeness of interactive information disclosure and regulatory review risk based on entropy balance is shown in Columns (1)–(4) of Table 5. The coefficients of *lnNumber* are positive and significant.

Table 5
Regression results of using the entropy balancing weighted sample.

	(1)	(2)	(3)	(4)
	CL	CL	CL	CL
<i>lnNumber</i>	0.006*** (4.803)	0.003*** (3.069)	0.006*** (5.518)	0.006*** (5.336)
<i>lnSize</i>		-0.005*** (-2.840)	-0.008*** (-4.404)	-0.008*** (-4.367)
<i>Age</i>		0.000*** (7.720)	0.000*** (6.738)	0.000*** (7.052)
<i>lbd</i>		0.000 (1.038)	0.000 (1.262)	0.000 (0.967)
<i>Opinion</i>		-0.085*** (-8.070)	-0.079*** (-7.545)	-0.078*** (-7.460)
<i>Grow</i>		0.002 (1.330)	0.001 (1.177)	0.002 (1.231)
<i>Roa</i>		-0.117*** (-3.480)	-0.108*** (-3.025)	-0.112*** (-3.090)
<i>Dual</i>		-0.000 (-0.113)	-0.001 (-0.209)	-0.001 (-0.282)
<i>Lev</i>		0.017* (1.839)	0.021** (2.550)	0.023** (2.523)
<i>Loss</i>		0.021*** (4.843)	0.024*** (5.732)	0.024*** (5.587)
<i>Big4</i>		-0.010* (-1.749)	-0.010* (-1.768)	-0.009 (-1.509)
<i>Soe</i>		-0.024*** (-6.549)	-0.020*** (-5.970)	-0.022*** (-6.049)
<i>Industry FE</i>	yes	yes	no	yes
<i>Month FE</i>	yes	no	yes	yes
<i>Obs.</i>	55,804	55,804	55,804	55,804
<i>Pseudo R²</i>	0.023	0.020	0.040	0.041

Notes: This table is estimated using entropy balancing with month and industry fixed effects. The key results are highlighted in bold. The t-values are shown in parentheses.***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Table 1 provides a description of the variables.

Therefore, even after reducing the sample bias between the group with more investor questions and the group with fewer investor questions, there was still a positive association between the richness and activeness of interactive information disclosure and regulatory review risk. After reducing the sample bias between the group with more delay time and the group with less delay time, there remains a negative association between the timeliness of interactive information disclosure and regulatory review risk. The main results are as follows.

6.2. Replacement of regulatory review risk indicator

In the main regression, this study uses the probability of receiving comment letters (*CL*) from the Shenzhen Stock Exchange to measure regulatory review risk. In the robustness tests, this study considers *CLN* and *lnInqcntet_len* as alternative regulatory intervention measures (where *CLN* is the number of comment letters received and *lnInqcntet_len* is the total number of words in the comment letters, which is calculated as the logarithm of the total number of words in the comment letters received by the firm in a given month). The negative binomial model is the standard choice for a basic count-data model. Therefore, this study uses a fixed-effect panel negative binomial regression model as shown in column (1) of Table 6, and a fixed-effect panel OLS regression model as shown in column (2) of Table 6.

Table 6 presents the results of the study. The coefficients of *lnNumber* in columns (1) and (2) of Table 6 are significantly positive at the 1% level, indicating that the number of investor questions increases the number of received comment letters and the total number of words in the comment letters. The results confirm the robustness of our findings from the main tests.

6.3. Alternative independent variable measures

In the main regression, we use the number of investor questions (*lnNumber*) to measure the richness and activity of interactive information disclosure. In the robustness tests, this study considers *lnAsk* and *lnReply* as alternatives to the richness and activeness of interactive information disclosure measures. The following equations measure *lnAsk* and *lnReply*:

$$\ln Ask = \ln(1 + Ask_len) \quad (3)$$

$$\ln Reply = \ln(1 + Reply_len) \quad (4)$$

Table 6
Regression results using alternative regulatory review risk measures, alternative independent variable measures, and annual data.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Monthly data				Annual data		
	CLN	lninqcntet_len	CL	CL	CL	CL	CL
<i>lnNumber</i>	0.008*** (5.599)	0.069*** (7.399)			0.179** (2.152)		
<i>lnAsk</i>			0.115*** (5.823)			0.154** (2.326)	
<i>lnReply</i>				0.045*** (3.173)			0.140** (2.114)
<i>lnSize</i>	-0.010*** (-3.955)	-0.240*** (-10.173)	-0.523*** (-8.175)	-0.502*** (-7.877)	-0.990*** (-7.334)	-0.995*** (-7.358)	-0.986*** (-7.325)
<i>Age</i>	0.000*** (6.270)	-0.008 (-1.252)	-0.004 (-0.246)	-0.003 (-0.218)	0.032 (0.962)	0.032 (0.953)	0.031 (0.937)
<i>lbd</i>	0.000 (0.779)	0.006** (2.377)	0.016** (2.063)	0.015** (2.033)	-0.661 (-0.485)	-0.635 (-0.465)	-0.649 (-0.476)
<i>Opinion</i>	-0.099*** (-7.109)	-0.293*** (-6.907)	-0.315*** (-3.361)	-0.334*** (-3.578)	-1.409*** (-4.294)	-1.408*** (-4.290)	-1.423*** (-4.342)
<i>Grow</i>	0.002 (1.122)	0.000 (0.035)	-0.003 (-0.133)	-0.005 (-0.253)	-0.044 (-0.712)	-0.042 (-0.681)	-0.046 (-0.743)
<i>Roa</i>	-0.123*** (-2.692)	-0.137 (-0.524)	-0.130 (-0.192)	-0.075 (-0.111)	-2.386* (-1.762)	-2.456* (-1.810)	-2.369* (-1.748)
<i>Dual</i>	-0.000 (-0.079)	-0.044 (-1.553)	-0.098 (-1.243)	-0.093 (-1.185)	-0.100 (-0.691)	-0.097 (-0.672)	-0.093 (-0.645)
<i>Lev</i>	0.029** (2.519)	0.241*** (2.846)	0.621*** (2.763)	0.625*** (2.782)	-0.162 (-0.345)	-0.150 (-0.318)	-0.159 (-0.338)
<i>Loss</i>	0.028*** (4.977)	0.101*** (3.663)	0.210*** (2.825)	0.219*** (2.936)	0.157 (0.849)	0.151 (0.817)	0.159 (0.858)
<i>Big4</i>	-0.007 (-0.845)	-0.012 (-0.099)	-0.213 (-0.513)	-0.191 (-0.459)	-0.296 (-0.484)	-0.290 (-0.474)	-0.270 (-0.442)
<i>Soe</i>	-0.028*** (-5.588)	0.075 (0.877)	0.147 (0.614)	0.162 (0.677)	0.375 (0.893)	0.376 (0.893)	0.370 (0.880)
<i>Cons</i>	0.104*** (5.565)	0.968 (1.605)					
<i>Ind</i>	yes	yes	yes	yes	yes	yes	yes
<i>Month or Year</i>	yes	yes	yes	yes	yes	yes	yes
<i>Obs.</i>	55,804	55,804	49,732	49,732	3565	3565	3565
<i>R² or Pseudo R²</i>	0.043	0.032	0.081	0.079	0.096	0.096	0.096

Note. This table presents the regressions of the regulatory review risk variables on the interactive information disclosure metrics. In Columns (1) and (2), we consider alternative regulatory review risk measures: the number of received comment letters (*CLN*) and the severity of comment letters received by the firm (*lnInqcntet_len*), which is measured using the total number of words in the comment letters. The richness and activeness of interactive information disclosure are proxied by *ln(Number)*. In columns (3) and (4), we consider alternative interactive information disclosure measures: the length of questions asked by investors (*lnAsk*) and the length of listed companies' replies (*lnReply*). Regulatory review risk is proxied by *CL*. In columns (5), (6), and (7), the richness and activity of interactive information disclosure are measured using annual data, and the dependent variable is the regulatory review risk in the annual data (*CL*). Control variables are included in the model. *Industry FE* and *month FE* reflect industry- and month-fixed effects. The key results are highlighted in bold. The *t*-values are shown in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Table 1 provides a description of the variables.

where *Ask_len* is the length of the questions asked by investors and *Reply_len* is the length of the listed companies' replies. This study reevaluates the regression of Eq. (2). The results are shown in columns (3) and (4) of Table 6, and no significant differences are observed in Table 4. The coefficients of *lnAsk* and *lnReply* are positive and significant at 0.01, indicating that higher *lnAsk* and *lnReply* are associated with higher *CL* (that is, companies are more likely to receive comment letters).

6.4. Considering annual data

In the previous analysis, the measurement of interactive information disclosure and regulatory review risk was based on the monthly data. The control variable was the company's financial data, which were artificially divided into monthly data based on quarterly and annual data. As shown in columns (5), (6), and (7) of Table 6, this study repeated the previous analysis process using annual data. These results are not essentially different from those based on monthly data, but the goodness of fit improved.

7. Additional analysis

7.1. Fast and effective response to regulatory review

Most literature on capital market supervision in China discusses the effectiveness of the punitive supervision of illegal acts by the CSRC, although a consensus has not been reached. Some studies suggest that the CSRC cannot effectively regulate companies (Anderson, 2000). However, other studies have found that the actions of the CSRC have regulatory effects (Chen et al., 2005). Most scholars have focused on the U.S. SEC's comment letter and Australia's ASX inquiry letter.

The Shenzhen Stock Exchange is the main body of non-penalty regulatory reviews in China, while the SEC is the main body of comment letters in the United States. However, as the market organizer and operator, the Shenzhen Stock Exchange is at the forefront of the capital market regulatory system, maintains records of all trading activities, and has unique advantages in terms of information acquisition channels, knowledge expertise, and regulatory costs. As mentioned above, in China, comment letters and company response letters are disclosed in chronological order. This step-by-step disclosure process is promptly made available to the market and is a distinctive feature of the Chinese market.

As elaborated in Section 5.2, the richness and activeness of interactive information disclosure significantly increase the probability of receiving comment letters in the current period and positively associate with regulatory review risk. This finding requires examining whether the richness and activeness of interactive information disclosure affect regulatory review risk in future periods. While the richness and activeness of interactive information disclosure are positively associated with regulatory review risk in the current period, comment letters are not administrative penalties. Following this, a non-penalty regulatory review comes into effect, significantly reducing the probability of receiving a comment letter in the next three periods.

To examine the impact of interactive information disclosure in period t on the probability of receiving a comment letter in period $t+3$, we estimate model (5) using the dependent variable CL_{t+3} . In Eq. (5), CL_{t+3} is represented by $CLF3$.

$$\Pr [CL_{i,t+3} = 1] = \text{logistic}(\beta_0 + \beta_1 \ln \text{Number}_{i,t} + \beta_2 CL_{i,t} + \beta_3 \Sigma \text{Controls}_{i,t} + \beta_4 \Sigma \text{Industry}_{i,t} + \beta_5 \Sigma \text{Month}_{i,t} + \varepsilon_{i,t}) \quad (5)$$

Table 7 shows the regression results for the impact of interactive information disclosure in the current period on the probability of receiving a comment letter in the next three periods. In Column (1) of Table 7, the coefficient of $\ln \text{Number}$ is significantly negative at the 1% level, indicating that the number of investor questions in the current period significantly decreases the probability of receiving a comment letter in the next three periods. In column (2) of Table 7, the coefficient of $\ln \text{Number}$ is negative and statistically significant (coefficient -0.114 with t -stat $= -4.307$), whereas the coefficient of CL is negative but not statistically significant (coefficient -0.086 with t -stat $= -1.224$), suggesting that firms with more investor questions in the current period are less likely to receive comment letters in the following three periods. However, the probability of receiving a comment letter in the current period does not significantly decrease the probability of receiving a comment letter in the next three periods.

The decrease in the probability of companies receiving a comment letter in the next three periods is mainly due to the impact of interactive information disclosure in the current period rather than the impact of the comment letter received. In other words, a non-penalty regulatory review is effective in significantly reducing the probability of receiving a comment letter in the next three periods.

7.2. The impact of the timeliness of interactive information disclosure

There are obvious differences between companies' responses to investor questions on the 'Hudongyi' platform. For example, some companies respond more quickly than others. Psychological research has shown that time delays are unfavorable for the companies and may lead to suboptimal cognitive processing and poor performance (Fox and Spector, 1999).

In essence, the 'Hudongyi' is an internet-based investor relationship management platform. Companies manage investor relationships through other means, such as conference calls, company visits, and websites (Bollen et al., 2006; Nel et al., 2019). Hollander et al. (2010) found that investors react negatively to the uncommunicative behaviors of company management during conference calls. Considering the effect of differences between companies' responses to investors on the regulatory review risk, this study believes that, if investor questions are not answered quickly on the 'Hudongyi' platform, investors and regulators may begin to foster a negative impression of the company, which will increase the probability of receiving a comment letter. A negative relationship, therefore, exists between the timeliness of interactive information disclosure and regulatory review risk.

This study used $\ln \text{Delay}$ to measure the timeliness of interactive information disclosure. The following equation measures $\ln \text{Delay}$:

$$\ln \text{Delay} = \ln(\text{Delay}) \quad (6)$$

A delay is the time delay for companies to respond to investors. If a company does not respond to investors for more than a year, interactive communication serves no purpose. In this case, the delay equals 365. This study uses indicator (6) to measure

Table 7
The probability of receiving a comment letter: Estimation Results for CLF3.

	(1)	(2)
	CLF3	CLF3
<i>lnNumber</i>	-0.115***	-0.114***
	(-4.361)	(-4.307)
<i>CL</i>		-0.086
		(-1.224)
<i>lnSize</i>	-0.368***	-0.371***
	(-6.123)	(-6.174)
<i>Age</i>	0.024	0.024
	(1.538)	(1.541)
<i>lbd</i>	0.014*	0.014**
	(1.954)	(1.966)
<i>Opinion</i>	-0.538***	-0.543***
	(-6.012)	(-6.055)
<i>Grow</i>	-0.027	-0.027
	(-1.248)	(-1.249)
<i>Roa</i>	-0.786	-0.793
	(-1.233)	(-1.244)
<i>Dual</i>	-0.138*	-0.139*
	(-1.806)	(-1.816)
<i>Lev</i>	0.373*	0.376*
	(1.752)	(1.768)
<i>Loss</i>	0.218***	0.220***
	(3.127)	(3.154)
<i>Big4</i>	-0.337	-0.338
	(-0.858)	(-0.862)
<i>Soe</i>	-0.003	0.000
	(-0.014)	(0.002)
<i>Ind</i>	yes	yes
<i>Month</i>	yes	yes
<i>Obs.</i>	50,945	50,945
<i>Pseudo R²</i>	0.063	0.063

Note. This table presents the results of the logistic regression estimation using Eq. (5). The dependent variable is the regulatory review risk in period $t+3$, which is *CLF3*. The independent variables are $\ln(\textit{Number})$ and *CL*, and the model also includes control variables. *Ind* and *Month* reflect industry and month fixed effects, respectively. The key results are highlighted in bold. The t -values are shown in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The definitions of the variables are presented in Table 1.

the timeliness of interactive information disclosure. This study also assesses the association between the timeliness of interactive information disclosure and regulatory review risk by employing the following logistic regression:

$$\Pr[CL_{i,t} = 1] = \text{logistic}(\beta_0 + \beta_1 \ln\textit{Delay}_{i,t} + \beta_2 \Sigma\textit{Controls}_{i,t} + \beta_3 \Sigma\textit{Industry}_{i,t} + \beta_4 \Sigma\textit{Month}_{i,t} + \varepsilon_{i,t}) \tag{7}$$

Column (1) in Table 8 shows the logistic regression result of Model (7) without control variables and with the delay of companies responding to investors (*lnDelay*) taken as the independent variable. Columns (2), (3), and (4) show the logistic regression results of Model (7), including the control variables. The difference between columns (2), (3), and (4) is the industry-fixed effects and month-fixed effects. In columns (1), (2), (3), and (4) of Table 8, the coefficients of *lnDelay* are positive and significant at 0.05 or 0.1, indicating that a higher *lnDelay* is associated with a higher *CL*; that is, companies are more likely to receive comment letters when their response time is long. Thus, the timeliness of interactive information disclosure is negatively associated with regulatory review risk.

7.3. The mediation effect test

In this section, we examine the channels through which interactive information disclosure affects the risk of a regulatory review. This study chooses newspaper media coverage (*lnNewsNum_Cont*) as the mediating variable and considers the impact of interactive information disclosure (*lnNumber*) on regulatory review risk (*CL*) through both direct and mediating effects. The following equation measures *lnNewsNum_Cont*:

$$\ln\textit{NewsNum_Cont} = \ln(1 + \textit{NewsNum_Cont}) \tag{8}$$

Table 8
Regressions of the probability of receiving a comment letter (CL) on the delay time for companies to respond to investors (*lnDelay*).

	(1)	(2)	(3)	(4)
<i>lnDelay</i>	0.033* (1.656)	0.036* (1.832)	0.040** (1.973)	0.039* (1.932)
<i>lnSize</i>		-0.415*** (-7.008)	-0.501*** (-8.081)	-0.505*** (-7.922)
<i>Age</i>		0.029*** (16.436)	0.000 (0.030)	-0.004 (-0.256)
<i>lbd</i>		0.012* (1.666)	0.014* (1.870)	0.016** (2.093)
<i>Opinion</i>		-0.301*** (-3.317)	-0.314*** (-3.418)	-0.326*** (-3.490)
<i>Grow</i>		-0.005 (-0.236)	-0.006 (-0.263)	-0.003 (-0.143)
<i>Roa</i>		-0.216 (-0.343)	0.105 (0.155)	0.022 (0.032)
<i>Dual</i>		-0.081 (-1.065)	-0.096 (-1.226)	-0.091 (-1.151)
<i>Lev</i>		0.268 (1.273)	0.705*** (3.195)	0.637*** (2.841)
<i>Loss</i>		0.161** (2.261)	0.225*** (3.025)	0.224*** (3.009)
<i>Big4</i>		-0.259 (-0.646)	-0.299 (-0.721)	-0.184 (-0.445)
<i>Soe</i>		0.106 (0.462)	0.169 (0.719)	0.165 (0.690)
<i>Month FE</i>	yes	no	yes	yes
<i>Industry FE</i>	yes	yes	no	yes
<i>Obs.</i>	49,732	49,732	49,732	49,732
<i>Pseudo R²</i>	0.072	0.023	0.078	0.079

Note. This table presents the results of the logistic regression estimation using Eq. (7), with robust standard errors clustered by the company identifier. The dependent variable is the regulatory review risk (*CL*). The timeliness of interactive information disclosure is measured using *lnDelay*, and control variables are also included in the model. *Industry FE* and *month FE* reflect industry and month fixed effects. The key results are highlighted in bold. The *t*-values are shown in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Table 1 provides a description of the variables.

where *NewsNum_Cont* is the total number of news articles on a firm in a given calendar month. The media coverage data is derived from the newspaper financial news database of the China Research Data Service Platform (CNRDS).

Following Baron and Kenny (1986), the main equations are as follows.

$$lninqcntet_len = \gamma_0 + \gamma_1 lnNumber + \gamma_2 \Sigma Controls_{i,t} + \gamma_3 \Sigma Industry_{i,t} + \gamma_4 \Sigma Month_{i,t} + \epsilon_{i,t} \tag{9a}$$

$$lnNewsNum_Cont_t = \zeta_0 + \zeta_1 lnNumber_t + \zeta_2 Controls_{i,t} + \zeta_3 \Sigma Industry_{i,t} + \zeta_4 \Sigma Month_{i,t} + \epsilon_{i,t} \tag{10a}$$

$$lninqcntet_len = \eta_0 + \eta_1 lnNumber_t + \eta_2 NewsNum_Cont_t + \eta_3 Controls_{i,t} + \eta_4 \Sigma Industry_{i,t} + \eta_5 \Sigma Month_{i,t} + \epsilon_{i,t} \tag{11a}$$

Previous studies on mediation tests assumed that independent, mediation, and dependent are all continuous variables. When these variables are categorical variables, the logistic regression equation and continuous variable regression equation have different scales (MacKinnon and Dwyer, 1993; Iacobucci, 2012). To avoid this problem, the dependent variable in this study is not whether the company received a comment letter (*CL*), but the total number of words in the comment letters received by a company (*lninqcntet_len*).

The results are reported in Table 9, which indicate that newspaper media coverage (*lnNewsNum_Cont*) plays a partial mediation effect between interactive information disclosure (*lnNumber*) and regulatory review risk (*CL*). Specifically, the coefficient of *lnNumber* is significant and positive (0.069 with *t*-stat = 7.399) in column (1), indicating that being asked more investor questions on the ‘Hudongyi’ platform is associated with a higher probability of receiving a comment letter. The coefficient of *lnNumber* is significant and positive (0.044 with *t*-stat = 12.453) in Column (2), indicating that if a change in the number of investor questions varies by one standard deviation, the change in newspaper media coverage varies by 0.044. This situation suggests that *lnNumber* positively affects *lnNewsNum_Cont*. The sign of the coefficient of *lnNumber* in Column (3) is still consistent with that of *lnNumber* in Column (1). The coefficient of *lnNewsNum_Cont* is significant and positive (0.275 with *t*-stat = 24.599), indicating that newspaper media coverage (*lnNewsNum_Cont*) partially mediates the relationship between interactive information disclosure (*lnNumber*) and regulatory review risk (*CL*).

This study employs $Z_{mediation}$ statistic test (Iacobucci, 2012) to test the significance of the mediation effect. Z_ζ and Z_η represent the *t*-values of ζ and η , respectively.

Table 9
The mediating effect of newspaper media coverage.

	(1)	(2)	(3)
	<u>lninqcntet_len</u>	<u>lnNewsNum_Cont</u>	<u>lninqcntet_len</u>
<i>lnNumber</i>	0.069*** (7.399)	0.044*** (12.453)	0.057*** (6.118)
<i>lnNewsNum_Cont</i>			0.275*** (24.599)
<i>lnSize</i>	-0.240*** (-10.173)	0.018** (1.965)	-0.245*** (-10.436)
<i>Age</i>	-0.008 (-1.252)	0.024*** (10.029)	-0.014** (-2.314)
<i>lbd</i>	0.006** (2.377)	0.003*** (2.891)	0.006** (2.085)
<i>Opinion</i>	-0.293*** (-6.907)	0.035** (2.176)	-0.303*** (-7.174)
<i>Grow</i>	0.000 (0.035)	-0.004 (-1.419)	0.002 (0.185)
<i>Roa</i>	-0.137 (-0.524)	0.154 (1.543)	-0.179 (-0.690)
<i>Dual</i>	-0.044 (-1.553)	0.014 (1.316)	-0.048* (-1.701)
<i>Lev</i>	0.241*** (2.846)	0.078** (2.414)	0.219*** (2.607)
<i>Loss</i>	0.101*** (3.663)	0.017 (1.592)	0.096*** (3.515)
<i>Big4</i>	-0.012 (-0.099)	0.020 (0.416)	-0.018 (-0.143)
<i>Soe</i>	0.075 (0.877)	0.073** (2.222)	0.055 (0.647)
<i>Cons</i>	0.968 (1.605)	-2.428*** (-10.531)	1.635*** (2.722)
<i>Ind</i>	yes	yes	yes
<i>Month</i>	yes	yes	yes
<i>Obs.</i>	55,804	55,804	55,804
<i>R²</i>	0.032	0.078	0.043

Notes: This table reports the channels through which interactive newspaper information disclosure affects regulatory review risk. Following [Baron and Kenny \(1986\)](#), we examine the mediating effect of newspaper media coverage (*lnNewsNum_Cont*) and estimate the following equation:

$$lninqcntet_len = \alpha_0 + \alpha_1 lnNumber + \alpha_2 \Sigma Controls_{i,t} + FirmFixed + MonthFixed + \epsilon_{i,t} \tag{9b}$$

$$lnNewsNum_Cont_t = \zeta_0 + \zeta_1 lnNumber_t + \zeta_2 Controls_{i,t} + FirmFixed + MonthFixed + \epsilon_{i,t} \tag{10b}$$

$$lninqcntet_len = \eta_0 + \eta_1 lnNumber_t + \eta_2 lnNewsNum_Cont_t + \eta_3 Controls_{i,t} + FirmFixed + MonthFixed + \epsilon_{i,t} \tag{11b}$$

Columns (1), (2), and (3) report the results for Equations (9)–(11), respectively. *Ind* and *Month* reflect industry- and month-fixed effects, respectively. The key results are highlighted in bold. The *t*-values are shown in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The definitions of the variables are presented in [Table 1](#).

$$Z_{mediation} = \frac{Z_\zeta * Z_\eta}{\sqrt{Z_\zeta^2 + Z_\eta^2}} \tag{12}$$

According to the results in [Table 9](#), the $Z_{mediation}$ statistic of the mediation variable newspaper media coverage (*lnNewsNum_Cont*) is 11.110, which is significant at the 1% level (the absolute value of 11.110 is greater than the critical value of 2.58). This result reflects a significant mediation effect between interactive information disclosure and regulatory review risk through newspaper media coverage.

7.4. The heterogeneity analysis

7.4.1. The impact of corporate internal governance

In [Section 5.2](#), the richness and activeness of interactive information disclosure are found to be positively associated with regulatory review risk. However, the timeliness of interactive information disclosure is negatively associated with regulatory review risk. This necessitates an examination of whether the level of internal governance strengthens or partially replaces the impact of interactive information disclosure on regulatory review risk.

This study selects the shareholding ratio of the largest shareholder, the squared sum of the shareholding ratios of the second-to-tenth-largest shareholders, the size of the board of directors, the ratio of independent directors, the dummy variable of whether the CEO is also the chair of the board of directors, cross-listing, the nature of equity, and executive holdings for the principal component analysis. The first principal component is selected as the corporate governance index (CG); a larger CG value indicates a higher level of corporate governance. The samples are divided into two groups based on the median CG. If the sample belongs to a group with high corporate governance, CG is equal to 1; otherwise, it is equal to 0.

Column (1) in Table 10 presents the regression results. The independent variable is the regulatory review risk (probability of receiving a comment letter in the current period, *CL*). The coefficients of $CG \times \ln\text{Number}$ in column (1) are significantly negative at the 5% level, indicating that when there is a high level of internal governance, the positive relationship between the number of investor questions and regulatory review risk is weakened. Thus, even when a lot of information is disclosed on the ‘Hudongyi’ platform, regulatory review risks of companies with high levels of internal governance are lower than companies with low levels of internal governance.

7.4.2. The impact of competition

The Herfindahl–Hirschman index (*HHI*) measures the degree of product market competition. A higher *HHI* value indicates a higher degree of concentration in the industry and a lower *HHI* value indicates a lower degree of concentration in the industry. Product market competition is one of the most influential external corporate governance mechanisms (Babar and

Table 10
Regression results of the heterogeneity analysis.

	(1)	(2)	(3)
<i>lnNumber</i>	0.252*** (6.800)	0.142*** (3.676)	0.163*** (5.549)
$CG \times \ln\text{Number}$	-0.123** (-2.561)		
$HHI \times \ln\text{Number}$		0.081* (1.727)	
$Soe \times \ln\text{Number}$			0.160** (2.319)
<i>CG</i>	0.489*** (3.066)		
<i>HHI</i>		-0.335** (-2.153)	
<i>lnSize</i>	-0.521*** (-8.134)	-0.524*** (-8.188)	-0.527*** (-8.230)
<i>Age</i>	-0.004 (-0.274)	-0.003 (-0.228)	-0.004 (-0.279)
<i>lbd</i>	0.010 (1.150)	0.016** (2.072)	0.016** (2.076)
<i>Opinion</i>	-0.314*** (-3.344)	-0.322*** (-3.436)	-0.311*** (-3.315)
<i>Grow</i>	-0.003 (-0.142)	-0.002 (-0.076)	-0.002 (-0.090)
<i>Roa</i>	-0.169 (-0.249)	-0.113 (-0.166)	-0.164 (-0.241)
<i>Dual</i>	-0.139* (-1.714)	-0.101 (-1.286)	-0.103 (-1.310)
<i>Lev</i>	0.618*** (2.739)	0.617*** (2.742)	0.613*** (2.720)
<i>Loss</i>	0.207*** (2.773)	0.212*** (2.842)	0.206*** (2.762)
<i>Big4</i>	-0.215 (-0.517)	-0.246 (-0.589)	-0.238 (-0.571)
<i>Soe</i>	0.197 (0.815)	0.148 (0.615)	-0.280 (-0.930)
<i>Ind</i>	yes	yes	yes
<i>Month</i>	yes	yes	yes
<i>Obs.</i>	49,732	49,732	49,732
<i>Pseudo R²</i>	0.082	0.082	0.082

Note. The dependent variable is the regulatory review risk (*CL*), which is measured as the probability of receiving a comment letter. The independent variables include *lnNumber*, *lnDelay*, *CG*, *HHI*, *Soe*, and three interaction terms: $CG \times \ln\text{Number}$, $HHI \times \ln\text{Number}$, and $Soe \times \ln\text{Number}$. The value of the *CG* dummy variable is 1 for a company that belongs to a group with high internal corporate governance, and 0 otherwise. The value of the *HHI* dummy variable is 1 for a company that belongs to the high *HHI* group, and 0 otherwise. All specifications use logistic regression with month- and industry-fixed effects, with robust standard errors clustered by company identifiers. The key results are highlighted in bold. The *t*-values are shown in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The definitions of the variables are presented in Table 1.

Habib, 2021). The samples are divided into high and low *HHI* groups based on the median *HHI* value. If the samples belong to the high *HHI* group, *HHI* is equal to one; otherwise, it is equal to zero.

Column (2) in Table 10 presents the regression results. The independent variable is the regulatory review risk (*CL*). The coefficient of $HHI \times \ln Number$ in column (2) is significantly positive at the 10% level, indicating that, in the group with a high *HHI* value, the positive relationship between the number of investor questions and regulatory review risk is strengthened. A possible reason is that companies in low-competitive industries (high *HHI* values) face more serious information asymmetries, and because of the lack of a homogeneous competition contrast effect, they generate stronger moral hazards and weaker corporate governance (Grossman and Hart, 1986). Thus, the potential problems exposed through the ‘Hudongyi’ platform are more likely to be ‘spotted’ by regulatory reviewers.

7.4.3. The impact of the nature of equity

This study divides the sample into state-owned and non-state-owned firms. If the sample belongs to the state-owned group, *Soe* equals one, and zero otherwise. Column (3) in Table 10 presents the regression results. The coefficient of $Soe \times \ln Number$ in column (3) is significantly positive at the 5% level, indicating that the positive relationship between the number of investor questions and regulatory review risk is strengthened in the state-owned group. A possible reason is that regulatory reviewers tend to be more concerned with state-owned firms in China.

8. Conclusion

As the official securities platform, the Shenzhen Stock Exchange’s ‘Hudongyi’ has a positive effect on the healthy development of China’s capital market. As there are no previous studies or literature concerning the impact of interactive information disclosure on non-penalty regulatory review risk, this study provides a positive and innovative exploration in this field.

This study finds that after controlling for other factors, the higher the number of investor questions, the higher the probability of receiving a comment letter in the current period. In other words, there is a positive association between the richness and activeness of interactive information disclosure and regulatory review risk in the current period.

For robustness checks, we use an entropy balancing technique. After controlling for endogeneity, the conclusions of this study hold. Moreover, our results hold when we conduct tests using alternative regulatory review risk, alternative richness, and activeness of interactive information disclosure, as well as considering annual data. In the additional analyses, we first find that the richness and activeness of interactive information disclosure are positively associated with regulatory review risk in the current period. The non-penalty regulatory review comes into effect, which significantly reduces the probability of receiving a comment letter in the next three periods. Second, the delayed response from a company to investor questions on the ‘Hudongyi’ platform causes investors and regulatory reviewers to have a negative impression of the company. There is a negative association between the timeliness of interactive information disclosure and regulatory review risk in the current period. Third, we examine the channel through which interactive information disclosure affects regulatory review risk and find that newspaper media coverage partially mediates the relationship between the richness and activeness of interactive information disclosure and regulatory review risk. Finally, this study finds that the level of internal governance, degree of industry competition, and nature of equity affect the relationship between interactive information disclosure and non-penalty regulatory review risk. For companies with high levels of internal governance, the positive relationship between the number of investor questions and regulatory review risk weakens. Thus, even when there is a lot of information available on the ‘Hudongyi’ platform, the regulatory review risk of companies with high levels of internal governance is lower than that of companies with low levels of internal governance. For companies in low-competitive industries and state-owned companies that are more concerned with regulatory reviewers, the association between the number of investor questions and regulatory review risk is strengthened.

Author contribution

Meng Wang: Conceptualization, Data curation, Investigation, Methodology, Formal analysis, Software, Visualization, Writing-original draft, Writing-review & editing. Yongjie Zhang: Conceptualization, Funding acquisition, Project administration, Supervision, Writing-review & editing. Yizhe Dong: Conceptualization, Writing-review & editing. Gaofeng Zou: Conceptualization, Investigation, Methodology, Formal analysis, Supervision, Funding acquisition, Project administration, Resources, Writing-review & editing. Wanlong Zhao: Conceptualization, Project administration, Writing-review & editing. All authors read and contributed to the manuscript, and no conflict of interest to declare.

Declaration of competing interest

The authors declare no conflict of interest.

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Appendix

Table A1
Determinants of Treated_A for the weighted sample determined by entropy balancing.

	mean	Treat variance	skewness	mean	Control variance	skewness
<i>Panel A: Without weighting</i>						
<i>lnSize</i>	1.268	1.211	0.449	1.073	1.083	0.425
<i>Age</i>	110.2	6327.000	0.804	111.500	6551.000	0.801
<i>Ibd</i>	37.880	29.700	1.173	37.860	29.780	1.174
<i>Opinion</i>	0.945	0.052	-3.922	0.942	0.054	-3.796
<i>Grow</i>	0.340	0.943	4.977	0.324	0.946	5.127
<i>Roa</i>	0.024	0.002	-0.009	0.020	0.002	-0.554
<i>Dual</i>	0.351	0.228	0.623	0.323	0.219	0.760
<i>Lev</i>	0.395	0.043	0.387	0.400	0.043	0.464
<i>Loss</i>	0.155	0.131	1.909	0.164	0.137	1.811
<i>Big4</i>	0.024	0.023	6.282	0.021	0.021	6.689
<i>Soe</i>	0.189	0.153	1.592	0.197	0.158	1.527
<i>Panel B: After entropy balance</i>						
<i>lnSize</i>	1.268	1.211	0.449	1.268	1.211	0.449
<i>Age</i>	110.200	6327.000	0.804	110.200	6327.000	0.804
<i>Ibd</i>	37.880	29.700	1.173	37.880	29.700	1.173
<i>Opinion</i>	0.945	0.052	-3.922	0.945	0.052	-3.922
<i>Grow</i>	0.340	0.943	4.977	0.340	0.943	4.977
<i>Roa</i>	0.024	0.002	-0.009	0.024	0.002	-0.009
<i>Dual</i>	0.351	0.228	0.623	0.351	0.228	0.623
<i>Lev</i>	0.395	0.043	0.387	0.395	0.043	0.387
<i>Loss</i>	0.155	0.131	1.909	0.155	0.131	1.909
<i>Big4</i>	0.024	0.023	6.282	0.024	0.023	6.282
<i>Soe</i>	0.189	0.153	1.592	0.189	0.153	1.592

Note: When the independent variable is the richness and activeness of interactive information disclosure, we construct a dummy variable Treated_A and divide our sample into two groups. Treated_A = 1 when the number of investor questions in the 'Hudongyi' platform is more than the median of the full sample (treatment group); Treated_A = 0 when the number of investor questions in the 'Hudongyi' platform is less than the median of the full sample (control group).

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