

Readability of Annual Financial Reports, Information Efficiency, and Stock Liquidity: Practical Guides From the Saudi Business Environment

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Abstract: This research investigates the impact of the annual financial report's readability on the efficiency of information and the level of stock liquidity. To achieve these objectives, the study used content analysis to examine the annual financial reports of a sample of (109) non-financial joint stock companies that are listed in the Saudi Stock Exchange from (2017 to 2021), with a total of 545 views, the study also used the linear decline model to test the study's hypotheses. The study found a correlation between the readability of the annual financial report and the efficiency of information and stock liquidity and based on this, the study recommends that companies and professional organizations should work on improving the readability of annual reports, in addition to analyze the factors affecting it, and to review both mandatory and voluntary disclosure requirements, in order to help the users of the financial statements to understand relevant information and to facilitate making decisions. This research contributes to the finance and accounting literature by focusing on the linguistic features of financial reports by providing practical evidence for the impact of the annual financial report's readability on the efficiency of information and stock liquidity in one of the emerging capital markets. However, these results must be considered with the limitation of the research period, the sample size, and methods of measuring the study variables.

Keywords: Readability of annual financial reports, information efficiency, stock liquidity, Saudi business environment.

1 Introduction

Corporate financial reports are one of the most important sources of information that stakeholders rely on in their decision-making, thus accounting studies have emphasized on the importance of such reports' readability and avoiding the preparation of complex, long and vague reports so that they can be easily understood by investors. Moreover, many professional bodies and regulators around the world, such as the Stock Exchange commission (SEC) and the French Capital Market Authority (AMF) have issued guidelines for improving the financial disclosures to be clearer and more readable, as over-disclosures may lead to information overload, which has a negative impact on the usefulness of financial reports [1]. Although there is no clear definition for the concept of readability of a particular report, some studies attempted to define readability by focusing on certain characteristics. Soepriyanto et al [2] suggested that readability is the ease understanding or Comprehension of the content of certain report because how it is written, and due to its binding, consistency and how its parts are organized, while others have expanded their definition of readability by the impact on potential users of the report, for example Noh [3] who defined readability as the ability of financial investors and analysts to understand information relevant to the assessment of financial disclosure.

In this context, accounting literature has provided several theories to explain managers' motivations for making financial reports more or less readable. "Agency Theory" assumes that increased agency problems lead managers to increase and improve disclosure of non-financial information so that information is easy to understand and more readable, while "Signaling Theory" considers readability is a signal being made by well-performing companies with high profits on the other hand underperforming companies tend to hide bad information and make their reports more difficult to read and interpret. As for "Legitimacy Theory", it suggests that the readability of the annual reports legitimizes company's activities and enables it to gain a community belief of the company as socially responsible. Reports with higher degrees of readability is associated with many positive economic consequences, Xu et al. [4] pointed to its role in mitigating moral hazards and adverse selection in addition to achieving more effective investments, Ertugrul et al. [5] claim that readability of annual reports can lead to lower financing costs, and that annual reports with lower readability is associated with reduced information efficiency, and a poor information environment for analysts to perform their jobs increased cost of information analysis, and high costs for both debt and capital.

Informational efficiency indicates the extent to which the market price reflects all relevant financial and nonfinancial

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information and represents an essential aspect of the quality of the capital market. A number of studies have pointed to the importance of the analysis of how corporate reports can affect information efficiency. In this regard, some studies have focused on the numerical aspect of corporate financial reports including the different patterns of accruals [6], earnings [7] while ignoring the textual-linguistic, where, the non-numerical aspect of the company's report (the linguistic and textual part) represents most of the company's report, so the clarity of this part is critical to the full understanding of the report's information [8], Unlike prior research, the current study focuses on the linguistic and textual part of the company's report, and to examine whether readability of annual reports (as a major characteristic of the linguistic and textual part) improves the informational efficiency?

In theory, psychology and financial theories suggest a positive correlation between readability level and the efficiency of information, as psychology theories suggest that low reading weakens the beliefs of information users on the reliability of information. Furthermore, financial theories indicate that low readability of the annual report weakens the accuracy of information [9] and accordingly, information is time-consuming and less complete when reflected in market prices, resulting in lower level of informational efficiency. Moreover, Hesarzadeh and Rajabalizadeh [10] found evidence on a positive relationship between the ease of reading and informational efficiency, furthermore, readability improves informational efficiency, and this relationship is stronger in companies with a high level of information symmetry.

With regard to the impact of the annual report's readability on stock liquidity, prior accounting literature [11] indicated that generally the quality of disclosure can reduce information asymmetry and enhances the liquidity of the company's stock, however, the majority of studies have focused on quantitative information in assessing disclosure quality, and therefore ignored the main feature of corporate reports, namely, the textual qualitative information, which maybe the scarcity of research in this regard is due to the lack of evidence on whether narrative disclosure provides relevant qualitative information compared to quantitative disclosures. Accordingly, many studies have attempted to examine the increasing interpretive power of verbal disclosure on quantitative disclosure. Li [12] claimed that the forward-looking information's tone within the company's management discussions and analysis is positively related to its future liquidity and earnings, besides that it increases the interpretive power along with other company's characteristics when predicting companies' future financial performance. Kothari et al. [12] also argue that companies with high-level of disclosure have a lower cost of equity as well as lower volatility in the return on equity, and more accurate analyst expectations.

Larcker and Zakolyukina [13] showed that language-based models are as useful as accounting models in detecting miss statements in financial statements, Capalbo et al [14] also found that Narcissistic CEOs with high confidence are more likely to perform earnings management.

In particular, reading and interpreting financial statements requires significant knowledge from the users of the financial statements in order to analyze the information within corporate reports, so more complex disclosures are expected to add more obstacles to investors understanding.

The current research contributes to the finance and accounting literature by analyzing the relationship between readability of annual financial report and the informational efficiency and stock liquidity in the period from 2019 to 2022, as prior research has not provided sufficient evidence on this relations, so analyzing this relationship in the Saudi environment as an example of emerging country economies will be of high importance to managers, regulators, and practitioners in the financial markets, it will also help in improving the quality of annual financial reports, moreover the majority of this research was conducted in developed business environments that have different characteristics from developing business environments within the MENA region. More specifically, the current study attempts to answer the following questions:

1. Does the readability of annual financial report affect the informational efficiency?
2. What is the impact of annual financial report's readability on the level of stock liquidity for listed firms in the Saudi Stock Exchange?

The rest of this research will be structured as follows: Section two: literature review and hypotheses development. Section three: research methodology. Section four: the empirical study findings. Section five: the discussion and conclusion.

2 Literature Review and Hypotheses Development

Previous studies have found inconsistent and mixed results on the relationship between readability of annual financial reports, informational efficiency, and stock liquidity, this can be illustrated as follows:

2.1. Readability of Annual Financial Reports and Informational Efficiency

In theory, the positive relationship between readability and informational efficiency can be explained through two perspectives [10]:

First: Psychology theories: which suggests that less reading weakens the ease of information processing, which affects stockholders' perspectives about the reliability of disclosures in company reports and their ability to provide useful information, leading to the failure understanding and comprehending information or slowing down the making of decisions and judgments, in such case the information is time-consuming and less complete leading to lower information efficiency [15].

Second: Financial theory: According to financial theory, less reading generally leads to reduced information accuracy less information understanding, which increase the likelihood of turning to other information sources such as market analysts services [16], and this requires more time and effort to provide relevant information thus leading to higher processing information costs. Accordingly, the first hypothesis can be formulated as follows:

H.1 "There is a positive and significant association between readability of annual financial reports and informational efficiency".

2.2. Readability of Annual Financial Reports and Stock Liquidity

Hasan and Habib [17] found that more a complex reporting texts (less readable) hinder investors' ability to conclude relevant information as it requires more time and effort to process and analyze information, leading to lower stock trading and thus reduced liquidity. Accounting literature provided an explanation for the theoretical basis between on the relation between readability and liquidity based on two perspectives [18]:

The first perspective: based on impression management literature indicating that managers may deliberately prepare biased financial reports to manipulate shareholder perceptions for the company's future performance and expectations [19] more specifically, the obfuscation hypothesis suggests that managers are required to strategically structure reports (using unnecessary long phrases or complex words) to hide bad news or their poor performance from investors.

The second perspective: which is explained by psychology-based research framework that investigates the role of financial information in influencing the process of decision-making by investor [20], accordingly human cognitive limitations lead to biases in the way information is collected, organized, and retrieved and thus affects decision-making strategies that depart from "Principles of Rational Choice".

Based on that complexity of financial reporting texts requires more efforts from investors to collect and process information, which may limit their willingness to buy stocks and thereby reduce stock liquidity, so the second hypothesis can be formulated as follows:

H2 "There is a positive and significant association between readability of annual financial reports and stock liquidity".

3 Research Methodology

3.1. Sample Selection

The research population is represented by all listed corporations in the Saudi Stock Exchange during the period from 2017 to 2022 which are amounted to (210) corporations from twenty-one business sector. Financial institutions such as banks, investment, finance and insurance corporations were excluded due to their special nature, as well as real estate funds sector because of lack of sufficient data, thus the final study population was (146) corporations, the study sample included (109) non-financial joint stock corporations equivalent to (66.74%) of the total number of listed corporations in the Saudi stock market, and the sample of the study consists of (545) corporation-year, the data has been collected manually from the annual reports of companies available on the Saudi Financial Market Website (Tadawul), as well as from the corporations websites.

3.2. Research Design

Study variables can be divided into:

3.2.1. The Independent Variable

Based on Cho et al. [21] and De Souza [22] readability of annual reports was measured according to the length of the financial report approach which is based on either the number of pages or words of the annual report, and is characterized by a low probability of being exposed to the impact of differences in linguistic features and this approach is suitable for application in the Saudi business environment for flesch and Fog indices as most companies reports are in Arabic, with the exception of a few companies whose reports are in English.

3.2.2. The Dependent Variables

Based on previous studies such as that of Hesarzadeh and Rajabalizadeh [10] informational efficiency (IE) is measured using the Return Variance Ratio, which reflects the deviation of the price from price from Random Walk Pattern and the

analysis is based on daily returns, by which Information Efficiency is measured by the following formula:

$|VR(1, k) - 1| \times (-1)$; where $VR(1, k)$ is the return variance ratio, i.e. $1/k$ times the ratio of the k -day return variance to the 1-day return variance. IE1 is computed using $VR(1, 5)$ and IE2 using $VR(1, 10)$

High levels of IE 1 and IE 2 indicate high information efficiency.

For the Stock liquidity LIQ variable, it was measured based on Amihud study [23] using the stock turnover rate, which is the value of traded stocks to the stock market value.

3.2.3. Control Variables

Firm size: Measured by the natural logarithm of the company's total assets, (Lev) measured by the ratio of total debt to total assets, and the quality of corporate governance (CGQ) an aggregate index was developed to measure the quality of the company's corporate governance mechanisms, taking the value from (zero) to (10) depending on the availability of corporate governance mechanisms: The independence of more than half the board members, the non-duality of CEO and Managing Director position, the audit committee members are three or more, the independence of the members of the Committee, the availability of financial and accounting expertise in the members of the Committee, the number of the audit committee meetings at least (4) times a year, the existence of guidelines for the work of the audit committee, the presence of corporate governance committee, the presence of a risk management committee, being audited by a big 4 audit firm. Return on Assets (ROA): measured by the ratio of net profit before tax to total assets value at the end of the year, and Market-to-book ratio (MB): the ratio of market value to book value of equity at the end of the year.

3.2. Research Model

This study attempts to analyze the association between the readability of annual report and both informational efficiency and stock liquidity. The study's hypotheses testing is based on the use of the linear regression (OLS Regression) model as follows:

The model for the impact of annual report readability on informational efficiency

$$IE_{it} = \beta_0 + \beta_1(READ_{it}) + \beta_2(SIZE_{it}) + \beta_3(ROA_{it}) + \beta_4(LEV_{it}) + \beta_5(CGQ_{it}) + \beta_6(MB_{it}) + \epsilon_{it}$$

Where,

IE: is the dependent variable which represents informational efficiency and is expressed by IE 1, IE 2, high levels indicate high informational efficiency, and READ represents the independent variable which is measured by the natural logarithm of the number of pages of the annual financial report, SIZE is measured by the natural logarithm of total assets, and (ROA) is measured by the rate of return on assets, (LEV) is the ratio of total debt to total assets, (CGQ) is the quality of corporate governance, and (MB) is the market to book value of equity at the end of the financial year.

The model for the impact of annual report readability on stock liquidity

$$LIQ_{it} = \beta_0 + \beta_1(READ_{it}) + \beta_2(SIZE_{it}) + \beta_3(ROA_{it}) + \beta_4(LEV_{it}) + \beta_5(CGQ_{it}) + \beta_6(MB_{it}) + \epsilon_{it}$$

Where,

LiQ: is the dependent variable that represents stock liquidity

4 The Empirical Study Findings

This section aims to test the validity of the data for the statistical analysis, followed by presenting the descriptive statistics of the study variables and the single variable analysis (correlation analysis) and then the regression analysis to test the study hypotheses:

4.1. Testing the Data Validity of Data for the Statistical Analysis

Kolmogorov-Smirnov and Shapiro-Wilk tests were used to verify how data are close to their natural distribution, and the results showed that the (P. value) or (Sig.) is less than (0.05), which means that data are not following natural distribution for all the variables, and this result is confirmed by (Skewness) which does not approach zero and (Kurtosis hyperbole factor) which does not approach (3) for most variables. To solve this problem, the natural log function of these variables has been used to approach normal distribution, and since the sample size is large, the problem that data is does not follow the natural distribution will not affect the validity of the study models, as the sig. level of these variables was (0,000).

Linear interference was also examined through the Multicollinearity Test, where variance Inflation Factor (VIF) was calculated for each independent variable and the (VIF) value for all the study variables did not exceed (10) so the study model is not affected by a linear interference problem. The correlation between variables has no statistical significance

and is very low, indicating the strength of the model used to interpret and identify the effect of the independent variable on dependent variables. Durbin-Watson test was used to verify that there was no autocorrelation problem between the study variables, and Durbin-Watson 's value for the first model was 1.348, and for the second model 1.068, which falls between the top tabular value and four minus the highest tabular values, which indicates that the study models do not have autocorrelation problem.

4.2. Testing the Data Validity of Data for the Statistical Analysis

Table 1: A Description of the Study Variables

Descriptive Statistics					
Variables	N	Minimum	Maximum	Mean	Std. Dev
READ	545	3.01	8.75	5.5184	1.50970
IE1	545	.009	.396	.29295	.075517
IE2	545	.181	.564	.36587	.081905
LIQ	545	3.14	18.35	9.6652	3.79667
SIZE	545	6.27	14.25	10.1734	1.76559
ROE	545	-.124-	.467	.28176	.104018
LEV	545	.047	4.980	2.88348	1.168927
CGQ	545	4	10	6.80	1.757
MB	545	1.15	4.97	3.0454	1.12917
Valid N (listwise)	545				

The previous table shows that the average natural logarithm for the number of pages of the annual financial report READ is (5.5184) with a standard deviation of (1.50970), the natural logarithm for the number of pages of the annual financial report varies from company to company with a minimum value of (3.01), while the maximum value was (8.75), and the average deviation of the value from the pattern of random movement of IE1 was (.29195) reflecting a standard deviation of (.075517), IE2 mean was (.36587) with a standard deviation of (.081905), while the there was a variation in the level of liquidity LIQ, with a minimum value of (3.14), and a maximum value equals to (18.35) and a mean equals to (9.6652).

As for the control variables, the average natural logarithm of the company's total assets was (10.1734) with a standard deviation of (1.76559), the maximum rate of return on assets was (46.7%), while the minimum was (-12.4%). The of financial leverage mean was (2.88348), with a standard deviation of (1.168927), the maximum value of the corporate governance quality (CGQ) was (10), while the minimum value was)(4). The market value to the book value mean was (3.0454) with a standard deviation of (1.12917).

4.3. Correlation Analysis

The Pearson coefficient was used to measure the strength and direction of the relationship between the readability of annual reports, the informational efficiency, and the stock liquidity. Table 2 shows the correlation matrix for the study variables.

Table 2: Correlation Matrix

Var.		READ	IE1	IE2	LIQ	SIZE	ROE	LEV	CGQ	MB
READ	Pearson Corr.	1								
	Sig. (2-tailed)									
IE1	Pearson Corr.	-.729**	1							
	Sig. (2-tailed)	.000								
IE2	Pearson Corr.	-.720**	.725**	1						
	Sig. (2-tailed)	.000	.000							
LIQ	Pearson Corr.	-.735**	.681**	.737**	1					
	Sig. (2-tailed)	.000	.000	.000						
SIZE	Pearson Corr.	-.821**	.733**	.729**	.753**	1				
	Sig. (2-tailed)	.000	.000	.000	.000					
ROE	Pearson Corr.	-.706**	.647**	.619**	.662**	.709**	1			
	Sig. (2-tailed)	.000	.000	.000	.000	.000				
LEV	Pearson Corr.	.790**	-.728**	-.746**	-.754**	-.812**	-.664**	1		
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000			
CGQ	Pearson Corr.	-.788**	.707**	.732**	.750**	.812**	.738**	-.750**	1	
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		
MB	Pearson Corr.	-.761**	.668**	.664**	.679**	.740**	.722**	-.707**	.766**	1

	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	
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Based on the previous table, it is clear that there is a negative and significant association between the annual report number of pages and the informational efficiency, where the correlation coefficient signal was negative for both IE1, IE2, and its significance level (sig.) was less than (0.05). This shows that the increase in the number of the annual report of pages results in reduced readability and informational efficiency, and therefore there is a positive and significant association between the readability and the informational efficiency. There is also a negative and significant correlation between the number of pages of the annual report and the level of stock liquidity where the correlation coefficient was (-0.735) and the level of significance (sig.) is less than (0.05). Therefore, there is a positive and significant association between the annual report readability and the level of stock liquidity.

As for the correlation between informational efficiency, stock liquidity and the control variables, the results showed a positive association between informational efficiency, stock liquidity and the return on assets, corporate governance quality, the market to the book value ratio of equity, while there was relationship a negative association between both information efficiency and stock with financial leverage, a the correlation factor sign was negative and the level of significance (sig.) was less than (0.05).

4.4. Multiple Regression Analysis

Ordinary Least Squares (OLS) was used to build the regression model for measuring the impact of the annual financial report's readability as an independent variable on both informational efficiency and stock liquidity as dependent variables, the results of the regression analysis of the study hypotheses can be presented as follows:

4.4.1. Testing the First Hypothesis

There is a positive and significant association between readability of annual financial reports and informational efficiency.

Table 3 shows the multi linear regression analysis results for the relationship between readability of annual financial reports and informational efficiency.

Table 3: Results of Multiple Linear Regression Analysis of the First Model

$IE_{it} = \beta_0 + \beta_1(\text{READ } it) + \beta_2(\text{SIZE } it) + \beta_3(\text{ROE } it) + \beta_4(\text{LEV } it) + \beta_5(\text{CGQ } it) + \beta_6(\text{MB } it) + \varepsilon_{it}$					
Variables	IE1_{it}				
	Unstand. Coeff.	Stand. Coeffi.		t	Sig.
	B	Std. Error	Beta		
Const.	.248	.048		5.186	.000
READ	-.009	.003	-.185	-2.646-	.009
SIZE	.007	.003	.165	2.246	.025
ROE	.072	.040	.100	1.791	.047
LEV	-.016-	.004	-.243-	-3.796	.000
CGQ	.005	.003	.115	1.673	.025
MB	.005	.004	.074	1.212	.026
R	.792				
R²	.628				
Adj R²	.621				
F	89.869				
Sig	.000				
Variables	IE2_{it}				
	Unstand. Coeff.	Stand. Coeffi.		t	Sig.
	B	Std. Error	Beta		
Const.	0.322	0.051		6.302	.000
READ	-0.007	0.004	-.130	-1.890	.026
SIZE	0.005	0.003	0.112	1.550	.022
ROE	0.011	0.043	0.014	0.257	.047
LEV	-.022	0.004	-.317	-5.036	.000
CGQ	0.011	0.003	0.243	3.594	.000
MB	0.004	0.004	0.061	1.017	.013
R	.799				
R²	.639				

Adj R²	.632
F	94.393
Sig	.000

It is clear from the previous table that (Adjust R2) value for the deviation from the IE1 random movement pattern is (0.628), while as for IE2, it is (0. 639). This shows that the interpretive value of the model is high, as most changes can be explained by the model, the overall significance of the regression model used can be showed through the analysis of variance (ANOVA), where the (F) value is (89. 869) at a significance level of (0.000) for IE1, and for IE2 it is (94.393) with a significance level of (0.000), showing the high significance of the study model and its validity to achieve the study objective.

The results of the regression in table 3 shows that the annual reports readability had a significant impact on the informational efficiency, as the probability value of the regression factor (β) was below the significance level (0.05) as (Sig = 0.000) This agrees with Hesarzadeh and Rajabalizadeh [10], who found a positive relation between readability of annual reports and informational efficiency, and that the ease reading enhances the informational efficiency.

The results also showed that informational efficiency has a significant positive relation with firm size, return on assets, market to book value of equity, and the quality of corporate governance while it has a significant negative relationship with the degree of financial leverage, as the probability value was below the level of significance (0.05).

The regression model for the impact of the annual financial report's readability on the informational efficiency can be formulated as follows:

First: $LE1_{it}$ model

$$(LE1_{it}) \approx 0.248 - 0.009(READ) + .007(SIZE) + 0.072(ROE) - .016(LEV) + .005(CGQ) + 0.005(MB)$$

Second: $LE2_{it}$ model

$$(LE1_{it}) \approx 0.322 - 0.007(READ) + .005(SIZE) + 0.011(ROE) - .022(LEV) + .011(CGQ) + 0.005(MB)$$

4.4.2 Testing the second hypothesis

There is a positive and significant association between readability of annual financial reports and stock liquidity.

Table (4) Results of multiple linear regression analysis for the relation between annual report readability and stock liquidity.

Table 4: Results of Multiple Linear Regression Analysis for the Relation Between Annual Report Readability and Stock Liquidity

$IIQE_{it} = \beta_0 + \beta_1(READ_{it}) + \beta_2(SIZE_{it}) + \beta_3(ROE_{it}) + \beta_4(LEV_{it}) + \beta_5(CGQ_{it}) + \beta_6(MB_{it}) + \varepsilon_{it}$					
variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	5.774	2.272		2.541	.012
READ	-.285	.166	-.113-	-1.717	.047
SIZE	.329	.149	.153	2.203	.028
ROE	3.237	1.915	.089	1.690	.032
LEV	-.905	.196	-.279-	-4.614	.000
CGQ	.498	.140	.230	3.559	.000
MB	.142	.193	.042	.736	.042
R = .818					
R² = .669					
Adj R² .662					
F = 107.627					
Sig = .000					

It is clear from the previous table that (Adjust R2) value is (0.669), which reflects that the interpretive value of the model is high, as most changes can be explained by the model, the overall significance of the regression model used can be showed through the analysis of variance (ANOVA), where the (F) value is (107. 627)) at a significance level of (0.000), showing the high significance of the study model and its validity to achieve the study objective.

The results of the regression analysis in Table 4 showed that the readability of annual reports had a significant impact on stock liquidity, as the regression coefficient (β) sign is negative for the number of pages of the annual financial reports and the probability value (Sig = 0.000) below the significance level (0.05). This proves the validity of the second model,

which agrees with Boubaker et al., [19], which claimed that high readability of annual reports leads to a higher degree of stock liquidity.

The results also showed that informational efficiency has a significant positive relation with firm size, return on assets, market to book value of equity, and the quality of corporate governance while it has a significant negative relationship with the degree of financial leverage, as the probability value was below the level of significance (0.05).

5 Discussion and Conclusion

The main aim of this study is to analyze the relationship between readability of annual financial reports and both the informational efficiency and the stock liquidity.

The study found that the readability of annual reports has a positive impact on improving informational efficiency and stock liquidity in the Saudi business environment as an example of emerging financial markets which are characterized by complex financial reports and increased information asymmetry. The findings of this study can represent a guide for future studies to analyze the impact of annual reports readability on financial performance, earnings quality, investment decisions efficiency, and audit quality. Since the findings of accounting research are generally related to the methods of measuring variables and the limitations of the models and methods used, therefore when looking to the findings of the current study some factors must be considered such as the study period which is three years and that is a short period, which may affect the accuracy of the results as there were some difficulties for obtaining data for a longer period, also the study sample included only non-financial companies, which may limit the generalizability of findings on other types of firms. Finally, informational efficiency was only measured using the rate of return variation, and stock liquidity was measured using the stock turnover rate.

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Conflict of interest

The authors declare that there is no conflict regarding the publication of this paper.

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