CHAPTER 4 - DATA ANALYSIS

4.1. Goodness of Fit

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.814[a]	.662	.646	3797.07531	2.170

a. Predictors: (Constant), Trend_X2.2, EPS_X1.3, ROA_X1.1, NPM_X1.4, PBV_X1.2, Volume_X2.1

b. Dependent Variable: StockPrice_Y

Fig. 4.1 - Goodness of Fit (Model Summary)

R-Square value is 0.662, indicating that 66.2% of the variability in the stock price can be explained by the chosen independent variables. This is a reasonably high figure, suggesting that the model offers relatively significant explanatory power. However, it also implies that the rest (33.8%) is influenced by other variables outside this regression equation or the variables studied. The Adjusted R-Square value, at 0.646, is slightly lower than the R-Square. This difference arises as the Adjusted R-Square takes into account the number of predictors in the model, preventing artificial inflation of the R-Square value by merely adding more variables. Our model's Std. Error of the Estimate is 3797.08. This statistic is a measure of the accuracy of our predictions. It gives us the standard deviation of the residuals, i.e., how much the observed stock prices differ, on average, from the predicted values. A lower Std. Error of the Estimate would suggest a higher accuracy of our predictions. In this context, the value of 3797.08 needs to be evaluated in relation to the range and standard deviation of the stock prices to understand if our model's predictions are sufficiently precise.

4.2.1. Descriptive Statistics

Descriptive Statistics

	Mean	Std. Deviation	N
StockPrice_Y	4912.9767	6379.93625	129
ROA_X1.1	.088447	.3382328	129
PBV_X1.2	3.1645	5.78319	129
EPS_X1.3	119.3591	251.25311	129
NPM_X1.4	.135048	.0978464	129
Volume_X2.1	32.0578	44.21862	129
Trend_X2.2	2.5814	1.83157	129

Fig. 4.2 - Descriptive Statistics

In the Descriptive Statistics subchapter of our data analysis, we examined the central tendency, variability, and total count of our variables of interest. These variables include our dependent variable, the Stock Price, and our independent variables, Net Profit Margin (NPM), Price-to-Book Value (PBV), Earnings Per Share (EPS), Return on Assets (ROA), Volume, and Trend.

The mean values for NPM, PBV, EPS, ROA, Volume, Trend, and Stock Price offer insight into the 'average' or typical values for these variables within our dataset. For instance, the mean Stock Price provides an understanding of the central tendency of stock prices for the LQ45 index during our study period.

Standard deviation values for these variables give us an indication of the variability or volatility within each variable. A higher standard deviation would suggest a wider dispersion of values around the mean, indicating higher volatility or variability within the data. On the other hand, a lower standard deviation would suggest a tighter clustering of values around the mean, indicating lower variability.

The count (N) for each variable provides information about the size of our dataset for each variable. This is a crucial piece of information as it has implications for the robustness of our subsequent statistical analysis. A larger N provides more robust estimates and increases the power of statistical tests.

The table above shows the number of data collected (N), standard deviation, and mean of the entire data used in this research. The total number of data samples collected (N) for variable Stock Price Change is 129, has a standard deviation of 6379.94, and mean of 4912.98. The total number of data samples collected (N) for the variable ROA is 129, has a standard deviation of 0.338, and mean of 0.088. The total number of data samples collected (N) for the variable PBV is 129, has a standard deviation of 5.783, and mean of 3.164. The total number of data samples collected (N) for the variable EPS is 129, has a standard deviation of 251.25, and mean of 119.36. The total number of data samples collected (N) for the variable NPM is 129, has a standard deviation of 0.098, and mean of 0.135. The total number of data samples collected (N) for the variable Volume is 129, has a standard deviation of 44.22, and mean of 32,057. The total number of data samples collected (N) for the variable Trend is 129, has a standard deviation of 1.832, and mean of 2.581.

In summary, these descriptive statistics serve as a foundation for our understanding of the data's characteristics. This assists us in formulating an accurate interpretation of the further analysis, specifically when we explore the relationships between the independent variables (NPM, PBV, EPS, ROA, Trend, and Volume) and the dependent variable (Stock Price) in our regression models.

4.2.2. R-Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.814[a]	.662	.646	3797.07531	2.170

a. Predictors: (Constant), Trend_X2.2, EPS_X1.3, ROA_X1.1, NPM_X1.4, PBV_X1.2, Volume_X2.1

b. Dependent Variable: StockPrice_Y

Fig. 4.3 - R-Test (Model Summary)

In the R-Test of our data analysis, we calculated the coefficient of determination (R^2) for our regression model. The R^2 statistic is a measure of how well our model explains the variability in the dependent variable, which is the Stock Price in this study.

R^2 values range from 0 to 1. An R^2 of 0 indicates that the model explains none of the variability in the Stock Price, while an R^2 of 1 indicates that the model perfectly predicts the Stock Price. The closer the R^2 is to 1, the better the model is at predicting the Stock

Price based on our independent variables, which are NPM, PBV, EPS, ROA, Volume, and Trend.

In our analysis, the R^2 value was 0.662. This indicates that our model explains approximately 66.2% of the variability in the Stock Price, which simply emphasizes that all the independent variables as a whole; Trend, EPS, ROA, NPM, PBV, and volume, simultaneously influence the dependent variable Stock Price by 66.2%. This suggests that the chosen independent variables collectively have a significant influence on the Stock Price, although the extent of this influence should be further explored in the individual coefficient estimates and significance tests for each independent variable. Therefore, we can conclude that the rest (33.8%) is influenced by other variables outside this regression equation or the variables studied.

4.2.3. F-Test

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3451089804	6	575181634.0	39.894	.000[b]
	Residual	1758969273	122	14417780.92		
	Total	5210059077	128			

a. Dependent Variable: StockPrice_Y

b. Predictors: (Constant), Trend_X2.2, EPS_X1.3, ROA_X1.1, NPM_X1.4, PBV_X1.2, Volume_X2.1

Fig. 4.4 - F-Test (ANOVA)

In the F-Test subchapter of our data analysis, we conducted an overall significance test for our regression model. This test is designed to determine whether there is a statistically significant relationship between our dependent variable (Stock Price), and our independent variables (NPM, PBV, EPS, ROA, Volume, and Trend) taken together.

The F-Test generates two key metrics: the F-value and the p-value. The F-value is a ratio of the model's explained variance to the unexplained variance. A larger F-value generally indicates a more statistically significant model. Our analysis yielded an F-value of 39.89, which is greater than F-table (2.17). This is quite large and suggests that our model has a high degree of statistical significance, meaning that there is a significant amount of variance in Stock Price that is explained by our independent variables.

The Significance value, on the other hand, is the probability of obtaining a result as extreme as the one we observed if the null hypothesis (H_0) were true. The null hypothesis (H_0), in this context, posits that none of our independent variables are significant, implying that they do not have any impact on the Stock Price. Our analysis yielded a Significance value of 0.000. As this is less than our chosen level of significance (usually 0.05), we reject the null hypothesis (H_0). This indicates that at least one of our independent variables significantly influences the Stock Price.

4.2.4. T-Test

Correlations

		StockPrice_Y	ROA_X1.1	PBV_X1.2	EPS_X1.3	NPM_X1.4	Volume_X2.1	Trend_X2.2
StockPrice_Y	Pearson Correlation	1	-.041	-.063	.802**	.001	-.267**	-.015
	Sig. (2-tailed)		.646	.477	.000	.989	.002	.864
	N	129	129	129	129	129	129	129
ROA_X1.1	Pearson Correlation	-.041	1	.099	-.008	.098	-.025	.107
	Sig. (2-tailed)	.646		.266	.930	.268	.779	.228
	N	129	129	129	129	129	129	129
PBV_X1.2	Pearson Correlation	-.063	.099	1	-.117	.129	-.047	-.087
	Sig. (2-tailed)	.477	.266		.186	.145	.598	.329
	N	129	129	129	129	129	129	129
EPS_X1.3	Pearson Correlation	.802**	-.008	-.117	1	.098	-.221*	.069
	Sig. (2-tailed)	.000	.930	.186		.269	.012	.434
	N	129	129	129	129	129	129	129
NPM_X1.4	Pearson Correlation	.001	.098	.129	.098	1	-.028	.103
	Sig. (2-tailed)	.989	.268	.145	.269		.752	.245
	N	129	129	129	129	129	129	129
Volume_X2.1	Pearson Correlation	-.267**	-.025	-.047	-.221*	-.028	1	.177*
	Sig. (2-tailed)	.002	.779	.598	.012	.752		.045
	N	129	129	129	129	129	129	129
Trend_X2.2	Pearson Correlation	-.015	.107	-.087	.069	.103	.177*	1
	Sig. (2-tailed)	.864	.228	.329	.434	.245	.045	
	N	129	129	129	129	129	129	129

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Fig. 4.5 - T-Test (Correlations)

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	VIF
1	(Constant)	3860.514	773.634		4.990	.000		
	ROA_X1.1	-530.614	1007.710	-.028	-.527	.599	.970	1.031
	PBV_X1.2	39.026	59.658	.035	.654	.514	.946	1.057
	EPS_X1.3	20.263	1.397	.798	14.510	.000	.915	1.093
	NPM_X1.4	-5006.472	3513.324	-.077	-1.425	.157	.953	1.049
	Volume_X2.1	-12.218	7.962	-.085	-1.535	.127	.909	1.100
	Trend_X2.2	-145.237	190.186	-.042	-.764	.447	.928	1.077

a. Dependent Variable: StockPrice_Y

Fig. 4.6 - T-Test (Coefficients)

In the T-Test subchapter, we tested the significance of each of our independent variables (ROA, PBV, EPS, NPM, Volume, Trend) in predicting the dependent variable, the Stock Price. This test helps us understand the unique contribution of each variable when controlling for the effects of the other variables in our model.

For ROA, the T-value is -0.527 and the significance value is 0.599. Given that the significance value is greater than our threshold of 0.05, we fail to reject the null hypothesis (H_0). This means that, when controlling for the other variables in our model, ROA does not significantly predict Stock Price in our sample.

Similarly, for PBV, with a T-value of 0.654 and a significance value of 0.514, we again fail to reject the null hypothesis (H_0). This suggests that PBV does not significantly predict Stock Price when controlling for the other variables in our model.

In the case of EPS, the T-value is 14.510 and the significance value is 0.000. As the significance value is less than our threshold of 0.05, we reject the null hypothesis (H_0). This suggests that EPS significantly predicts Stock Price when controlling for the other variables in our model. Given the large t-value, it also suggests a strong relationship.

From the Correlation Matrix table, it is observable that there is a very strong positive correlation between Earnings Per Share (EPS) and Stock Price, reflected by a correlation coefficient of 0.802. Being statistically significant at the 0.01 level (2-tailed), this indicates a substantial degree of association between these two variables.

For NPM, the T-value is -1.425 and the significance value is 0.157. As the significance value is greater than our threshold of 0.05, we fail to reject the null hypothesis (H_0). This suggests that NPM does not significantly predict Stock Price when controlling for the other variables in our model.

For Volume, the T-value is -1.535 and the significance value is 0.127. Again, as the significance value is greater than our threshold of 0.05, we fail to reject the null hypothesis (H_0). This suggests that Volume does not significantly predict Stock Price when controlling for the other variables in our model.

Lastly, for Trend, the T-value is -0.764 and the significance value is 0.447. As the significance value is greater than our threshold of 0.05, we fail to reject the null hypothesis (H_0). This suggests that Trend does not significantly predict Stock Price when controlling for the other variables in our model.

From the data above, we can observe the value of T and significance value of all the 6 independent variables used in this research; ROA (Return on Asset), PBV (Price to Book Value), EPS (Earning per Share), NPM (Net Profit Margin), Volume, and last but not least, Trend.

In summary, of all our independent variables, only EPS significantly predicts Stock Price in our model when controlling for the other variables. This suggests that EPS may be a key factor to consider when predicting Stock Price in the context of Index LQ45 Stocks.

4.2.5. Assumptions Checking

4.2.5.1. Multicollinearity Test

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	VIF
1	(Constant)	3860.514	773.634		4.990	.000		
	ROA_X1.1	-530.614	1007.710	-.028	-.527	.599	.970	1.031
	PBV_X1.2	39.026	59.658	.035	.654	.514	.946	1.057
	EPS_X1.3	20.263	1.397	.798	14.510	.000	.915	1.093
	NPM_X1.4	-5006.472	3513.324	-.077	-1.425	.157	.953	1.049
	Volume_X2.1	-12.218	7.962	-.085	-1.535	.127	.909	1.100
	Trend_X2.2	-145.237	190.186	-.042	-.764	.447	.928	1.077

a. Dependent Variable: StockPrice_Y

Fig. 4.7 - Multicollinearity Test (Coefficients)

Correlations

		StockPrice_Y	ROA_X1.1	PBV_X1.2	EPS_X1.3	NPM_X1.4	Volume_X2.1	Trend_X2.2
StockPrice_Y	Pearson Correlation	1	-.041	-.063	.802**	.001	-.267**	-.015
	Sig. (2-tailed)		.646	.477	.000	.989	.002	.864
	N	129	129	129	129	129	129	129
ROA_X1.1	Pearson Correlation	-.041	1	.099	-.008	.098	-.025	.107
	Sig. (2-tailed)	.646		.266	.930	.268	.779	.228
	N	129	129	129	129	129	129	129
PBV_X1.2	Pearson Correlation	-.063	.099	1	-.117	.129	-.047	-.087
	Sig. (2-tailed)	.477	.266		.186	.145	.598	.329
	N	129	129	129	129	129	129	129
EPS_X1.3	Pearson Correlation	.802**	-.008	-.117	1	.098	-.221*	.069
	Sig. (2-tailed)	.000	.930	.186		.269	.012	.434
	N	129	129	129	129	129	129	129
NPM_X1.4	Pearson Correlation	.001	.098	.129	.098	1	-.028	.103
	Sig. (2-tailed)	.989	.268	.145	.269		.752	.245
	N	129	129	129	129	129	129	129
Volume_X2.1	Pearson Correlation	-.267**	-.025	-.047	-.221*	-.028	1	.177*
	Sig. (2-tailed)	.002	.779	.598	.012	.752		.045
	N	129	129	129	129	129	129	129
Trend_X2.2	Pearson Correlation	-.015	.107	-.087	.069	.103	.177*	1
	Sig. (2-tailed)	.864	.228	.329	.434	.245	.045	
	N	129	129	129	129	129	129	129

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Fig. 4.8 - Multicollinearity Test (Correlations)

In assessing potential multicollinearity in the regression model, Variance Inflation Factor (VIF) and Tolerance values were computed for each predictor variable. In addition, the Correlation Matrix, which forms a crucial part of our multicollinearity analysis, reveals interesting insights about the linear relationships between the independent variables (NPM, PBV, EPS, ROA, Volume, Trend) and the dependent variable (Stock Price) in our model.

Based on the results of the multicollinearity test, it is known that the Tolerance value of the independent variables (ROA, PBV, EPS, NPM, Volume, and Trend) are greater than 0.1 (0.9xx), which indicates that there is no evidence of multicollinearity in the model. On the other hand, The VIF values of the independent variables in this research is less than 10 (1.0xx), which indicates that there is no evidence of multicollinearity in the model. These results suggest that each predictor variable is providing unique and valuable information in the prediction of the dependent variable.

The Correlation Matrix, which forms a crucial part of our multicollinearity analysis, reveals interesting insights about the linear relationships between the independent variables (NPM, PBV, EPS, ROA, Volume, Trend) and the dependent variable (Stock Price) in our model.

EPS and Volume display a negative correlation, with a coefficient of -0.221. This correlation is at the 0.05 level (2-tailed). Although the correlation is relatively weak, this negative relationship may lean toward the presence of multicollinearity..

Similarly, Volume and Trend show a positive correlation, with a coefficient of 0.177 at the 0.05 level (2-tailed) of significance. This modest correlation hints at potential multicollinearity between these two independent variables.

4.2.5.2. Autocorrelation Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.814[a]	.662	.646	3797.07531	2.170

a. Predictors: (Constant), Trend_X2.2, EPS_X1.3, ROA_X1.1, NPM_X1.4, PBV_X1.2, Volume_X2.1

b. Dependent Variable: StockPrice_Y

Fig. 4.9 - Autocorrelation Test (Model Summary)

In testing for autocorrelation in our model, we used the Durbin-Watson statistic. This test helps us to understand whether the residuals (or error terms) in our model are independent. It's crucial in ensuring the accuracy of the standard errors and the validity of our statistical tests.

In examining the residuals from the regression analysis, a Durbin-Watson was conducted to test for autocorrelation. The test statistic was 2.17, which is in the vicinity of 2. This suggests that there is likely no autocorrelation present in the residuals. While values above 2 can sometimes indicate negative autocorrelation, a value of 2.17 is close enough to 2 that it generally suggests no meaningful autocorrelation. This indicates that the residuals from our model are not significantly correlated with each other, providing support for the validity of the research’s regression model.

There’s no significant autocorrelation in the residuals of the regression model because the value is close to 2, which is the value indicating no autocorrelation.

4.2.5.3. Heteroscedasticity Test

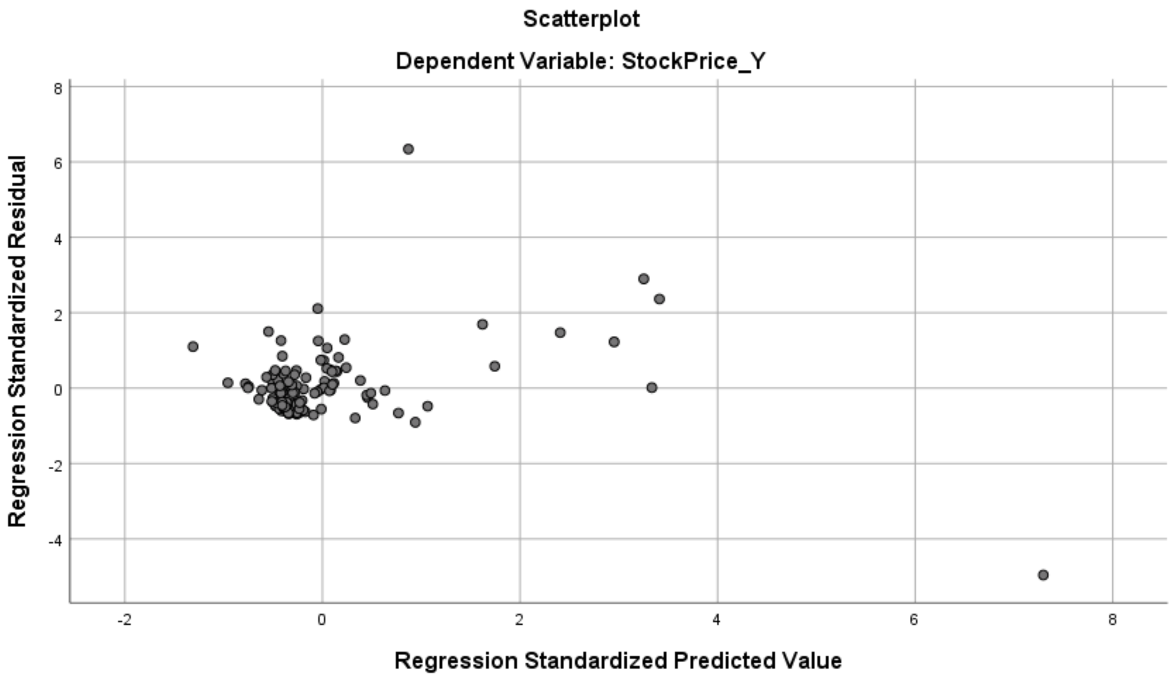

Fig. 4.10 - Heteroscedasticity Test (Scatterplot)

In the Heteroscedasticity Test subchapter, we used a scatterplot to visualize the relationship between the regression standardized residuals and the regression standardized predicted values. Heteroscedasticity refers to the circumstance where the variability of the error term, or residual, is not constant across all levels of the independent variables. This is an important assumption for regression analysis, as violating this assumption can lead to inefficient parameter estimates and incorrect conclusions about the relationships between variables.

4.2.5.4. Normality Test

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
StockPrice_Y	.242	129	.000	.635	129	.000
ROA_X1.1	.397	129	.000	.156	129	.000
PBV_X1.2	.324	129	.000	.366	129	.000
EPS_X1.3	.318	129	.000	.464	129	.000
NPM_X1.4	.100	129	.003	.928	129	.000
Volume_X2.1	.238	129	.000	.536	129	.000
Trend_X2.2	.349	129	.000	.694	129	.000

a. Lilliefors Significance Correction

One-Sample Kolmogorov-Smirnov Test

			StockPrice_Y	ROA_X1.1	PBV_X1.2	EPS_X1.3	NPM_X1.4	Volume_X2.1	Trend_X2.2
N			129	129	129	129	129	129	129
Normal Parameters[a,b]	Mean		4912.9767	.088447	3.1645	119.3591	.135048	32.0578	2.5814
	Std. Deviation		6379.93625	.3382328	5.78319	251.25311	.0978464	44.21862	1.83157
Most Extreme Differences	Absolute		.242	.397	.324	.318	.100	.238	.349
	Positive		.195	.362	.262	.294	.100	.194	.349
	Negative		-.242	-.397	-.324	-.318	-.086	-.238	-.240
Test Statistic			.242	.397	.324	.318	.100	.238	.349
Asymp. Sig. (2-tailed)[c]			.000	.000	.000	.000	.003	.000	.000
Monte Carlo Sig. (2-tailed)[d]	Sig.		.000	.000	.000	.000	.003	.000	.000
	99% Confidence Interval	Lower Bound	.000	.000	.000	.000	.001	.000	.000
		Upper Bound	.000	.000	.000	.000	.004	.000	.000

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. Lilliefors' method based on 10000 Monte Carlo samples with starting seed 2000000.

Fig. 4.11 - Normality Test (Test of Normality)

To verify the normality assumption underlying the multiple linear regression analysis, One-Sample Kolmogorov-Smirnov tests were performed on the dependent variable (stock price) and the independent variables (NPM, PBV, EPS, ROA, Volume, and Trend). The K-S and tests are generally used to assess the assumption of normality, which is essential for many statistical analyses (H_0). The null hypothesis for both tests is that the sample data is drawn from a population that follows a normal distribution.

Based on the results, it revealed that the p-value for all variables was less than the common alpha level of 0.05. Similarly, the S-W test also yielded p-values less than 0.05 for all variables.

According to these results, we reject the null hypothesis (H_0), leading us to conclude that the data for the dependent and independent variables do not follow a normal distribution. This significant departure from normality needs to be considered as we proceed with the analysis.

However, it's crucial to remember that the assumption of normality in regression analysis primarily applies to the residuals (errors) rather than the variables themselves. Therefore, despite the current findings, the planned regression analysis can still be conducted. The key step following the regression analysis will be to examine the residuals to determine if they satisfy the normality assumption.

4.3. Discussions

Based on the test results, it suggests that EPS significantly predicts Stock Price when controlling for the other variables in our model. Thus, it can be concluded that the model's hypothesis (H1), where it proposed that fundamental metrics may affect the movement of Stock Price, can be safely accepted.

The model's hypothesis (H2), where it proposed that technical indicators may affect the movement of Stock Price, has to be rejected. The test results showed that the technical indicators (Volume and Trend) do not have a significant relationship with Stock Price. It is worth noting that the relationship between these technical indicators and stock prices is non-linear, therefore our hypothesis may be affected by factors outside of our model, for example, market sentiment or global economic events.

Our analysis suggested that, contrary to expectations, only earnings per share (EPS) among the fundamental metrics was found to have a significant influence on stock prices. The technical indicators, volume and trend, did not significantly influence stock price movements.

There could be several reasons for this outcome. First, it is possible that market participants may not be considering the fundamental metrics we've included in our model when making investment decisions. For instance, factors such as market sentiment or other macroeconomic indicators might be perceived as more important.

Moreover, the global COVID-19 pandemic has greatly impacted financial markets around the world, including the Indonesian stock market. This event has led to heightened market volatility and significant changes in investor behavior. The pandemic may have caused market participants to focus more on short-term survival of businesses rather than their long-term fundamentals. This could explain why the other fundamental metrics, except EPS, did not significantly affect stock prices.

Furthermore, regarding our second hypothesis, the non-significant results for technical indicators may be due to the fact that these indicators may not be as reliable during periods of extreme market volatility. Previous research has suggested that during such periods, the correlation between stock prices and traditional technical indicators may be weak.

This research also highlights the unique nature of the Indonesian stock market, specifically the LQ45 index. It suggests that market dynamics and the impact of the global pandemic have led investors to consider different factors in their decision-making process than what traditional financial theories might suggest. The findings of this research have significant implications for investors, policymakers, and businesses. They suggest that during times of market uncertainty, traditional fundamental and technical analyses may not be as effective.

However, our study is not without its limitations. While we used a robust sample of 129 companies, our research was limited to the Indonesian market during a particularly turbulent time. Future research may want to consider different markets or time periods, or include additional variables to better understand the factors influencing stock price movements.

In conclusion, our study found that only EPS among the fundamental metrics significantly influences stock price movements in the LQ45 index, highlighting the complexity of stock price behavior and the importance of context-specific factors in financial market analysis.