

## ERROR CORRECTION MODEL APPROACH AS A DETERMINANT OF STOCK PRICES

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### **Abstract**

*The short-term and long-term effects of ROI, EPS, PER Inflation, SBI, Exchange Rate, and GDP on the stock price are the focus of this study. The study's data came from company financial statements, including the Indonesian Stock Exchange Index LQ45. The stationarity test, the classical assumptions test, the cointegration test, and the error correction model test was utilized in this study's statistical analysis. KURS and SBI had a positive effect on stock prices in the short term, but there is no effect in the long term, and inflation and GDP do not affect the stock price both in the short term and in the long term, according to this study. As a result, investors and businesses can use this study's contribution as a point of reference when considering factors that have a short-term and long-term impact on stock prices.*

**Keywords:** ROI; EPS; PER; inflation; exchange rate; GDP; stock price

### **INTRODUCTION**

The Corona Virus (COVID-19) pandemic has made the order of human life uncertain, this uncertainty has an impact on various sectors such as religion, education, health, tourism, manufacturing, transportation, social, food and economic. All sectors have experienced a slump that in recent years has made the order of life a problem, with the issuance of various government policies in preventing the virus from spreading and policies regarding the implementation of these sectors to remain stable, the government issued policies where these policies are solutions to human life which are currently difficult to predict.

One of the economic sectors affected by the corona virus (COVID-19), which is currently still in the recovery stage, various government policies have been issued to reduce the problem, besides that, this economic policy also discusses investing in Indonesia. Investment in Indonesia needs adaptation due to the corona virus (COVID-19), this adaptation is carried out where investors who will invest must rethink and even need to rearrange their portfolios, so investors must be careful, because when the world of investment or stock exchanges around the world on average experiences a decline (Collins & Weil, 2020) and it is undeniable that this also has an impact on the stock exchange in Indonesia, is the Indonesia Stock Exchange.

The existence of the Covid-19 pandemic has made investors in investing more cautious, detailed analyzing from various aspects in investing, because the purpose of investors in investing is to get profits not losses, this is also related to the stock returns obtained, if you want to get high profits, stock returns must be high and vice versa if the stock's return is low then the loss will be earned. Therefore, investors in this condition need to be careful and also minimize the risks that will be obtained when investing.

Technical analysis and fundamental analysis is one of the stock analysis in minimizing the risk that will be obtained by investors, investors need relevant information about the development of the stock exchange, one of the information that can be used is the movement of stock prices on the Indonesia Stock Exchange. Various

types of stock price indices on the Indonesian stock exchange during the COVID-19 pandemic experienced an unreasonable decline and fluctuating, the tendency of stock prices to lead to unstable stock prices, and it was proven from various stock indexes on the Indonesian stock exchange that the average stock price decreased, this was due to several factors both internal and external.

Internal factors are related to micro factors which are related to problems in the company, one of the information related to internal factors is the financial performance of a company presented in the company's financial statements, information on the company's financial performance is needed by investors to be analyzed before investors invest in the company, required information such as ROI, EPS and PER. Meanwhile, external factors are related to macro factors which are related to problems that exist outside the company, one of the information is related to external factors, namely Indonesia's economic stability which can be seen from Inflation, Exchange Rate, Interest Rate, GDP and others. These two factors affect the stock price in the capital market.

Previous research on internal factors (ROI, EPS, PER influenced stock prices) such as (Allozi & Obeidat, 2016), (Pradhan & Dahal, 2018), (Bratamanggala, 2018), (Stephen & Okoro, 2014), (Nautiyal & Kavidayal, 2018), (Basak et al., 2019), (Kumbure et al., 2022), (Berggrun et al., 2020), (Kumar, 2017), (Lusiana, 2020), (Yusuf & Hamzah, 2016), (Hamzah, 2021), (Wahyuni & Irman, 2021), (Setyo Liyundira, 2019), (Chandra et al., 2019), (Puspitaningtyas, 2017), (Widasari & Faridoh, 2017), (Nurlia & Juwari, 2020), (Martha & Yanti, 2019), (Setyo Liyundira, 2019), (Mabrur Alifiawan et al., 2019), (Akhmadi & Prasetyo, 2018), (Trisanti & Sari Marliani, Dra, 2019), (Eka Ardiana & Farida Ulfah, 2022), (Sensoy & Serdengeçti, 2020), (Rahmawati & Hadian, 2022), (Ramlah, 2021), (Kang et al., 2021), (Joshi & Mukhopadhyay, 2022) and (Daniswara & Daryanto, 2019).

Previous research on external factors (Inflation, KURS, PER, SBI and GDP influenced stock prices) such as (Puspitaningtyas, 2017), (Stephen & Okoro, 2014), (Nautiyal & Kavidayal, 2018), (Basak et al., 2019), (Kumbure et al., 2022), (Allozi & Obeidat, 2016), (Pradhan & Dahal, 2018), (Yusuf & Hamzah, 2016), (Hamzah, 2021), (Martha & Yanti, 2019), (Mabrur Alifiawan et al., 2019), (Sensoy & Serdengeçti, 2020), (Kang et al., 2021), (Joshi & Mukhopadhyay, 2022), and (Mabrur Alifiawan et al., 2019).

## METHODS

Data sources include the Central Bureau of Statistics, the Indonesian Stock Exchange, and the Bank of Indonesia. The sample in this study consists of 45 companies that are included in the LQ45 Index from 2015 to 2022. Both descriptive and verificative methods are used in this study. The data stationarity test, the classical assumption test, the cointegration test, and the model error correction model test were the analytical methods used.

The linear Regression Equation to obtain a long-term relationship in this study is as follows:

$$Y_t = \beta_0 + \beta_1 ROI_t + \beta_2 EPS_t + \beta_3 PER_t + \beta_4 INF_t + \beta_5 KURS_t + \beta_6 SBI_t + \beta_7 GDP_t + \mu_t \dots \dots \dots (1)$$

Where  $Y_t$  stands for share price in period  $t$ ,  $\beta_0$  represents constants,  $\beta_1, \beta_2 \dots \beta_7$  stands for coefficient, and  $\mu_t$  stands for residual cointegration.

The ECM equation model to explain the short-term relationship between bound variables and free variables in this study is as follows:

$$\Delta Y_t = \alpha_0 + \alpha_1 \Delta X_t + \alpha_2 \Delta X_{t-1} + \alpha_3 \Delta X_{t-2} + \alpha_4 \Delta X_{t-3} + \alpha_5 \Delta X_{t-4} + \alpha_6 \Delta X_{t-5} + \alpha_7 \Delta X_{t-6} + \alpha_8 \Delta Y_{t-1} + \gamma (Y_{t-1} - b_1 X_{t-1} - b_2 X_{t-2} - b_3 X_{t-3} - b_4 X_{t-4} - b_5 X_{t-5} - b_6 X_{t-6} - b_7 X_{t-7} - b_8 Y_{t-2}) + \epsilon_t \dots \dots \dots (2)$$

Using the F test, to examine the relationship between the variables ROI, EPS, PER, inflation, exchange rate, SBI, GDP, and stock prices.

## RESULTS

Test methods used for conducting data stationarity tests in research this is an ADF (Augmented Dickey Fuller) test using a real rate of 5%. If the tADF value is greater than the MacKinnon latency value, then it can be concluded that the data used is a stationer (does not contain the root of the unit) of the roots of this unit is carried out at the level of level up to First Difference.

Table 1. Stationarity Test Results

Variable	DF Value	ADF Value
ROI	-4.721091	-4.810111
EPS	-5.911031	-5.481933
PER	-4.130311	-4.831222
Inflation	-3.913012	-3.810444
Kurs	-3.671011	-3.410312
SBI	-2.891055	-2.999211
GDP	-2.779122	-2.817781
Stock Price	-3.259711	-3.210046

Source : processed data, 2022

Based on Table 1, it can be seen that from the estimates that have been made show that variables that have an absolute value of DF and ADF smaller counts compared to with DF and DF Tables at the level 5% trust, then overall all variables are not yet stationary. To know on what degree the data will be stationary then next it is necessary to quantify the degree of integration test.

On Table 2 it is seen that the entire value of DF and ADF variables greater than the value DF and ADF calculate at a 5% confidence level. This shows that all observations have been stationary at degree one or 1. With thus it can be said that all variables have stationary at the first degree 1.

Table 2. Integration Degree Test Results

Variable	DF Value	ADF Value
ROI	-6.847124	-6.891123
EPS	-6.954211	-6.300912
PER	-5.781091	-5.963812
Inflation	-5.078125	-5.711033
Kurs	-6.846732	-6.968120
SBI	-7.981423	-7.883212
GDP	-7.997227	-7.889623
Stock Price	-7.119682	-7.327122

Source : processed data, 2022

Description: DF value and ADF Table with  $\alpha = 5\%$ ,  $N = 360$  is each  $-2.8922$  and  $-3.4602$ .

Based on the results of classical assumption tests such as normality tests, heteroskedasticity tests, autocorrelation tests and multicollinearity tests, from some of these tests show that the data and regression models both in the short term and in the long term in this study meet the results of normal distributed data, there is no heteroskedasticity, no autocorrelation occurs and there is no multicollinearity in the equations of the model, So that if it meets the classical assumption test, then it is continued with the cointegration test.

Table 3. Cointegration Test Results

Augmented test statistic	Dickey-Fuller	t-statistic	Prob*
		-9.793512	0.0000
Test critical values:			
1% level	-3.568308		
5% level	-2.921175		
10% level	-2.598551		

\*MacKinnon (1996) one-sided p-values

Once it is known that all variables are used in this stationary study on First Difference, then a co-integration test is carried out to know if the relationship is term length between variables used in this study. Steps performed to perform the cointegration test is Forming the Residual Series of the OLS Equation which has been done before. Here is presented cointegration test results from the data to be used in this study using the method Residual Based Test.

Table 4. Model Error Correction Test Results

Variable	Coefficient	Std.Error	t-Statistic	Prob.
C	8.108762	11.60218	0.836191	0.6087
D(ROI)	3.091821	0.059191	3.910421	0.0032
D(EPS)	2.885610	0.061419	3.706185	0.0056
D(PER)	3.560124	0.040932	6.694521	0.0000
D(INFLATION)	-8.901271	0.093711	-1.051042	0.7911
D(KURS)	2.756120	0.074831	6.505210	0.0000
D(SBI)	5.391850	0.080572	4.702751	0.0000
D(GDP)	-2.730136	0.059253	-0.869102	0.9601
HS(-1)	-1.703728	0.069712	-2.930362	0.0174
ROI(-1)	3.888410	0.050421	3.730574	0.0050
EPS(-1)	1.695021	0.079110	2.850423	0.0312
PER(-1)	4.994720	0.066921	3.989365	0.0030
INFLATION(-1)	6.230781	0.009471	0.930641	0.7047
KURS(-1)	2.071630	0.060121	2.210973	0.0421
SBI(-1)	-1.833650	0.509841	-0.507521	0.8010
GDP(-1)	-2.002710	2.117202	-0.947201	0.8572
R-Squared	0.869195			
Adjusted R- Squared	0.835790			
F-statistic	9.750691			
Prob (F-statistic)	0.000000			

Source : processed data, 2022

Based on Table 3. The variables used in this study are known to have a significant cointegration or long-term relationship. This is demonstrated by the fact that the significant value probability of the residual value is lower than the Test Critical Values of 1%, 5%, and 10%, as well as by the higher t-statistical value of the MacKinnon Critical Values to ensure that the data are integrated into I (0).

The Adjust R-square value of 0.835790 in Table 4 indicates that the determinant variables in the model can account for 83,57 percent of changes in independent variables, while other variables outside the model have an impact on 16,43 percent. In light of Table 4, indicates that the value the ECT (Error Correction Term) variable is variables that indicate the Share Price. It is can be an indicator that the specifications of the model whether or not through a degree of significance error correction coefficient (Ardana, 2016). If the variable is ECT significant, then the model specifications are valid (valid) and can describe variations of non-variables free.

Short-term, t-static value of ROI variable of 3.910421 with a probability of 0.0032 and the coefficient of short-term ROI of 3.091821. This means the variable ROI significant positive effect on the level 5% trust and implications that there is a short-term relationship between variable ROI to stock price. Long-term, t-statistical value of ROI variables long-term of 3.730574 with probability 0.0050, and term coefficient long ROI obtained by dividing ROI coefficient value (-1) with ECT coefficient (HSt-1) of 3.888410. This means ROI variables have a significant positive effect at a 10% confidence level and carrying implications that there is a term relationship length between ROI variables to stock price, where if ROI experiences an increase of one percent will then increase in share price by 3.888410 % or vice versa.

Short-term, t-static value of EPS variable of 3.706185 with a probability of 0.0056 and the coefficient of short-term EPS of 2.885610. This means the variable EPS significant positive effect on the level 5% trust and implications that there is a short-term relationship between variable EPS to stock price. Long-term, t-statistical value of EPS variables long-term of 2.850423 with probability 0.0312, and term coefficient long EPS obtained by dividing EPS coefficient value (-1) with ECT coefficient (HSt-1) of 1.695021. This means EPS variables have a significant positive effect at a 10% confidence level and carrying implications that there is a term relationship length between EPS variables to stock price, where if EPS experiences an increase of one percent will then increase in share price by 1.695021 % or vice versa.

Short-term, t-static value of PER variable of 6.694521 with a probability of 0.0000 and the coefficient of short-term PER of 3.560124 This means the variable PER significant positive effect on the level 5% trust and implications that there is a short-term relationship between variable PER to stock price. Long-term, t-statistical value of PER variables long-term of 3.989365 with probability 0.0030, and term coefficient long PER obtained

by dividing PER coefficient value (-1) with ECT coefficient (HSt-1) of 4.994720. This means PER variables have a significant positive effect at a 10% confidence level and carrying implications that there is a term relationship length between PER variables to stock price, where if PER experiences an increase of one percent will then increase in share price by 4.994720 % or vice versa.

Short-term, t-static value of Inflation variable of -1.051042 with a probability of 0.7911 and the coefficient of short-term Inflation of -8.901271. This means variables Inflation has no effect on the rate 5% trust and implications that there is no short-term relationship between the variables inflation to the stock price. Long-term, t-statistical value of Inflation variables long-term of 0.930641 with probability 0.7047, and term coefficient long inflation obtained by dividing Inflation coefficient value (-1) with ECT coefficient (HSt-1) of 6.230781. This means that the Inflation variable has no effect at a confidence level of 10% and bring implications that there is no relationship long-term between inflation variables against stock price, where if inflation experience an increase of one percent then it will lowered stock price by 6.230781% or vice versa.

Short-term, t-static value of KURS variable of 6.505210 with a probability of 0.0000 and the coefficient of short-term KURS of 2.756120 This means the variable KURS significant positive effect on the level 5% trust and implications that there is a short-term relationship between variable KURS to stock price. Long-term, t-statistical value of KURS variables long-term of 2.210973 with probability 0.0421, and term coefficient long KURS obtained by dividing KURS coefficient value (-1) with ECT coefficient (HSt-1) of 2.071630. This means KURS variables have a significant positive effect at a 10% confidence level and carrying implications that there is a term relationship length between KURS variables to stock price, where if KURS experiences an increase of one percent will then increase in share price by 2.071630% or vice versa.

Short-term, t-static value of SBI variable of 4.702751 with a probability of 0.0000 and the coefficient of short-term SBI of 5.391850 This means the variable SBI significant positive effect on the level 5% trust and implications that there is a short-term relationship between variable SBI to stock price. Long-term, t-statistical value of SBI variables long-term of -0.507521 with probability 0.8010, and term coefficient long inflation obtained by dividing SBI coefficient value (-1) with ECT coefficient (HSt-1) of -1.833650. This means that the SBI variable has no effect at a confidence level of 10% and bring implications that there is no relationship long-term between SBI variables against stock price, where if SBI experience an increase of one percent then it will lowered stock price by -833650% or vice versa.

Short-term, t-static value of GDP variable of -0.869102 with a probability of 0.9601 and the coefficient of short-term GDP of -2.730136. This means variables GDP has no effect on the rate 5% trust and implications that there is no short-term relationship between the variables GDP to the stock price. Long-term, t-statistical value of GDP variables long-term of -0.947201 with probability 0.8572, and term coefficient long GDP obtained by dividing GDP coefficient value (-1) with ECT coefficient (HSt-1) of -2.002710. This means that the GDP variable has no effect at a confidence level of 10% and bring implications that there is no relationship long-term between GDP variables against stock price, where if GDP experience an increase of one percent then it will lowered stock price by -2.002710% or vice versa.

## DISCUSSIONS

The test of the analysis revealed that ROI influences stock prices in both the short and long term. This indicates that the return on investment (ROI) can be utilized to enhance the business's capacity to generate profits from its total assets in the short and long term. In order to profit from these measurements, it will be possible to describe the company's asset management performance. If this ratio is calculated, the higher it is, the better a company is doing. The company's excellent situation will be a wonderful reason for investors to make investments because businesses with a high return on investment (ROI) are regarded as secure and offer the possibility of profit. The greater the interest of investors in purchasing shares, the higher the stock price will rise. because market conditions, specifically the level of demand and supply of shares, ultimately determine the price of a single share. This study is consistent with other studies (Mukhtar et al., 2022) and (Eka Ardiana & Farida Ulfa, 2022), which assert that stock prices are influenced by ROI.

Because, in accordance with the results of the analysis test, EPS has an effect on stock prices in both the short term and the long term, it is used to measure management's success in achieving profits for the owners of the company. After all fees and taxes for the relevant accounting period have been paid, the amount is paid to the general shareholders. If the ratio is low, it indicates that the business does not perform well by focusing on revenue, such as low revenue as a result of uneven sales or high costs. On the other hand, the company is considered mature if the obtained ratio is high. The level of return that an investor will receive when he invests in it is outlined in EPS. Since the stock issuing company's rising EPS demonstrates the company's favorable prospects and opportunities for investors to earn returns, many investors will be interested in purchasing shares.

The stock price will also rise as a result of a rise in demand for these shares and their supply. This study is consistent with other studies (Mukhtar et al., 2022) and (Eka Ardiana & Farida Ulfah, 2022), which assert that stock prices are influenced by EPS.

The test of the analysis revealed that PER influences stock prices in both the short and long term. To put it another way, the ratio of PER to a company's profit is inverse, so businesses with high PER values have low profits and low PER values have high profits. A business that has a low PER indicates that it is profitable. If the company has a low PER, investors will be interested in the short- and long-term returns on their shares. A high PER indicates a high stock price, while a low PER indicates a low stock price. The stock price and investors' stock return are significantly influenced by the PER. This study is consistent with other studies (Saputra, 2022) which assert that stock prices are influenced by PER.

According to the findings of the analytical test, both short-term and long-term stock prices are unaffected by inflation. As a result, investment growth slows as a result of an imbalance in the capital market caused by inflation's tendency to lower the real interest rate. Companies may go out of business as a result of excessive inflation, which can harm the economy as a whole. In addition, whether inflation is high or low, it will have a negative effect on stock price movements. If inflation is very low, economic growth will be extremely sluggish. As stock prices fall due to inflation, investors will reconsider whether or not to invest their money in the business in order to avoid taking high risks in the short and long term, such as bankruptcy or losses caused by falling stock prices. This study is consistent with other studies (Fang et al., 2019) which assert that stock prices are influenced by Inflation.

The analysis test showed that the rupiah exchange rate affects stock prices in both the short and long term. The weakening rupiah exchange rate has a negative effect on stock prices in the capital market because the majority of companies that go public on the Indonesia Stock Exchange have foreign debt in the form of foreign exchange. The condition of the rupiah exchange rate, which is estimated to be bad, can result in a reflection on the stock price that will decline and vice versa, specifically when companies export goods abroad with raw materials obtained from within the country. Based on the short and long terms that the rupiah exchange rate can affect the stock price. As a result, the company's profit may rise. This lab upgrade might tempt investors to purchase shares in this company. Due to an increase in demand for this company's shares, the stock price will rise. This study is consistent with other studies (Cahyaning Pratiwi et al., 2022) which assert that stock prices are influenced by KURS.

The test of the analysis showed that SBI has an effect on stock prices in the short term, but not in the long term. Investors should consider the BI Rate when making decisions regarding capital market investments because it has the potential to have a short-term effect on stock price movements. In order to achieve the inflation target and maintain the stability of the rupiah currency, the Bank of Indonesia periodically sets the BI rate, which is a one-month term interest rate. However, since stock prices are unaffected by the long-term interest rate, investors should not use the BI rate as a long-term benchmark when making investment decisions. This study is consistent with other studies (Cahyaning Pratiwi et al., 2022) which assert that stock prices are influenced by SBI.

According to the results of the analysis test, GDP has no short- or long-term effect on stock prices. This means that a country with low GDP growth indicates a decline in people's capacity to produce and consume. The production capacity of businesses that go public with these groups will also decrease. The company's revenue will decrease as a result of a falling production rate, and profits will also decrease. The dividend will be modest if the profit falls. If some companies that have gone public experience the cycle, then the majority of stock prices on the stock market will also show a downward trend. This will assume the company's performance on the stock exchange. This study is consistent with another study (Ratnaningrum et al., 2022) which states that stock prices are not affected by GDP.

## CONCLUSIONS

KURS and SBI have an effective positive effect on the stock price on a long-term basis short, but no influence in the long term. Inflation and GDP have no effect on the stock price both in the short term and long term, according to the findings of this study. ROI, EPS, and PER have positive effects on the stock price in the short term and long term, respectively. The share price is impacted simultaneously by all factors, whether in the short term or the long term. The next researcher can use samples from other types of indices on the Indonesian Stock Exchange or extend the study period by testing more variables like Index Price Consumers, Money Supply, Oil Prices, Volumes Trade, taxes, and other micro-factors to get accurate results. As a result, investors and businesses can use this study's contribution as a point of reference when considering factors that influence stock prices over the short and long term.

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