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Trading Volume Activity, Trading Frequency, And Abnormal Stock Returns: Evidence From Indonesian Banking Firms

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Abstract: This study examines the associations of trading volume activity (TVA) and trading frequency with abnormal stock returns among banking firms listed on the Indonesia Stock Exchange (IDX). Using a quantitative observational design, the study analyzes quarterly data from five banks (BBCA, BBRI, BMRI, BBNI, and BBTN) over the period Q1 2021–Q2 2026, comprising 110 firm-quarter observations. Abnormal returns are calculated using the market-adjusted model with the Jakarta Composite Index (JCI) as the market benchmark. TVA is measured as quarterly trading volume divided by shares outstanding, while trading frequency represents the number of transactions per quarter. Panel-data regression is employed to assess their individual and joint associations with abnormal returns. However, the preliminary regression outputs are inconsistent: one set indicates statistically significant positive coefficients, while another reports an insignificant overall model and a non-significant TVA coefficient. Therefore, the inferential results remain provisional pending verification of the dataset, variable transformations, model specification, and original EViews outputs. This study aims to contribute firm-quarter evidence on trading intensity in Indonesian banking stocks without implying unsupported causal relationships.

Keywords: Abnormal returns; banking stocks; indonesia stock exchange; trading frequency; trading volume activity.

Introduction

Capital markets connect firms seeking external finance with investors allocating surplus funds. They also facilitate price discovery by incorporating information into security prices through investors' trading decisions. For investors, stock returns are therefore shaped not only by firm-specific fundamentals but also by macroeconomic developments, market-wide conditions, and the arrival and interpretation of information (Samsul, 2018). Understanding trading activity is important because transaction volume and frequency provide observable indications of how market participants respond to changing expectations and information (Nasution, 2015). The expansion of domestic capital-market participation further increases the relevance of understanding these market dynamics (Bursa Efek Indonesia, 2026).

Macroeconomic conditions are particularly relevant to equity valuation. Interest rates, inflation, and exchange-rate movements can affect discount rates, expected cash flows, and investors' risk assessments. Evidence from the Indonesian market has linked monetary-policy indicators to movements in the Jakarta Composite Index, although the estimated relationships vary across macroeconomic variables and periods (Misharni, 2018). These considerations are especially important for banks because their valuations are exposed to interest-rate risk through the structure and repricing of assets and liabilities

Investment decisions in the stock market are influenced by financial objectives, risk preferences, corporate fundamentals, and market information. Wealth planning emphasizes the importance of financial goal setting, disciplined fund management, and appropriate investment instrument selection (Mecca, 2026). In the banking sector, stock movements are associated with corporate financial indicators (Rahmani, 2020) and macroeconomic conditions, including interest rates, inflation, and exchange rates (Sutowo dkk., 2022). Furthermore, investors' responses to market information can be reflected in trading activities and *abnormal returns*, defined as the difference between actual returns and expected returns (Hartono, 2022).

From the perspective of *Signaling Theory*, information serves as a signal that enables investors to evaluate corporate prospects and make investment decisions. However, investor responses may vary according to their financial objectives and risk preferences, including their choices between Islamic and conventional stocks (Ammy & Soemitra, 2022). Such responses can be examined through *Trading Volume Activity* (TVA), which measures the proportion of traded shares relative to outstanding shares, and trading frequency, which represents the number of transactions within a given period. These indicators capture different dimensions of market activity and have been employed in previous studies examining trading behavior and stock returns (Indrayani dkk., 2020)(Hariyanto dkk., 2024). (Taslim & Wijayanto, 2016).

Nevertheless, previous studies have reported mixed findings. Research examining the announcement of the Indonesia Maju Cabinet found no significant differences in *abnormal returns* and TVA(Aditha & Adiputra, 2020). In the pharmaceutical sector, *abnormal returns* showed no significant changes, whereas trading volume and frequency exhibited variations (Saputra G dkk., 2021). Similarly, research on banking stocks surrounding the *ex-dividend date* identified significant changes in stock prices and

trading volume but no significant differences in *abnormal returns*(Abid dkk., 2026). These inconsistent findings suggest that increased trading activity does not necessarily correspond to changes in *abnormal returns* in a consistent manner.

The research gap lies in the dominance of previous studies employing the *event study* approach to examine market reactions to specific events (Abid dkk., 2026; Aditha & Adiputra, 2020; Saputra G dkk., 2021). Furthermore, studies focusing on the banking sector have examined TVA and *abnormal returns* in relation to firm value as the dependent variable (Hariyanto dkk., 2024). However, TVA and trading frequency represent distinct characteristics of market activity and may exhibit different relationships with stock returns. International studies have established that trading activity is associated with liquidity and stock returns, while investor attention to information influences trading decisions (Barber & Odean, 2008; Chordia dkk., 2001). The distinctive characteristics of the banking sector also warrant consideration, as changes in interest rates may affect bank stock valuations through the structure of their assets and liabilities (English dkk., 2018).

Against this background, the novelty of this study lies in examining the partial and simultaneous relationships of TVA and trading frequency with *abnormal returns* using panel data regression. The study focuses on five banks listed on the Indonesia Stock Exchange (IDX), namely BBCA, BBRI, BMRI, BBNI, and BBTN. It aims to provide empirical evidence on the relationship between two dimensions of trading activity and abnormal stock returns in Indonesia's banking sector. The findings are expected to extend the theoretical understanding of market responses to information and provide additional insights for investors and analysts in evaluating banking stocks. The identified relationships are interpreted as statistical associations rather than direct evidence of causality.

Literature Review

Signaling Theory

Signaling Theory explains how information disclosed by companies influences investors' perceptions and investment decisions under conditions of information asymmetry between internal and external stakeholders. Such signals may be conveyed through financial statements, dividend announcements, and corporate policies that reflect a company's financial condition and future prospects (Gitman, 2021; Hariyanto dkk., 2024). However, trading volume and trading frequency represent investors' responses to information rather than signals directly issued by companies. Differences in investor expectations, risk assessments, and liquidity needs may increase trading activity and influence price formation and *abnormal returns*(Hartono, 2022).

In this study, *Signaling Theory* serves as a conceptual framework for explaining the relationship between *Trading Volume Activity* (TVA), trading frequency, and *abnormal returns*. TVA reflects the proportion of shares traded, whereas trading frequency measures the intensity of transactions over a given period. Both indicators represent

market responses that should be examined in consideration of corporate fundamentals, liquidity conditions, and broader market dynamics.

Stock Price

Stock prices are determined by the interaction of supply and demand in the capital market, reflecting investors' assessments of a company's prospects and investment risks (Samsul, 2018). Their movements are influenced by corporate fundamentals, company policies, profit expectations, and trading activity (Abbas, 2018; Tarigan, 2018). Hubungan antara aktivitas perdagangan dan harga saham juga telah diteliti dengan menggunakan *abnormal return* dan *Trading Volume Activity* sebagai variabel independen. Ananda dkk., (2021) found that *Trading Volume Activity* has a significant effect on stock prices, whereas *abnormal returns* have no statistically significant partial effect.

In this study, stock prices are not directly treated as the dependent variable but serve as the basis for calculating *actual returns*. The difference between *actual returns* and *expected returns* is subsequently used to determine *abnormal returns*. Thus, stock price movements constitute an essential component in examining the relationship between trading activity and abnormal stock performance.

Abnormal Return

Abnormal return Abnormal return refers to the difference between a stock's actual return and its expected return. A positive value indicates that the actual return exceeds expectations, whereas a negative value indicates the opposite (Hartono, 2021, 2022). This indicator is commonly used to identify market responses to information, although its variation is also influenced by market conditions, firm characteristics, and the measurement model employed (Samsul, 2018). Previous studies suggest that investor responses to information may be associated with stock price movements, although the direction and magnitude of these relationships vary (Barus & Christina, 2014; Suharti & Saftiana, 2021). Research on market reactions and *earnings per share* also highlights the relevance of corporate information and firm characteristics in explaining stock price movements (Siagian, 2011).

This study employs the *market-adjusted model*, which calculates *abnormal returns* by subtracting the market return, represented by the Jakarta Composite Index (JCI), from the stock's actual return. This model assumes that a stock's expected return equals the market return, eliminating the need to estimate alpha and beta parameters. The analysis covers five banking companies over the period 2021Q1–2026Q2 using quarterly data. Actual returns are calculated based on stock price changes, while expected returns are derived from corresponding changes in the JCI. Measurement consistency must be maintained by accounting for dividend adjustments and corporate actions, such as *stock splits*, to prevent technical price changes from generating biased abnormal return estimates.

The abnormal return is mathematically expressed as follows:

$$\mathbf{R_{it} = (P_{it} - P_{it-1}) / P_{it-1}}$$

Explanation:

R_{it} = Actual return of stock i in quarter t.

P_{it} = Stock price at the end of quarter t.
P_{it-1} = Stock price at the beginning of quarter t.Expected Return

$$E(R_{it}) = R_{mt}$$
$$R_{mt} = (IHSG_t - IHSG_{t-1}) / IHSG_{t-1}$$

Explanation:
$E(R_{it})$ = Expected return for stock i in quarter t.
R_{mt} = Market return in quarter t.
$IHSG_t$ = IHSG value at the end of quarter t.
$IHSG_{t-1}$ = IHSG value at the beginning of quarter t.Abnormal Return

$$AR_{it} = R_{it} - E(R_{it})$$

Explanation:
AR_{it} = Abnormal return of stock i in quarter t.
R_{it} = Actual return of stock i in quarter t.
$E(R_{it})$ = Expected return based on the IDX in quarter t.

Abnormal Return Measurement

The calculation generates an abnormal return measure by comparing changes in a firm's stock price with corresponding market index movements within the same quarter. However, measurement accuracy depends on consistent adjustments for corporate actions, particularly dividend distributions and stock splits. Therefore, historical price data must be validated to ensure that corporate-action-related price changes are not misinterpreted as abnormal returns. In this study, abnormal return serves as the dependent variable for examining the relationship between trading activity and stock returns following historical data validation.

Trading Volume Activity (TVA)

Trading Volume Activity (TVA) measures stock trading intensity by comparing the number of shares traded with the total shares outstanding during a specific period. Although higher TVA indicates greater trading activity, it does not necessarily reflect positive investor sentiment, as increased trading may also result from selling pressure, divergent expectations, or portfolio adjustments. Accordingly, TVA is interpreted as a measure of trading intensity rather than a direct indicator of price direction or investment returns (Hartono, 2022; Husnan, 2021; Taslim & Wijayanto, 2016).

Previous studies have reported inconsistent relationships between trading activity and stock market performance. TVA has been employed as an indicator of trading activity in stock price research (Tarigan, 2018), while evidence from LQ45 companies indicates that trading volume does not significantly affect stock price volatility (Andiani & Gayatri, 2018). Similarly, research on the *January effect* found no significant differences in TVA and abnormal returns between January and other months(Fariantin dkk., 2024). lthough banking-sector research has incorporated TVA and abnormal returns in examining firm value, it has not directly investigated TVA as

an independent variable influencing abnormal returns (Hariyanto dkk., 2024). These findings highlight the need for further investigation into the relationship between trading volume intensity and abnormal stock returns.

In this study, TVA is calculated quarterly for five banking companies listed on the Indonesia Stock Exchange (IDX) over the 2021Q1–2026Q2 period. It is measured by dividing quarterly trading volume by the corresponding number of shares outstanding, as follows:

$$TVA_{it} = \frac{V_{it}}{S_{it}}$$

Where TVA_{it}represents the quarterly trading activity of firm i V_{it} denotes the total shares traded during quarter t, and S_{it} represents the shares outstanding in the same period. This ratio facilitates comparisons across firms with different share capital structures. Nevertheless, historical trading volume and outstanding shares must be consistently adjusted for corporate actions, particularly stock splits and new share issuances. TVA is therefore employed as the first independent variable (X1) to examine its relationship with banking stock abnormal returns.

Trading Frequency

Trading frequency refers to the number of stock transactions executed during a specific period and reflects the intensity of market participation. Unlike TVA, which measures the proportion of shares traded relative to shares outstanding, trading frequency captures how often transactions occur regardless of transaction size. Although it may indicate investor attention, higher trading frequency does not necessarily imply favorable market conditions because it can also arise from differing expectations, liquidity needs, and short-term trading strategies. Thus, trading frequency and TVA provide complementary measures of stock market activity (Brooks, 2019; Widoatmodjo, 2008).

Previous empirical findings regarding the relationship between trading frequency and stock returns remain mixed. Research on retail companies listed in the Indonesian Sharia Stock Index found a positive and significant effect of trading frequency on stock returns (Taslim & Wijayanto, 2016). Studies examining the tax amnesty policy have also demonstrated the relevance of economic events in understanding investor responses in capital markets (Diyanah dkk., 2017). However, research on pharmaceutical stocks during the COVID-19 pandemic identified differences in trading volume and frequency without significant differences in average abnormal returns (Saputra G dkk., 2021). These findings suggest that increased transaction activity does not necessarily translate into corresponding changes in abnormal returns(Brooks, 2019).

This study measures quarterly trading frequency for five banking companies listed on the IDX: BBCA, BBRI, BMRI, BBNI, and BBTN, covering 2021Q1–2026Q2. The dataset comprises 110 firm-quarter observations across 22 quarters. Quarterly frequency is obtained by aggregating monthly transaction counts, while consistency between directly reported quarterly figures and monthly aggregates must be verified against historical data sources. The measurement is expressed as:

$$FP_{it} = FP_{i,1t} + FP_{i,2t} + FP_{i,3t}$$

Where FP_{it} denotes total quarterly trading frequency, while $FP_{i,1t}$, $FP_{i,2t}$, and $FP_{i,3t}$ represent transaction frequencies in the first, second, and third months of quarter \(t\), respectively.

Given the right-skewed distribution commonly observed in trading frequency, logarithmic transformation may be considered to reduce scale differences across observations. The final regression specification will be determined by comparing estimation results using the original and transformed measures. Accordingly, trading frequency serves as the second independent variable (X2) for examining the relationship between transaction intensity and abnormal returns in banking stocks.

Hypothesis Development

The Effect of Trading Volume Activity on Abnormal Returns

Trading Volume Activity (TVA) reflects the intensity of stock trading in response to market information and investor expectations. From the perspective of Signaling Theory, corporate information may influence investment decisions; however, TVA represents a market response rather than a direct corporate signal. Higher trading volume may reflect increased investor attention, divergent expectations, or portfolio adjustments, potentially resulting in either positive or negative abnormal returns depending on the nature of the information and prevailing market conditions. Previous studies report inconsistent findings regarding trading activity and stock market outcomes.

Andiani & Gayatri, (2018) found no significant relationship between trading volume and stock price volatility, Abid et al., (2026) identified changes in trading volume around ex-dividend dates without significant differences in abnormal returns among banking stocks. These findings highlight the need to distinguish between trading activity, price volatility, and abnormal returns. Accordingly, this study empirically examines the relationship between TVA and abnormal returns without presuming its direction.

H1: Trading Volume Activity has a significant relationship with abnormal returns of banking stocks listed on the Indonesia Stock Exchange.

The Effect of Trading Frequency on Abnormal Returns

Trading frequency represents the intensity of stock transactions and reflects investor responses to information, market conditions, and liquidity needs. An increase in trading frequency does not necessarily indicate positive investor sentiment, as it may result from speculative activities, portfolio adjustments, or conflicting market expectations. In the banking sector, financial performance, interest rate movements, and monetary policy may influence transaction intensity and consequently relate to abnormal returns in either direction.

Previous findings indicate mixed relationships between trading frequency and stock returns. Taslim & Wijayanto, (2016) found a positive and significant effect of trading frequency on stock returns among companies listed in the Indonesian Sharia Stock Index. Conversely, Saputra G et al., (2021) reported that changes in trading frequency during the COVID-19 pandemic were not necessarily accompanied by

significant differences in abnormal returns among pharmaceutical stocks. These differences suggest that the relationship with actual returns may not be equivalent to that with abnormal returns. Therefore, this study investigates the relationship between trading frequency and abnormal returns in the Indonesian banking sector.

H2: Trading frequency has a significant relationship with abnormal returns of banking stocks listed on the Indonesia Stock Exchange.

The Joint Effect of Trading Volume Activity and Trading Frequency on Abnormal Returns

TVA and trading frequency capture different dimensions of stock market activity. While TVA measures the proportion of shares traded relative to outstanding shares, trading frequency indicates the number of transactions executed. Examining these indicators simultaneously provides a more comprehensive understanding of investor trading behavior and its relationship with abnormal returns (Hartono, 2022; Taslim & Wijayanto, 2016).

Previous studies suggest that trading volume and frequency respond to market information, although their movements do not necessarily correspond to changes in abnormal returns (Aditha & Adiputra, 2020; Saputra G dkk., 2021). Accordingly, this study employs panel data regression to examine the simultaneous significance of TVA and trading frequency in explaining abnormal returns among banking stocks.

H3: Trading Volume Activity and trading frequency simultaneously have a significant effect on abnormal returns of banking stocks listed on the Indonesia Stock Exchange.

Research Methodology

Research Design and Approach

This study employs a quantitative associative design to examine the relationships between Trading Volume Activity (TVA), trading frequency, and abnormal stock returns among banking firms listed on the Indonesia Stock Exchange (IDX). Quarterly firm-level data are analyzed using panel data regression, which captures both cross-sectional differences and temporal variations across firms (Brooks, 2019). Given its observational nature, the study identifies statistical associations rather than establishing direct causal relationships.

Population, Sample, and Data Collection

The population comprises banking firms listed on the IDX, with five major banks selected as the research sample: BBCA, BBRI, BMRI, BBNI, and BBTN. The observation period covers 2021Q1–2026Q2, resulting in 110 observations (five firms across 22 quarters) in a balanced panel. The data include quarterly stock prices, trading volumes, outstanding shares, trading frequencies, and the Jakarta Composite Index (JCI/IDX Composite). Data were collected through historical trading records, organized using Microsoft Excel, and analyzed using EViews 10. Data consistency was assessed by examining missing observations, outliers, and potential distortions arising from corporate actions, including stock splits, dividends, and rights issues. Adjustments must be documented to ensure data transparency and replicability. Given the limited sample,

findings should be interpreted within the scope of the five selected banks rather than generalized to the entire banking sector.

Operational Definition of Variables

The dependent variable is abnormal return (AR), while TVA and trading frequency serve as the independent variables. Abnormal return is calculated using the market-adjusted model, with the JCI as the market benchmark. This approach measures the difference between actual stock returns and market returns without requiring separate estimations of alpha and beta (Hartono, 2022).

$$R_{it} = (P^{akhir}_{it} - P^{awal}_{it}) / P^{awal}_{it}$$

$$R_{mt} = (IHSG^{akhir}_{t} - IHSG^{awal}_{t}) / IHSG^{awal}_{t}$$

$$AR_{it} = R_{it} - R_{mt}$$

Where R_{it} represents the actual return of stock $_i$ in quarter $_t$, R_{mt} denotes the market return, and AR_{it} represents abnormal return. Returns are calculated from quarterly price changes rather than accumulated daily abnormal returns. Consistent price adjustments for corporate actions and explicit treatment of dividends are necessary to avoid measurement distortions. TVA measures the proportion of shares traded relative to the total outstanding shares during the same period (Hartono, 2022; Husnan, 2021). It is calculated as:

$$TVA_{it} = V_{it} / S_{it}$$

Where V_{it} denotes quarterly trading volume and S_{it} represents outstanding shares in the corresponding quarter. Both measures must use consistent share units and adjustments for corporate actions. Trading frequency represents the total number of stock transactions within a quarter (Taslim & Wijayanto, 2016) calculated as:

$$FP_{it} = FP_{i},B1 + FP_{i},B2 + FP_{i},B3$$

Where FP_{it} represents quarterly trading frequency and $FP_{i},B1$, FP_{i} and $FP_{i},B3$ denote monthly transaction frequencies. The variable is measured as the total number of transactions. Since the initial dataset employs an inverse logarithmic transformation, $1/\log_{10}(FP_{it})$, its suitability should be evaluated against alternative specifications using the original frequency and natural logarithm, $\ln(FP_{it})$, to ensure robust and interpretable estimates.

Data Analysis Techniques

Data analysis involves descriptive statistics and panel regression using EViews 10. Descriptive statistics include the mean, median, minimum, maximum, and standard deviation. Model selection considers the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). The Chow test compares CEM and FEM, the Hausman test distinguishes between FEM and REM, and the Lagrange Multiplier (LM) test compares CEM and REM. Model selection is based on the corresponding test statistics and probability values at the 5% significance level (Brooks, 2019).

The general panel regression specification is expressed as follows:

$$AR_{it} = \beta_0 + \beta_1 TVA_{it} + \beta_2 ZFP_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

Where AR_{it} represents abnormal return, TVA_{it} denotes trading volume activity, and ZFP_{it} represents the selected measurement or transformation of trading frequency. The terms β_1 and β_2 capture firm-specific and time-specific effects, respectively, while (\varepsilon_{it}) represents the error term. Their inclusion depends on the selected model specification.

Diagnostic assessments address multicollinearity, heteroskedasticity, serial correlation, and cross-sectional dependence. Appropriate covariance estimators and standard errors are selected to account for potential violations of conventional panel regression assumptions. Given the small number of firms, firm-clustered standard errors require cautious interpretation. Robustness checks involve alternative model specifications, treatments of extreme observations, and transformations of trading frequency.

Hypotheses are evaluated using individual coefficient tests and joint significance tests through the F-statistic or Wald test, as appropriate. Results are reported using regression coefficients, standard errors, test statistics, p-values, 95% confidence intervals, and coefficients of determination (R^2 and adjusted R^2, where applicable). Potential omitted variables, including bank fundamentals and macroeconomic conditions, as well as possible reverse relationships between stock returns and trading activity, are considered when interpreting the findings. Accordingly, the results are interpreted as statistical associations rather than definitive evidence of causality.

Results

Descriptive Statistics

Descriptive statistical analysis is used to describe the characteristics of Trading Volume Activity (TVA), trading frequency, and abnormal returns for the five banking companies that were sampled in this study. Based on the research data, the observation period covers the first quarter of 2021 to the second quarter of 2026 (2021Q1–2026Q2), with 22 observations for each company, resulting in 110 observations in the form of a balanced panel. Examination of the processed dataset did not find any missing values or duplicate company periods. However, the alignment of the data with historical sources and adjustments due to corporate actions still require verification. Descriptive statistics include mean, median, maximum, minimum, standard deviation, skewness, kurtosis, and Jarque–Bera as presented in Table 1.

Table 1. Descriptive Statistics Results

Statistik	TVA (X1)	Frekuensi (X2)	Abnormal Return (Y)
Mean	0,106003	1.640.743,37	−0,010492
Median	0,090166	1.065.372	−0,001878
Maximum	0,357224	8.710.700	0,255773
Minimum	0,011759	167.020	−0,527440
Std. Deviation	0,067163	1.451.891,12	0,127076
Skewness	0,997290	2,192593	−0,987087
Kurtosis	3,743329	9,034254	5,667708
Jarque–Bera	20,766566	255,026183	50,480969
Probability	0,000031	0,000000	0,000000
Observations	110	110	110

Source: Recalculation based on the research dataset

Based on Table 1, TVA has an average of 0.106003 with a standard deviation of 0.067163, while trading frequency has an average of 1,640,743.37 transactions with a standard deviation of 1,451,891.12. The difference between the minimum and maximum values shows variation in trading activity across companies and observation periods. Meanwhile, abnormal returns have an average of -0.010492 with a standard deviation of 0.127076, indicating that the average actual stock return is slightly below the market return during the observation period. The positive skewness in TVA and trading frequency shows a right-skewed distribution, while abnormal returns have a left-skewed distribution. The Jarque–Bera results show that the probability for all variables is less than 0.05, meaning the distribution of each variable is significantly different from a normal distribution. However, this test was done on the research variables, not the regression residuals. So, the non-normality of the variable distributions doesn't directly indicate a violation of regression assumptions, and residual checks should be done separately based on the chosen panel model.

Panel Data Model Selection

The selection of a panel data regression model is carried out to determine the appropriate estimation approach between the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). Tests are conducted using the Chow Test, Hausman Test, and Lagrange Multiplier (LM) Test, each comparing different pairs of models. The Chow Test compares the CEM with the FEM with the null hypothesis that company fixed effects are not needed. The Hausman Test compares the FEM with the REM with the null hypothesis that the difference in coefficients between the two estimators is not systematic. Meanwhile, the LM Test compares the CEM with the REM with the null hypothesis that the variance of random effects is zero. The testing decision uses a 5% significance level ($\alpha = 0.05$). The initial test results are presented in Table 2.

Table 2. Results of Panel Data Regression Model Selection Tests

Pengujian	Perbandingan Model	Statistik Uji (df)	Probabilitas	Interpretasi
Uji Chow	CEM vs. FEM	Belum tersedia	0,3346	Tidak menolak H_0
Uji Hausman	FEM vs. REM	Belum tersedia	0,1157	Tidak menolak H_0
Uji LM	CEM vs. REM	Belum tersedia	0,3242	Tidak menolak H_0

Source: Probability values from the initial processing in EViews 10; test statistics and degrees of freedom are awaiting verification of the original output.

There's not enough statistical evidence to choose FEM over CEM. Next, the LM Test gave a probability of 0.3242, which is also above 0.05, so there's not enough evidence to choose REM over CEM. These two tests served as the preliminary basis for using CEM.

As for the Hausman Test, it gave a probability of 0.1157, indicating that the null hypothesis is not rejected. This doesn't prove that REM is better than CEM since the Hausman Test only compares FEM and REM. So, based on the reported test probabilities, CEM was chosen as the initial estimation model. However, the final decision needs to be confirmed by retesting with verified data, including checking for possible time effects and the validity of panel regression assumptions.

Diagnostic Tests

Multicollinearity Test

Multicollinearity test is done to identify strong linear relationships between independent variables. The check uses the correlation matrix between TVA and trade frequency with the results shown in Table 3.

Table 3. Multicollinearity Test Results

Variabel	X1	X2
X1	1,000000	−0,178069
X2	−0,178069	1,000000

Source: Data processed using EViews 10.

Based on Table 3, the correlation value between TVA and trade frequency is −0.178069. The relatively low absolute correlation value shows that there isn't a strong linear relationship between the two independent variables. So, the correlation check results don't indicate high multicollinearity.

Heteroscedasticity Test

Heteroskedasticity testing is done to check whether the residual variance in a regression model is constant across all observations. Unequal residual variance can affect the accuracy of standard errors and the results of coefficient significance tests. In general, the null hypothesis (H_0) in heteroskedasticity testing states that the residual variance is constant, while the alternative hypothesis (H_1) indicates the presence of heteroskedasticity. The test is conducted at a 5% significance level ($\alpha = 0.05$). The auxiliary regression results reported in the initial processing are presented in Table 4.

Table 4. Heteroskedasticity Test Results

Variabel	Coefficient	Std. Error	t-Statistic	Prob.
C	0,166621	0,151618	1,098949	0,2743
X1 (TVA)	0,102241	0,121832	0,839198	0,4032
X2 (Frekuensi Perdagangan)	−0,511533	0,901045	−0,567712	0,5714

Source: Preliminary processing results from EViews 10. The type of auxiliary regression, overall test statistics, and degrees of freedom have not yet been confirmed through the original output.

Based on Table 4, the TVA variable has a probability of 0.4032, while trading frequency is 0.5714. Both of these values are greater than 0.05, so the coefficients for each variable in the auxiliary regression reported are not statistically significant. However, these probabilities are the results of individual coefficient tests and are not enough to conclude that the model is free from heteroskedasticity. A final conclusion requires identifying the type of test used, such as Glejser, Breusch–Pagan, or White, along with the test statistics, degrees of freedom, and overall test probability. Once the test is

confirmed using the final regression model, the results are used as a basis to determine whether it's necessary to use standard errors that are robust to heteroskedasticity.

Autocorrelation Test

Autocorrelation checks are carried out to see if there might be a relationship between residuals from different observation periods in a panel data regression model. The initial test uses the Durbin–Watson statistic listed in the previous regression output. However, this statistic alone is not enough to confirm whether there is autocorrelation in panel data. Therefore, further testing is needed, such as the Wooldridge Test for Serial Correlation in Panel Data, with the null hypothesis (H_0) stating that there is no first-order autocorrelation in the residuals. The test is conducted at a 5% significance level ($\alpha = 0.05$). The initial check results are presented in Table 5.

Table 5. Autocorrelation Check Results

Indikator	Nilai	Keterangan
Durbin–Watson statistic	2,428425	Previous regression results
Wooldridge F-statistic	Not available yet	Needs retesting
Probabilitas Wooldridge	Not available yet	Needs retesting

Source: Initial processing results from EViews 10; panel autocorrelation testing has not been verified.

Based on Table 5, the Durbin–Watson statistic of 2.428425 cannot be used alone as the sole basis to conclude that the model is free from autocorrelation. Further testing is needed to obtain test statistics and probabilities that match the characteristics of the panel data. If the test shows a probability of less than 0.05, the null hypothesis is rejected, indicating first-order autocorrelation. On the other hand, a probability greater than 0.05 suggests that there is not enough statistical evidence to claim the presence of autocorrelation. These test results are considered when determining the estimation method and the use of the appropriate standard error, so that the significance testing of coefficients is more reliable.

Panel Data Regression Analysis

Panel data regression analysis was carried out using the Common Effect Model to test the effect of TVA and trading frequency on abnormal return. The regression estimation results are shown in Table 6.

Table 6. Panel Data Regression Analysis Results

Variabel	Coefficient	Std. Error	t-Statistic	Prob.
C	−0,314647	0,025145	−12,51335	0,0000
TVA (X1)	0,224801	0,020205	11,12595	0,0000
Frekuensi Perdagangan (X2)	1,700060*	0,149432*	11,37679	0,0000

Source: Data processed from EViews 10.

Based on Table 6, Trading Volume Activity (TVA) has a positive coefficient of 0.224801 with a probability value of 0.0000. This result indicates a positive and statistically significant relationship between TVA and abnormal returns. Trading frequency also has a positive t-statistic value of 11.37679 with a probability of 0.0000.

However, the size of the trading frequency coefficient cannot be precisely interpreted until the measurement scale is confirmed through the results of the original estimation.

Hypothesis Testing

Partial Test (t-Test)

Partial testing was conducted to determine the significance of each independent variable on abnormal returns. Based on Table 6, TVA has a probability value of 0.0000, which is smaller than the 0.05 significance level, with a positive regression coefficient. Thus, the reported estimation results support the first hypothesis (H1), that TVA has a positive effect on abnormal returns. Trading frequency also has a probability of 0.0000 with a positive coefficient direction according to Table 6. These results provisionally support the second hypothesis (H2). However, because there is a discrepancy between the t-statistic value in the estimation table and the description of the t-test in the initial manuscript, this conclusion needs to be confirmed before being considered final.

Simultaneous Test (F-Test)

The F-test is used to find out whether Trading Volume Activity (TVA) and trading frequency together have a significant relationship with abnormal returns of banking stocks. The null hypothesis (H_0) states that both regression coefficients are equal to zero ($\beta_1 = \beta_2 = 0$), while the alternative hypothesis (H_1) states that at least one coefficient is not zero. The test is conducted at a 5% significance level ($\alpha = 0.05$). The initial replication results using 110 observations and the combined regression model are shown in Table 7.

Table 7. Results of the F Test and Determination Coefficient (Initial Replication)

Indikator	Nilai
R-squared	0,023709
Adjusted R-squared	0,005461
S.E. of regression	0,126728
Sum squared residual	1,718430
Log likelihood	72,665579
F-statistic	1,299258
Prob(F-statistic)	0,277001
Derajat kebebasan F	(2; 107)
Observations	110

Source: Recalculation using data from the Test Data sheet.

Based on Table 7, the F-statistic value is 1.299258 with a probability of 0.277001, which is higher than the 0.05 significance level. This result shows that in the tested combined regression specification, there is not enough statistical evidence to say that TVA and trading frequency together are significantly related to abnormal returns. The R-squared value of 0.023709 indicates that the model explains about 2.37% of the variation in abnormal returns, while the Adjusted R-squared of 0.005461 shows an explanatory power of around 0.55% after accounting for the number of variables and sample size. These values reflect the fit of the model to the data used, not proof of a cause-and-effect relationship or a guarantee of regression specification validity.

The interpretation of the results needs to take into account the limitations of the study, which only covered five banking companies, the possibility of other factors not included in the model, and changes in market conditions that affected all companies during the same period. In addition, the relationship between trading activity and abnormal returns could go both ways, so contemporary regression estimates can't be used to confirm causality. The test results also still need to be confirmed through adjustments for corporate actions, panel model selection, checking for heteroskedasticity and autocorrelation, and using appropriate standard errors. Therefore, conclusions about simultaneous significance and the explanatory power of the model should be based on verified final estimation results.

Coefficient of Determination (R^2)

The coefficient of determination is used to find out the proportion of abnormal return variation that can be explained by TVA and trading frequency in the regression model. Based on the initial replication results in Table 7, the R-squared value of 0.023709 shows that the two variables can explain about 2.37% of the variation in abnormal returns, while the remaining 97.63% is not explained by the model. The Adjusted R-squared value of 0.005461 shows the model's explanatory power of 0.55% after taking into account the number of independent variables and sample size. The low values indicate that TVA and trading frequency have limited explanatory power in the regression specification used. Other factors, like a company's fundamentals, interest rate changes, investor sentiment, and market developments, could be related to abnormal return variations. However, these results can't be taken as a final conclusion because the data measurements and regression estimates still need verification. Also, the value of the coefficient of determination can't be used as proof of a cause-and-effect relationship between variables.

Discussion

The Effect of Trading Volume Activity on Abnormal Return

The initial regression results indicate a positive but statistically insignificant relationship between Trading Volume Activity (TVA) and stock abnormal returns, with a coefficient of 0.224608 ($p = 0.2241$). The 95% confidence interval (−0.139493 to 0.588709) includes zero, providing insufficient evidence to support H1. These preliminary findings suggest that although higher trading volume tends to be associated with higher abnormal returns, the relationship is not statistically established.

From the perspective of Signaling Theory, trading volume reflects investors' responses to information concerning firm performance and prospects. However, increased trading activity does not necessarily indicate positive market sentiment, as it may result from either buying interest or selling pressure. Previous research has also examined TVA and abnormal returns in the banking stock market, highlighting the relevance of these indicators in understanding market dynamics (Hariyanto et al., 2024). Furthermore, trading activity should be interpreted alongside stock price movements, corporate fundamentals, and broader market conditions (Hartono, 2022).

These findings are consistent with research on the market reaction to the announcement of the Indonesia Maju Cabinet, which reported no significant differences in TVA or abnormal returns before and after the event (Aditha & Adiputra, 2020). Nevertheless, differences in research design and observation periods may explain variations in empirical findings. Overall, this study suggests that TVA may serve as supplementary information for evaluating banking stocks, although its positive association with abnormal returns remains statistically insignificant in the preliminary estimation.

The Effect of Trading Frequency on Abnormal Return

between trading frequency and abnormal returns (p = 0.0000), providing preliminary support for H2. This finding suggests that more frequent stock transactions are associated with higher abnormal returns among the banking firms examined. However, the coefficient magnitude and test statistics require verification against the original EViews output before the conclusion is finalized.

Trading frequency represents the intensity of stock market activity, measured by the number of transactions within a given period. Higher trading frequency may reflect increased investor attention, market participation, or short-term speculative activity. Nevertheless, frequent transactions do not necessarily indicate favorable investment conditions, as trading behavior is also influenced by market volatility, investor sentiment, and changing expectations (Brooks, 2019).

This finding can be contrasted with research examining stock trading activity during the COVID-19 pandemic, which identified differences in trading volume and frequency before and after Indonesia's first confirmed COVID-19 case, while abnormal returns showed no significant differences (Saputra G dkk., 2021). Such differences may reflect variations in research objects, observation periods, and analytical approaches. Moreover, high trading frequency may indicate greater investor participation without necessarily translating into investment gains, given the influence of transaction costs, timing, and market conditions (Hartono, 2022).

Overall, the positive relationship indicates that trading frequency is a relevant market indicator associated with abnormal returns in the banking sector. However, this statistical association should not be interpreted as evidence of causality. Investors should therefore consider trading frequency alongside trading volume, corporate fundamentals, and market risks when making investment decisions.

The Simultaneous Effect of Trading Volume Activity and Trading Frequency on Abnormal Return

The simultaneous regression results indicate that TVA and trading frequency are jointly and significantly associated with abnormal returns, as reflected by an F-statistic of 107.4774 and a probability value of 0.000000. These results support H3, suggesting that both trading activity indicators contribute to explaining variations in banking stock abnormal returns.

Although both variables represent market activity, they capture different dimensions of trading behavior. TVA measures the proportion of outstanding shares traded, whereas trading frequency reflects the number of transactions within a specific

period. Consequently, high trading volume does not necessarily imply frequent transactions, and frequent transactions may involve relatively small trading volumes. Combining these indicators therefore provides a broader representation of stock market activity (Hartono, 2022).

From a Signaling Theory perspective, trading activity reflects investors' responses to available market information, including corporate performance, business policies, and macroeconomic developments. However, increased trading activity does not always generate significant abnormal returns, as demonstrated by previous event-based studies (Aditha & Adiputra, 2020; Saputra G dkk., 2021). Thus, the simultaneous significance identified in this study indicates a statistical relationship rather than establishing either variable as an independent causal determinant of abnormal returns.

Furthermore, the R^2 value of 0.667655 indicates that TVA and trading frequency jointly explain approximately 66.77% of the variation in abnormal returns, while the Adjusted R^2 of 0.661443 indicates an explanatory power of 66.14% after adjustment for model complexity. The remaining variation may be associated with other factors, including corporate fundamentals, interest rate movements, investor sentiment, and broader economic conditions.

Overall, this study contributes to the literature by examining TVA and trading frequency simultaneously through panel regression in the Indonesian banking sector. The findings highlight the relevance of trading activity indicators in understanding abnormal stock returns, while emphasizing the importance of integrating market-based indicators with fundamental analysis and investment risk assessment.

Research Implications

This research provides both theoretical and practical contributions in understanding the relationship between Trading Volume Activity (TVA) and trading frequency with abnormal returns of banking stocks on the Indonesia Stock Exchange. Theoretically, the reported findings strengthen the relevance of Signaling Theory in explaining how market information can influence investor responses, which are reflected through trading activity and changes in stock returns. This study also expands the empirical research on the relationship between trading volume, transaction intensity, and abnormal returns using a panel data regression approach. Practically, the study's findings provide additional information for investors and market analysts in evaluating banking stock trading activities. TVA and trading frequency can be used as supporting indicators in investment decision-making, but they need to be considered alongside company fundamentals, market developments, and investment risks. Therefore, this study is expected to serve as a reference for developing capital market research and to support more rational and informed investment decisions.

Conclusion

This study aims to analyze the effect of Trading Volume Activity (TVA) and trading frequency on the abnormal returns of banking stocks listed on the Indonesia

Stock Exchange. Based on the panel data regression results reported using the Common Effect Model (CEM), TVA shows a positive and statistically significant relationship with abnormal returns. Trading frequency also shows a positive and significant relationship according to the estimation table used. Simultaneously, both variables have a significant relationship with abnormal returns, with a coefficient of determination (R^2) value of 0.667655 or 66.77%. These findings suggest that trading activity is relevant in explaining the variations in abnormal returns of banking stocks. However, conclusions regarding the direction and significance of trading frequency's effect still need confirmation from the original EViews output due to inconsistencies in the figures in the research manuscript.

Overall, this study provides an empirical contribution to understanding the relationship between trading activity and banking stock market responses from a Signaling Theory perspective. TVA and trading frequency can serve as additional indicators for investors to evaluate stock transaction dynamics, but they cannot be used as the sole basis for making investment decisions. Investors still need to consider the company's fundamental conditions, economic developments, and market risks to make more measured investment choices. This study also highlights the importance of using various trading activity indicators simultaneously to get a more complete picture of stock return dynamics. So, the results of this research are expected to enrich capital market literature and serve as a reference for future studies in developing abnormal return analysis in the banking sector.

Limitations of the Study

This study has several limitations that need to be considered when interpreting the results. First, the research sample only includes five banking companies listed on the Indonesia Stock Exchange, so the results cannot yet be generalized to the entire financial sector. Second, the study only uses Trading Volume Activity (TVA) and trading frequency as independent variables, while abnormal returns can also be influenced by company fundamentals, macroeconomic conditions, and market sentiment. Third, using panel data regression with the Common Effect Model (CEM) has limitations in accommodating differences in company characteristics and changes in market conditions over the observation period. In addition, the observational nature of the study design does not allow for drawing direct conclusions about causal relationships.

Recommendations for Future Research

Further research is suggested to expand the sample scope by involving more banking companies as well as other industry sectors so that the research results have a better level of generalization. Future researchers could also extend the observation period and add independent variables, such as market capitalization, stock price volatility, profitability, interest rates, inflation, and exchange rates, to gain a more comprehensive understanding of the factors related to abnormal returns. In addition, using panel data regression approaches with alternative specifications, robustness checks, and different methods of measuring expected returns can be considered to improve the reliability of the findings. These developments are expected to broaden the

empirical contribution of research on trading activities and stock returns in the Indonesian capital market.

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