TEXTUAL ANALYSIS OF ANNUAL REPORTS AND COMPANY PERFORMANCE IN A MARKET PERSPECTIVE

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Abstract

This study examines the link between firm performance and the use of optimistic tone in the Management Discussion and Analysis (MD&A) section of annual reports. It also investigates how such tone affects market responses. The analysis is based on 125 firm-year observations from 25 non-financial IDX30 firms over the 2020–2024 period. Using Natural Language Processing (NLP) to measure tone and panel regression within an event study framework, the results indicate that optimistic tone is positively associated with cumulative abnormal return (CAR). In addition, firms with stronger return on equity (ROE) are more likely to use optimistic narrative tone. These findings support signaling and agency theory, highlighting the strategic role of narrative disclosures in investor communication. Although the sample controls for sectoral bias, its limited scope and short time frame during COVID-19 may limit generalizability. The study contributes to understanding how textual disclosure influences market behavior in emerging economies.

Keywords: Positive Tone, Cumulative Abnormal Return (CAR), Return On Equity (ROE)

INTRODUCTION

Annual reports are the primary means of corporate communication that not only contain financial information, but also convey managerial expectations and strategies through narrative sections such as *Management Discussion and Analysis* (Alduais, 2022; Ayuningtyas & Harymawan, 2021; F. Li, 2010) . Such narratives play a strategic role in shaping market perceptions, as investors not only pay attention to numbers, but also perceive the tone and language used by management in describing the company's future (Alduais, 2022; Ayuningtyas & Harymawan, 2021) . In recent decades, academic studies have shown that the tone in annual reports, especially the optimistic tone, has an influence on market reactions, such as changes in stock prices (Bonsall et al., 2017; Michelon et al., 2022). This makes linguistic analysis an important approach in studying managerial communication and the credibility of prospective information disclosure.

In Indonesia, the Financial Services Authority requires MD&A in annual reports, but the narrative is not always objective. Management often presents an optimistic narrative to build investor confidence, especially when facing external pressures or stagnant performance (Le & Nguyen, 2024) . In the context of emerging markets with limited financial literacy (OJK, 2024), the potential influence of narrative tone becomes even more significant, given that most investors are retail investors who are prone to cognitive biases and limited understanding of complex reports. Therefore, it is important to understand whether the prospective tone in annual reports truly reflects company fundamentals or is simply a form of *impression management*.

Several theoretical frameworks attempt to account for this occurrence. The upbeat tone is seen by *signalling theorists* as a favourable reflection of management's internal corporate quality (Spence, 1973). By contrast, *agency theory* (Jensen & Meckling, 1976) highlights the strategic use of information to conceal risk or satisfy investors. Assuming the market can rationally filter pertinent information, the *Efficient Market Hypothesis*(Fama, 1970), states that only tones reflecting fundamental prospects would elicit a favourable response. Developed nations have a lot of literature on this topic, but Indonesia has very little, and what little there is focusses on compliance and social responsibility disclosure (Marwa & Kristanto, 2022). Furthermore, the correlation between anticipated tone and real company success has not been thoroughly investigated in the literature.

This research aims to examine two key points. The first thing to consider is if there is a positive correlation between the optimistic tone of future disclosure and the market reaction, as shown by the *cumulative abnormal return* (CAR). Second, if more optimistic narratives are often presented by organisations with higher financial success. The purpose of this work is to provide a relevant and empirical analysis for developing markets by adapting a *text mining* technique based on tone dictionaries (Loughran et al., 2011) for usage with Indonesian annual reports. The results will hopefully shed light on how tone plays a role in business communications and provide managers, investors, and regulators a better idea of how to evaluate the veracity of narrative data.

REVIEW OF LITERATURE

This study is grounded in three primary theoretical frameworks: signalling theory, agency theory, and the efficient market hypothesis (EMH). Each provides a distinct rationale

for how optimistic tones in narrative financial reporting may shape market perception and investor behavior.

Signalling theory, originally introduced by (Spence, 1973), emphasizes that companies can reduce information asymmetry by communicating internal quality through external cues. In financial reporting, a positive tone particularly in the *Management Discussion and Analysis* (MD&A) section is interpreted as a strategic signal reflecting favorable future prospects (Kayed & Meqbel, 2024; F. Li, 2010). Managers of high-performing firms may intentionally use upbeat language to reinforce their reputation and attract investors. This interpretation suggests that tone can be a credible reflection of actual performance.

In contrast, agency theory (Michael C. Jensen & Meckling, 1976) offers a more critical view. It posits that divergent interests between management and shareholders may incentivize the former to present overly positive narratives to protect their own utility especially when performance is weak or scrutiny is high (Ben-Amar et al., 2022; Merkl-Davies & Brennan, 2007). From this standpoint, optimistic tone may not serve as an honest disclosure of prospects, but rather as a tool for perception management. Consequently, tone could be used manipulatively, undermining its informational value.

The third theoretical pillar, the efficient market hypothesis (Fama, 1970), asserts that market prices fully incorporate all available information. If this condition holds, tone should only influence investor behavior when it conveys new, substantive insights. However, in less efficient markets such as Indonesia where retail investors dominate and financial literacy remains limited (OJK, 2024), narrative tone may disproportionately shape price movements. In this context, even tone that lacks fundamental basis may affect the cumulative abnormal return (CAR).

Taken together, these three theories offer complementary yet contrasting perspectives on the use of optimistic tone in corporate disclosure. Signaling theory interprets it as a credible cue of quality, agency theory warns of strategic distortion, and EMH frames its influence within market efficiency. In the context of emerging markets, such as Indonesia, these forces interact—tone may reflect real performance, be exaggerated for self-serving motives, and still significantly influence market behavior due to limited investor sophistication. Based on this theoretical foundation, the following hypotheses are proposed to test how tone relates to market reaction and firm fundamentals.

Previous research shows that the readability of annual reports plays an important role in influencing the market response to information submitted by companies. (Loughran et al., 2011) states that tone in annual reports, especially positive tone, is significantly associated with better market response, leading to higher abnormal returns (Malaquias & Júnior, 2021; Tailab & Burak, 2021). (Wu et al., 2022) also confirm that reports with a positive tone tend to trigger a rapid market reaction and lead to higher stock prices. On the other hand, annual reports that are difficult to understand or contain confusing jargon can actually reduce the effectiveness of communication with investors and slow down market response. Research by (Alduais, 2022) shows that clear and easy-to-read annual reports are more likely to result in a more stable stock price and increase investor confidence in the company.

H1: The more positive the tone of the statement regarding the company's future condition, the more positive the market response.

According to previous study, a more positive tone, particularly when expressing predictions and future prospects, is often used by organisations with greater performance in their annual reports. Research by (Irfan et al., 2023) shows that companies with positive performance more often use optimistic language to reinforce positive investor perceptions and increase their share prices. (Alta'any et al., 2025) also confirms that companies with good results, both financially and operationally, use a more optimistic tone to attract market attention and improve their image. Furthermore, research by (Suryani & Fauz, 2024) explains that an optimistic tone in annual reports is associated with better company performance, as companies tend to want to portray bright future prospects to stakeholders. This is supported by findings from (Ibrahim et al., 2024) , which found that companies with strong performance consistently use positive language to emphasize success and better prospects in the future.

H2: Companies with better performance tend to convey information about the future with a more positive tone.

RESEARCH METHOD

Research Approach and Design

This study adopts a quantitative approach with an empirical-positivistic paradigm to evaluate the relationship between prospective narratives conveyed by management in annual reports and market perceptions of company performance (Alrefaei, 2019). This approach was chosen because it is able to test the relationship between variables objectively through statistical analysis that can be generalized. The research used a time-series cross-section panel data design that integrates cross-entity and time-series data, and it covered the years 2020–2024, from the beginning of the epidemic until the economy started to recover. This design allows the analysis of both inter-temporal dynamics and inter-firm differences, and is effective in controlling for heterogeneity and temporal variation. To address the two main objectives, two panel regression models are used: the first model examines the effect of prospective tone on cumulative abnormal return (CAR), while the second model explores the determinants of prospective tone based on firm performance. This approach provides a comprehensive picture of the interaction between managerial communication and market response in the context of information disclosure.

Population and Research Sample

In this analysis, all firms listed on the IDX that are not involved in the financial sector are used as a population. Financial sectors such as banking, insurance, and financing institutions are excluded due to significant differences in reporting structure, regulation, and financial characteristics (Alduais, 2022). The sample consists of IDX30 index member companies that have consistently joined the index over the period 2020-2024, publish full annual reports in digital format (PDF or HTML), and include a narrative MD&A and business outlook section. Companies also need to make their financial and market data accessible to the public. Identification of companies with big capitalisation, high liquidity, and solid disclosure standards led to the selection of IDX30 as a useful index to study the correlation between management narratives and market reactions. This selection approach is based on previous research methodologies such as those used by (Adhariani & du Toit, 2020; Ayuningtyas & Harymawan, 2021), which emphasize the importance of consistency and data quality in text-based and market research.

Variable Definition and Measurement

This study tests two panel regression models with different variables. In the first model, *Cumulative Abnormal Return* (CAR) is used as the dependent variable to measure the market response to prospective information disclosure, particularly the tone in the MD&A section. CAR reflects investors' reaction to future information, either positively or negatively. The CAR calculation uses an *event study* approach with a *market model*, within an event window of 15 trading days (H-7 to H+7), and a normal return estimation period from H-120 to H-7 (Basdas & Oran, 2014). This process begins by calculating the daily *abnormal return* (AR) based on the expected return estimated from the market model:

$$\boldsymbol{AR_{it} = R_{it} - (a_i + \beta_i R_{mt})}$$

a_i and β_i are derived from the regression results acquired during the estimate period, R_{mt} is the market return calculated using the IHGS, and RitR_{it} Rit is the actual stock return of firm i on day t. The CAR is obtained by adding up the AR values for each day of the event window:

Accumulate abnormal returns during the event window (H-7 to H+7):

$$\boldsymbol{CAR = \sum_{t=-7}^{+7} AR\ it}$$

The market's reaction to the annual report's disclosures is shown by a positive CAR value, whereas investors' reactions are shown by a negative number.

In both models, Positive Tone serves as both the independent and dependent variable. Positive Tone, which is a representation of the positive sentiment contained in management's prospective narrative. This variable is used in the second regression model to analyze the extent to which company performance affects management's tendency to convey optimistic messages to stakeholders. Positive Tone is considered an indicator of a company's communication strategy in shaping market perceptions, in line with the literature on strategic disclosure and impression management(Henry, 2008; Zhang et al., 2022)

Positive Tone was calculated using a lexicon-based NLP approach, based on positive and negative word lists from previous studies(Angela K. Davis, Jeremy M. Piger, 2011; Loughran et al., 2011) . The procedure was conducted systematically in several technical stages: first, the company's annual report in PDF format was manually truncated to retrieve only the *Management Discussion and Analysis* (MD&A) and business outlook sections. These sections were then converted into Microsoft Word format to remove all Indonesian text, leaving only English text. Second, the words in the narrative text were classified into positive and negative categories based on references from(Bassyouny et al., 2020; Henry, 2008; Loughran et al., 2011) . This process is assisted by Python programming to automate the identification and calculation of the frequency of each word belonging to the two categories. Third, after obtaining the number of positive and negative words, the Positive Tone value is calculated by dividing the number of positive words by the total number of positive and negative words, using the formula:

$$\boldsymbol{Positive\ Tone} = \frac{\boldsymbol{Number\ of\ Positive\ Tone}}{\boldsymbol{Number\ of\ Positive\ Tone\ Words + Number\ of\ Negatif\ Tone\ Words}}$$

This formula is consistent with the tone calculation method in previous studies (Angela K. Davis, Jeremy M. Piger, 2011; Arslan-Ayaydin et al., 2021; Yekini et al., 2016) which is widely used in content analysis-based financial research.

To illustrate, the narrative in a manufacturing company's 2022 annual report states: *"The industry faces raw material cost pressures, but companies remain committed to improving efficiency and expanding the domestic market."* The sentence contains one positive word ("improve") and one negative word ("pressure"), so the Positive Tone score is 0.50. This value indicates that even though the company is facing external challenges, management is still trying to convey optimism through a positive communication strategy.

An independent variable that helps to explain changes in Positive Tone in the second model is Return on Equity (ROE). One measure of a company's ability to turn its capital into profit is the return on equity (ROE), which is determined by dividing net income by total equity. Optimism about the future is assumed to be a hallmark of companies with strong financial success, as measured by a high return on equity (ROE) (Alduais, 2022). Management consciously employs positive disclosures as a performance signal to stakeholders, in line with *signalling theory* (Suryani & Fauz, 2024)

In order to decrease estimate bias and increase the regression model's validity, this research uses two control variables: firm size and leverage. In accordance with the signalling theory's claim that big businesses send positive signals to the market through information disclosure, firm size is determined as the natural logarithm of total assets at the end of the fiscal year. This takes into consideration the fact that large businesses are more consistent and open with their disclosure practices. A measure of financial risk is the debt-to-asset ratio, often known as leverage. In addition to raising the likelihood of insolvency, a high capital structure could influence how investors react to positive data presented in annual reports. These two variables are used to control for external factors beyond narrative content that may influence market perceptions (Alduais, 2022).

Research Model

This study examines two main interrelated causal relationships, so two separate regression models are used to gain a comprehensive understanding of the role of positive tone in MD&A in influencing market response and the factors that influence the formation of such tone. The first model tests the effect of positive tone on *Cumulative Abnormal Return* (CAR), while the second model tests the effect of company performance on positive tone.

Model 1:

$$\boldsymbol{CAR_{it} = \alpha + \beta_1 FLS\_Tone + \beta_2 Size_{it} + \beta_3 Leverage_{it} + \varepsilon_{it}}$$

Model 2:

$$\boldsymbol{FLS\_Tone_{it} = \alpha + \beta_1 ROE + \beta_2 Size_{it} + \beta_3 Leverage_{it} + \varepsilon_{it}}$$

In order to analyse the data, we used EViews software and a panel data regression technique. Before running the statistics to determine the optimal model, we employed tests like the Chow test, Hausman test, and Lagrange Multiplier test to limit down the alternatives to pooling least squares, fixed effect, and random effect. In addition to verifying the usual assumptions, we look for heteroskedasticity, residual normalcy, autocorrelation, and multicollinearity. If it is discovered that these assumptions are not met, robust standard errors are used to ensure that the findings remain robust.

RESULTS AND DISCUSSION

Table 1
Descriptive Analysis

	Positive Tone	CAR	ROE	SIZE (K1)	LEVERAGE (K2)
Mean	1.303200	0.045383	17.29960	31.89370	1.222960
Median	0.310000	0.022210	12.93000	31.98780	0.840000
Maximum	16.47000	1.848590	140.2000	34.61840	6.540000
Minimum	0.050000	-0.379340	-38.32000	30.20450	0.120000
Std. Dev.	2.994035	0.210759	26.19209	0.893495	1.168376
Skewness	3.196809	5.110034	3.047089	0.331672	2.301606
Kurtosis	12.81549	44.23565	14.31265	2.710975	9.198016
Sum	162.9000	5.672900	2162.450	3986.712	152.8700
Sum Sq. Dev.	1111.567	5.507982	85067.16	98.99337	169.2728
Observations	125	125	125	125	125

Source: Data processed by Eviews (2025)

There is a lot of diversity in financial performance characteristics across organisations, according to the descriptive analysis of 125 observations. With a median of 0.31 and a standard deviation of 2.994, the Positive Tone variable shows that most organisations employ a low prospective tone, with a few outliers using extremely high tones. The average is 1.303. The CAR variable reflects the market's varying reaction to corporate information, with an average of 0.045 and a narrow variation of values. Companies' returns on equity (ROE) vary greatly, from very lucrative to loss-making, with an average of 17.299 and a standard deviation of 26.192.

On the other hand, SIZE and other firm characteristic variables are very consistent across the board, with an average of 31.893 and a standard deviation of 0.894, suggesting that the sample's businesses are all around the same size. On the other hand, LEVERAGE varies greatly, ranging from very cautious to very debt-dependent, with a mean of 1.222 and a deviation of 1.163. Overall, the data shows diversity in prospective tone, profitability, and capital structure, despite the relative uniformity in firm size.

Statistical Analysis

Model Analysis in Panel Data Regression

The first and most important step in using a linear regression with path analysis methodology on panel data is to choose the best model estimation method.

One method for determining whether a panel data modelling strategy based on the common effect or fixed effect approach is more appropriate is the Chow test. The outcomes of hypothesis testing using chi-square and F-square statistical analysis provide the basis for decision making.

H0 states that the common effect model will be better.

H1 states that the fixed effect model is better.

H_1 is accepted and H_0 is denied if the chi-square or F test value is less than the significance threshold ($\alpha = 0.05$) as shown by the test results. According to the findings, the common effect is more effective. But using H_0 appears to make the common effect model suit panel data regression estimates better.

Table 2
Chow Test Results Model 1

Redundant Fixed Effects Tests
Equation: FEM2
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	0.145320	(24,97)	1.0000
Cross-section Chi-square	4.415528	24	1.0000

Chow Test Model 2 Results

Redundant Fixed Effects Tests

Equation: FEM
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	1.723681	(24,97)	0.0333
Cross-section Chi-square	44.401037	24	0.0069

Source: Processed data (2025)

As shown in Table 2, both the F-statistic and Chi-square tests for Model 1 produce p-values of 1.000, indicating no statistical reason to reject the common effect model. In contrast, Model 2 produces significant p-values (0.0069), leading to rejection of the null hypothesis and favoring the fixed effect model. At this stage, Model 1 appears to suit the common effect framework, while Model 2 fits the fixed effect framework more closely.

However, the Chow test only compares common and fixed effects. Further diagnostics are required to determine whether random effects offer a better specification.
It is the **Hausman Test.** Selecting an appropriate model for estimating panel data—the common effect or the fixed effect model—is the first step in running the Hausman Test. An alternative theory is put forth:

H0: *Random effect* model will be better than *fixed effect* model
H1: The *fixed effect* model will be better than the *random effect* model.

To reject H_0, the probability value of the Hausman Chi-Square test must be less than 0.05, indicating that the *fixed effect* model is more suitable than the *random effect* model. On the other hand, if the probability value is more than 0.05, which means that H_0 is accepted, the *random effect* model is better for estimating panel data regression.

Table 3
Hausman Test Model 1

Correlated Random Effects - Hausman Test
Equation: REM
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	2.183501	3	0.5352

Hausman Test Model 2

Correlated Random Effects - Hausman Test
Equation: REM2
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	4.992502	3	0.1723

Source: Processed data (2025)

For both models, the p-values exceed the 0.05 threshold, indicating that H_0 cannot be rejected. Therefore, the random effect model is preferred over the fixed effect model for both Model 1 and Model 2, according to the Hausman test.

To validate the suitability of the random effect model compared to the common effect model, a Lagrange Multiplier (LM) test is required.

The **LM-Test** is short for the **Lagrange Multiplier Test**. If the common effect model isn't suitable, then the random effect model should be considered instead. The purpose of this research is to determine whether the random effect approach provides a better explanation for the variance across entities by applying the LM-Test to Model 1.

Table 4
Lagrange Multiplier Test Model 1

Lagrange Multiplier Tests for Random Effects
Null hypotheses: No effects
Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided
(all others) alternatives

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	12.18395 (0.0005)	0.187129 (0.6653)	12.37108 (0.0004)

Lagrange Multiplier Test Model 2

Lagrange Multiplier Tests for Random Effects
Null hypotheses: No effects
Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided
(all others) alternatives

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	1.601015 (0.2058)	0.162336 (0.6870)	1.763352 (0.1842)

Source: Processed data (2025)

A *random effects* model is used to evaluate the influence on CAR because, according to Table 4 of the Lagrange test results, the Breusch-Pagan probability value for Model 1 is 0.0005 (<0.05). Model 2 evaluates Positive Tone using the *common effect* model since the result is 0.2058 (>0.05).

Tabel 5
Model Selection Summary for Panel Regression

Model	Chow Test (Common vs Fixed)	Hausman Test (Random vs Fixed)	LM Test (Common vs Random)	Final Model
Model 1	Common Effect (p = 1.000)	Random Effect (p = 0.5352)	Random Effect (p = 0.0005)	Random Effect
Model 2	Fixed Effect (p = 0.0069)	Random Effect (p = 0.1723)	Common Effect (p = 0.2058)	Fixed Effect

Source: Processed data (2025)

As summarized in Table 5, Model 1 is estimated using the random effect model. Although the Chow test does not reject the common effect, both the Hausman and LM tests

support the use of random effects, justifying this choice. For Model 2, despite the LM and Hausman tests showing no significant results, the Chow test clearly favors the fixed effect model. Therefore, Model 2 is estimated using the fixed effect model, which better captures within-firm variation over time.

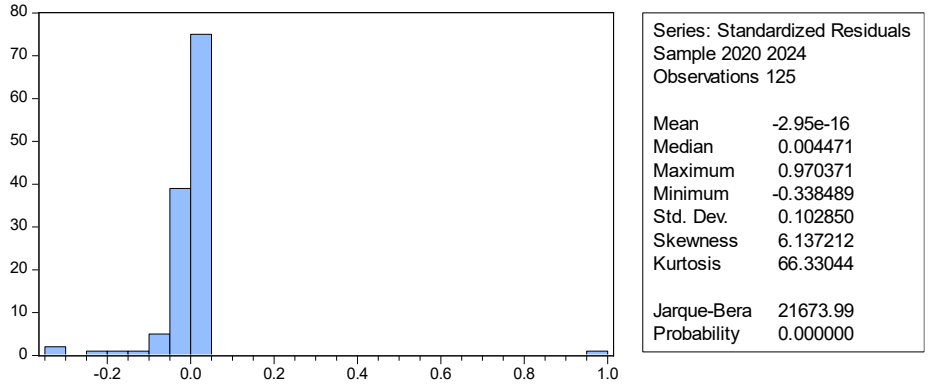
Classical Assumption Test Analysis

In linear regression, the classical assumption test is a must-have for correct estimating results.

A **Normality Test**. Finding out whether the residual data follows a normal distribution is the goal of this test. Using the following criteria, the test employs a histogram graph and the Jarque-Bera (JB) test:

If p-value < α, then H0 is rejected.
If p-value > α, then H0 is accepted

Model 1



Model 2

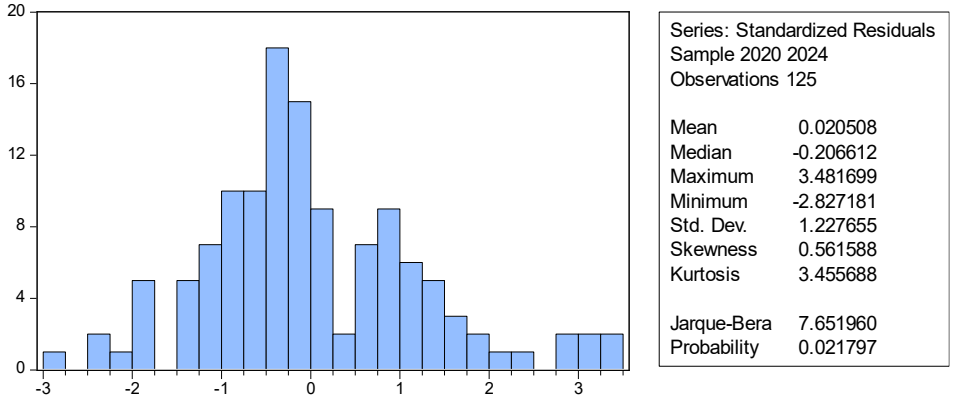


Figure 1
Data Normality Test
Source: Processed data (2025)

The normality assumption was assessed using the Jarque-Bera test, which yielded p-values below the 0.05 threshold in both Model 1 (p = 0.0000) and Model 2 (p = 0.02178). This result indicates a deviation from normality. Nevertheless, given the sample size (N = 125), the Central Limit Theorem (CLT) allows us to proceed, as normality is less critical for large-sample regression models.

To address potential outlier influence, boxplot visualization and standardized residual analysis were conducted. No extreme values were detected that would significantly distort the model. Therefore, no data transformation was applied. However, the use of robust standard errors or variable transformation techniques (e.g., winsorizing or log transformation) remains a valid consideration for future research involving smaller samples or more volatile data distributions.

Multicollinearity **Test**. In order to ensure that the processed regression model does not include any correlated or related independent variables, this test is performed. The multicollinearity test, which uses the values of the correlation matrices, is shown in the table below:

Table 6
Multicollinearity Test Model 1

	X_Tone Positive	K1_SIZE	K2_LEVERAGE
X_Tone Positive	1.000000	0.703167	0.776073
K1_SIZE	0.703167	1.000000	0.881126
K2_LEVERAGE	0.776073	0.881126	1.000000

Multicollinearity Test Model 2

	X_ROE	K1_SIZE	K2_LEVERAGE
X_ROE	1.000000	0.703167	0.776073
K1_SIZE	0.703167	1.000000	0.881126
K2_LEVERAGE	0.776073	0.881126	1.000000

Source: Processed data (2025)

The table above shows that all of the independent variables have correlation coefficients below 0.80. Since multicollinearity is not an issue, we may infer that the model is appropriate for predicting the effect of independent variables on the dependent variable.

The goal of the **heteroscedasticity test** is to determine whether the residual variances in the regression model are not distributed evenly. It is preferable to have "homoscedastic" data. Since there were no statistically significant regression coefficients of the independent variables on the RESABS variable, the Glejser test did not find any indication of heteroscedasticity. The foundation of this hypothesis is:

H0 : There is no *heteroscedasticity* problem

H1 : There is a *heteroscedasticity* problem

Table 7
Heteroscedasticity Test Model 1
Heteroskedasticity Test: Glejser

R-squared	0.644903
Adjusted R-squared	0.636099
S.E. of regression	0.058646
Sum squared resid	0.416159
Log likelihood	179.1953
F-statistic	73.25062
Prob(F-statistic)	0.000000

***Heteroscedasticity* Test Model 2**

Heteroskedasticity Test: Glejser

R-squared	0.124330
Adjusted R-squared	0.102620
S.E. of regression	1.085834
Sum squared resid	142.6633
Log likelihood	-185.6282
F-statistic	5.726654
Prob(F-statistic)	0.001066

Source: Processed data (2025)

Since all of the independent variables have probability values of 0.0000 that are less than 0.05, the heteroscedasticity test of Model 1 verifies the acceptance of H_1. Since the p-value for each independent variable is less than 0.05, Model 2 also accepts H_1. This suggests that both models exhibit heteroscedasticity due to the substantial values of the independent variables' regression coefficients. The results show that the error variance varies between the two models.

Autocorrelation Test. The goal of this test, which is typical for time series data, is to determine whether there is a correlation between the mistakes (residues) in period t and the prior period (t-1). The data cannot be considered independent if the residuals show signs of autocorrelation. Assuming autocorrelation is present in the model, H_0 is rejected when the Obs*R-squared probability value is less than 0.05. Conversely, if the value is larger than 0.05, H_0 is accepted and no autocorrelation is present in the model.

Table 8
Autocorrelation Test Model 1
Breusch-Godfrey Serial Correlation LM Test:

R-squared	0.846335
Adjusted R-squared	0.835200
S.E. of regression	0.025608
Sum squared resid	0.045248
Log likelihood	171.5702
F-statistic	76.00596
Prob(F-statistic)	0.000000

Autocorrelation* Test *Model 2

Breusch-Godfrey Serial Correlation LM Test:

R-squared	0.028432
Adjusted R-squared	-0.041971
S.E. of regression	1.736102
Sum squared resid	207.9694
Log likelihood	-144.6668
F-statistic	0.403845
Prob(F-statistic)	0.844554

Source: Processed data (2025)

With a probability value of 0.00000 < 0.05, the results of the autocorrelation test in Model 1 support the acceptance of H_1 as a result of autocorrelation. H_0 is accepted in Model 1 since the probability value of 0.84455 > 0.05, suggesting that autocorrelation is not included in the model. To address the issues of autocorrelation and heteroscedasticity in panel data models, the Panel-Corrected Standard Errors (PCSE) and Feasible Generalised Least Squares (FGLS) estimators collaborate. By using panel data, FGLS may enhance the standard error and coefficient estimations, making them more exact and efficient, hence addressing the drawbacks of the OLS model.

Hypothesis Testing. Path analysis processing is the initial stage in answering the formulation of research problems. The following results are obtained from data processing:

Table 9

Eviews Output Results Coefficient Equation Model 1

Dependent Variable: Y1_CAR
Method: Panel EGLS (Cross-section random effects)
Date: 06/16/25 Time: 21:34
Sample: 2020 2024
Periods included: 5
Cross-sections included: 25
Total panel (balanced) observations: 125
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	-1.643879	0.756367	-2.173389	0.0317
X_Tone Positive	0.001794	0.000622	2.881828	0.0047
K1_SIZE	0.048530	0.024334	1.994296	0.0484
K2_LEVERAGE	0.090303	0.020981	4.304017	0.0000

Source: Data processed by Eviews (2025)

The calculation results (*output*) of the equation are as follows:

$$Y1 = -1.643 + 0.001\ X + 0.048\ K1 + 0.090\ K2 + \varepsilon$$

Based on the above equation, it can be interpreted as follows:

1. If other variables are held constant, a one-unit increase in Positive Tone is associated with an increase of 0.001794 in CAR. This implies that a more optimistic narrative tone tends to positively influence abnormal returns
2. The coefficient of Size is 0.0485, indicating that larger firms are associated with higher CAR values, possibly due to greater visibility or investor confidence in firm stability.
3. Leverage has a positive and statistically significant effect on CAR, with a coefficient of 0.0903. This suggests that firms with higher financial leverage tend to experience greater abnormal returns, potentially due to higher risk-taking or signaling effects

Eviews Output Results Equation Coefficient Model 2

Dependent Variable: Y2_Tone Positive
Method: Panel EGLS (Cross-section weights)
Date: 06/16/25 Time: 21:24
Sample: 2020 2024
Periods included: 5
Cross-sections included: 25
Total panel (balanced) observations: 125
Linear estimation after one-step weighting matrix
Cross-section weights (PCSE) standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	44.22719	3.540024	12.49347	0.0000
X_ROE	0.049551	0.006534	7.583327	0.0000
K1_SIZE	-1.453717	0.115847	-12.54863	0.0000
K2_LEVERAGE	1.956474	0.167197	11.70163	0.0000

Source: Processed data (2025)

The calculation results of the equation are as follows:

$$Y2 = 44.227 + 0.049\ X - 1.453\ K1 + 1.956\ K2 + \varepsilon$$

What follows is an interpretation based on the previous equation:

1. With all other variables held constant, the intercept of Positive Tone is 44.227, representing its base value. The coefficient of ROE is 0.0495, meaning that for every one-point increase in ROE, the Positive Tone score increases by 0.0495 units, assuming all other variables remain unchanged.
2. The coefficient of Size is -1.4537, indicating that as firm size increases by one unit, the Positive Tone score decreases by approximately 1.45 points. This may reflect more conservative narrative practices among larger firms due to increased public scrutiny or regulatory pressure.
3. Leverage has a positive coefficient of 1.956, suggesting that a one-point increase in leverage is associated with an increase of 1.956 in the Positive Tone score, all else being equal.

Simultaneously, Model 1 has an effect on Positive Tone as well as Model 2 has an effect on CAR, as shown in the data processing results in the table below.

Table 10
Coefficient of Determination Model 1

Dependent Variable: Y1_CAR
Method: Panel EGLS (Cross-section random effects)
Date: 06/16/25 Time: 21:34
Sample: 2020 2024
Periods included: 5
Cross-sections included: 25
Total panel (balanced) observations: 125
Swamy and Arora estimator of component variances

R-squared	0.761859	Mean dependent var	0.045383
Adjusted R-squared	0.755954	S.D. dependent var	0.210759
S.E. of regression	0.104117	Sum squared resid	1.311679
F-statistic	129.0338	Durbin-Watson stat	1.425284
Prob(F-statistic)	0.000000		

Source: Processed data (2025)

Adjusted Rsquare ($R^{2)}$, after adjustment, is 0.755. Using Positive Tone, Size, and Leverage together has a 75.5% impact on CAR, as seen in the figure. Things beyond our control affect the remaining 24.5%. To restate, the study model explains the CAR variable to the extent of 75.5% when controlling for Positive Tone, Size, and Leverage, while other factors explain the remaining 24.5%.

Coefficient of Determination Model 2

Dependent Variable: Y1_Positive Tone
Method: Panel EGLS (Cross-section weights)
Date: 06/16/25 Time: 21:24
Sample: 2020 2024
Periods included: 5
Cross-sections included: 25
Total panel (balanced) observations: 125
Linear estimation after one-step weighting matrix
Cross-section weights (PCSE) standard errors & covariance (d.f. corrected)

R-squared	0.852916	Mean dependent var	1.761975
Adjusted R-squared	0.849269	S.D. dependent var	2.996100
S.E. of regression	1.242955	Sum squared resid	186.9374
F-statistic	233.8857	Durbin-Watson stat	1.788290
Prob(F-statistic)	0.000000		

Source: Processed data (2025)

Adjusted Rsquare (R^2) after adjustment, is 0.849. 84.9% of the positive tone is affected by using ROE, Size, and Leverage together, as seen in the figure. The other variables influenced the remaining 15.1%. That is, the Return on Equity (ROE), Size, and Leverage variables explain 84.9% of the variance in the Positive Tone variable, while other factors explain the remaining 15.1%.

Simultaneous Test Analysis. The test is performed jointly using the F distribution when Model 1 influences *Positive Tone* and Model 2 affects *CAR* at the same time. The F table value is 3.0705 with 122 degrees of freedom (df) in the denominator and 2 in the numerator. Otherwise, H_a is acceptable if F count > F table, and H_0 is approved if F count < F table. This proves that the independent variables have a substantial impact on the dependent variable all at once.

Table 11
Simultaneous Test Results Model 1

R-squared	0.761859
Adjusted R-squared	0.755954
S.E. of regression	0.104117
F-statistic	129.0338
Prob(F-statistic)	0.000000

Simultaneous Test Results Model 2

R-squared	0.852916
Adjusted R-squared	0.849269
S.E. of regression	1.242955
F-statistic	233.8857
Prob(F-statistic)	0.000000

Source: Data processed by Eviews (2025)

According to the results in Model 1, the combined effects of Positive Tone, Size, and Leverage on CAR are significant (F-value = 129.033). 4.0705 in the F-table, with a 0.000 < 0.05 significant level. With an F-value of 233.885 > F-table of 3.0705 and a significance threshold of 0.000 < 0.05, H_0 is rejected and H_a is accepted, just as it is with Model 2. All of this points to the fact that the independent variables significantly affect Positive Tone when considered together.

Discussion of Research Results

Table 12
Research Hypothesis Summary Results

Model 1	**Sig**	**Decision**
Tone Positive - CAR	0.0000 < 0.05	Significant and Influential
Size - CAR	0.0484 < 0.05	Significant and Influential
Leverage - CAR	0.0000 < 0.05	Significant and Influential
Model 2	**Sig**	**Decision**
ROE - Positive Tone	0.0000 < 0.05	Significant and Influential
Size - Positive Tone	0.0000 < 0.05	Significant and Influential
Leverage-Positive Tone	0.0000 < 0.05	Significant and Influential

Source: Processed data (2025)

The panel regression estimation results in Model 1, *Positive Tone* has been shown to have a significant effect on *Cumulative Abnormal Return* (CAR), indicating that investors respond directly to narrative tone. This supports the *efficient market hypothesis*(Fama, 1970) , that the market internalizes available information including text in annual reports. Henry(Henry, 2008; Tailab & Burak, 2021) shows that a positive tone in MD&A can increase investor confidence and have an impact on stock prices. The study(Z. Li et al., 2023) also confirms that the market reacts quickly to an optimistic tone,

especially in companies with a good management reputation. (Alshorman & Shanahan, 2021) found that a positive tone strengthens investors' perception of short-term prospects, while(Malaquias & Júnior, 2021) showed a direct relationship between tone and abnormal returns in emerging markets.

The control variables Size and Leverage in Model 1 are also significant to CAR. Larger company size is associated with higher returns because it is perceived as stable and low risk. This is relevant to the study(Alduais, 2022) , which shows that large companies are more professional in preparing narratives and have greater trust from institutional investors. Meanwhile, high leverage also shows a positive influence on CAR (Alduais et al., 2022) . In this context, investors may interpret the use of debt as a growth leverage tool, as long as it is supported by convincing communication(S. Li et al., 2023) . However, this also opens up room for expectation manipulation if the tone does not reflect the true financial condition.

Model 2 shows that *Return on Equity (ROE)* has a significant effect on positive tone. This finding supports *signaling theory*, where well-performing companies tend to send positive signals through prospective narratives (Spence, 1973). This is reinforced (Suryani & Fauz, 2024), which shows that companies with high profitability use positive tone perception of sustainable performance However, company size (Size) actually has a significant negative effect on tone. This is consistent with the findings (F. Li, 2010) , that large companies are more cautious in conveying expectations because they face reputational pressure and market scrutiny. Meanwhile, high leverage encourages the use of optimistic tone, which can be interpreted as an *impression management* strategy to maintain market and creditor perceptions (Merkl-Davies & Brennan, 2007; Oliveira et al., 2021).

In Model 2, the control variables Size and Leverage have a significant effect on *Positive Tone*. Large companies tend to use a more optimistic narrative because they are considered stable and credible (Suryani & Fauz, 2024) . Meanwhile, high leverage is also associated with an optimistic tone, which can be interpreted as a communication strategy to instill investor confidence, although it is risky if it does not reflect real conditions (Alduais, 2022).

CONCLUSION

This study finds that the tone used in forward-looking sections of annual reports is associated with market perceptions and firm fundamentals. Specifically, firms expressing a more optimistic tone tend to show higher cumulative abnormal returns (CAR), and those with stronger financial performance measured by return on equity (ROE) are more likely to communicate positively. These findings align with signaling theory, where positive tone serves to reduce information asymmetry. However, given the observational nature of the data, these associations should not be interpreted as causal effects. Moreover, the inverse relationship found between firm size and tone suggests that tone is not solely a strategic tool, but also shaped by contextual factors such as public scrutiny and institutional constraints. Leverage also appears to influence tone choice, supporting agency theory by highlighting how managerial incentives might affect disclosure behavior.

While the use of a lexicon-based approach offers transparency and efficiency, it comes with notable limitations. The method does not capture context, irony, or sentence structure, which can affect sentiment interpretation. Future research may benefit from incorporating more advanced models like BERT, which are capable of processing contextual meaning and linguistic nuance in financial texts. Additionally, extending this research through experimental or quasi-experimental designs could enhance causal inference, while combining textual analysis with investor behavior data may offer deeper insights into how narrative communication influences decision-making in emerging markets.

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