



Analysis of the Influence of Macroeconomic Variables on the Stock Price Index of the Property, Real Estate and Building Construction Sector Year 2018 – 2023

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ARTICLE INFO

Keywords: GDP Growth Rate, BI Rate, Inflation, Exchange Rate, Property Sector

Received : 3 May

Revised : 17 June

Accepted: 17 July

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ABSTRACT

This study aims to examine the influence of macroeconomic variables – namely GDP growth rate, BI Rate, inflation, and exchange rate – on the stock price index of the Property, Real Estate, and Building Construction Sector in Indonesia from 2018 to 2023. Using quarterly data and employing the Vector Error Correction Model (VECM), the research identifies both long-term and short-term relationships between the selected macroeconomic indicators and sectoral stock index. The results show that in the long run, GDP growth rate and exchange rate have a positive and significant influence, while inflation has a negative and significant effect. The BI Rate does not significantly influence the sectoral index in the long term. In the short term, the exchange rate and BI Rate exhibit both positive and negative effects at various lags, while inflation negatively affects the index. Impulse Response Function (IRF) analysis reveals fluctuating responses of the index to macroeconomic shocks, and Forecast Error Variance Decomposition (FEVD) indicates that GDP growth and BI Rate contribute most to explaining the variability of the index. These findings provide insight for investors and policymakers regarding the dynamic interaction between macroeconomic conditions and stock market performance in the property and construction sector

INTRODUCTION

Investment is something that has been commonly done by people lately. "Investment is a commitment to a certain amount of funds or other resources that are made at this time, with the aim of obtaining a certain amount of profit in the future." (Tandelin, 2016: 2). Investing a certain amount of funds in real assets (land, gold, machinery or buildings) or financial assets (deposits, stocks, or bonds) is an investment activity that is commonly carried out. The parties who carry out investment activities are called investors. Tandelin (2016: 2) classifies investors into two, namely individual investors (individual/retail investors) and institutional investors (institutional investors). Individual investors consist of individuals who carry out investment activities. While institutional investors usually consist of insurance companies, fund storage institutions (banks and savings and loan institutions), pension fund institutions, and investment companies.

The purpose of investment is to improve investor welfare. Welfare in this case is monetary welfare, which can be measured by adding current income plus the current value of future income. There are several reasons why someone makes an investment, including to get a more decent life in the future by improving their standard of living from time to time or at least trying to maintain their current income level so that it does not decrease in the future, reducing inflationary pressures to avoid the risk of decreasing the value of their wealth or property rights due to the influence of inflation, and the encouragement to save taxes by providing tax facilities to people who invest in certain business fields. Investment can be done anywhere. Investors can invest directly by buying real assets in the form of land, gold, machinery or buildings from a second party. Investors can also directly invest their money in the form of financial assets such as savings and deposits in financial institutions desired by the investor himself. In addition, if you want to invest financial assets in other forms such as stocks, bonds, derivatives, mutual funds, or other instruments, investors can directly go to the desired securities company.

In investing in financial assets, investors must be familiar with the term capital market. According to the official website of the Indonesia Stock Exchange, the capital market is a market for various long-term financial instruments that can be traded, both debt securities (bonds), equity (stocks), mutual funds, derivative instruments and other instruments. The capital market is a means of funding for companies and other institutions (eg the government) and as a means for investment activities. Thus, the capital market facilitates various facilities and infrastructure for buying and selling activities and other related activities.

Financial instruments traded in the capital market are long-term instruments (terms of more than 1 year) such as stocks, bonds, warrants, rights, mutual funds, and various derivative instruments such as options, futures, and others. Capital Market Law No. 8 of 1995 concerning the Capital Market defines the capital market as "activities related to Public Offerings and trading of Securities, Public Companies related to the Securities they issue, and institutions and professions related to Securities".

The Capital Market plays an important role in a country's economy because the capital market has two functions, namely first as a means for business funding or as a means for companies to obtain funds from the capital community (investors). Funds obtained from the capital market can be used for business development, expansion, additional working capital and others. Second, the capital market is a means for the public to invest in financial instruments such as stocks, bonds, mutual funds, and others. Thus, the public can place the funds they have according to the characteristics of the profits and risks of each instrument. The decrease in the BI Rate will directly cause the mortgage interest rates of several national banks to also decrease. As quoted on the Liputan6.com site, the policy of lowering the Bank Indonesia benchmark interest rate (BI Rate) is considered to have an impact on the reduction in mortgage interest rates.

"KPR is an abbreviation of Home Ownership Credit, which is a financing product for home buyers with a financing scheme of up to 90% of the house price. Until now, KPR has been provided by banks, although there are already financing companies that distribute financing from secondary institutions for housing financing." Rumah.com. Starting from January 15, 2015, as can be seen on the official website of Bank Indonesia, Bank Indonesia's benchmark interest rate or what we usually call the BI Rate has dropped by 25 basis points (bps) from 7.75% to 7.50%. This is what made Bank Tabungan Negara (BTN) and other national banks lower their KPR interest rates. On the Tribunnews.com website, the President Director of BTN said that for non-subsidized houses, the drop could reach 75 basis points or 0.75%. Meanwhile, subsidized houses without the Housing Financing Liquidity Facility (FLPP) had their interest rates lowered by up to 200 basis points or 2%.

The decrease in mortgage interest rates has caused a multiplier effect on the property sector. National banks hope that this policy will boost the distribution of new credit, which means increasing people's purchasing power for products offered by the property sector. The effect of this increase will also increase labor absorption, cement purchases, and stock movements for the property business.

In addition, the reason why the property sector is a promising sector for investment is the still high need of Indonesian people for property. At least there are still 14 million out of 61 million families in Indonesia who do not have a house. The government is also increasingly struggling to provide houses for lower middle class families. Based on existing facts, the demand for houses in Indonesia reaches 900,000 units per year, while the supply of housing is only 80,000 units per year.

In addition to macroeconomic factors, the high flow of urbanization has also resulted in the property sector being eyed by many newcomers. According to the Kompas.com website, the Capital City of the Republic of Indonesia, DKI Jakarta will get an additional 70,000 newcomers after a week of being left by around 6.5 million of its residents on Eid al-Fitr holidays. In addition, according to Price Waterhouse Cooper data in 2023, Indonesia's urbanization population rate is 51.4% or the second highest after Malaysia with a figure of 73.4%.

This rapid urbanization must be supported by proper development equality. The massive infrastructure development planned by the government through the Masterplan for the Acceleration and Expansion of the Indonesian Economy (MP3EI) will certainly bring extraordinary multiplier effects. With good infrastructure, the need for property will also increase. The DKI Jakarta Provincial Government has planned the development of rusunawa in the Kemayoran area to accommodate the lower middle class.

The last reason is along with the increasing number of free trade agreements, as well as the implementation of the ASEAN Economic Community (AEC) which will directly increase the need for property for foreigners in Indonesia. For this reason, the government is perfecting Government Regulation (PP) Number 41 of 1996 which regulates Foreign Property Ownership with Right of Use Status.

Investment in the Property and Real Estate Sector never causes financial losses. Every year the average property price increases by 15% to 20%, and can be more than 20% if the location is favorite and there is potential for life, business, or industry. There are two ways to invest in the property and real estate sector, either buying land (with or without a house building) or buying shares (paper assets). (Lupita Putri & Subiakto Soekarno, 2012: 2)

LITERATURE REVIEW

Investment

According to Isnaini & Ghoniyah (2019) Investment is a commitment to a certain amount of funds or other resources made at this time, with the aim of obtaining a certain amount of profit in the future. Meanwhile, according to Leopodis (2021) Investment is a sacrifice of resources (time, money, and effort) today in the hope of getting more resources in the future.

In other words, investment is a commitment to sacrifice current consumption with the aim of increasing consumption in the future. Investment can be related to the investment of a certain amount of funds in real assets such as: land, gold, houses and other real assets or in financial assets such as: deposits, stocks, bonds, and other securities. Financial assets are claims in the form of securities on a number of assets of the party issuing the securities.

Stock Price Index

Information about stock market performance is often summarized in an index called the stock market index. The stock market index is also called the stock price index. The stock price index is an indicator or reflection of stock price movements. The index is one of the guidelines for investors to invest in the capital market, especially stocks. (Idx.co.id) Currently, the Indonesia Stock Exchange has eleven types of stock price indices, which are continuously disseminated through print and electronic media. These indices are the Composite Stock Price Index (IHSG), Sectoral Index, LQ45 Index, Jakarta Islamic Index (JII), Kompas100 Index, Bisnis-27 Index, PEFINDO25 Index, SRI-KEHATI Index, Main Board Index, Development Board Index, and Individual Index.

METHODOLOGY

The location of this research is at the Indonesia Stock Exchange (IDX) located at Jalan Jenderal Sudirman Kavling 52 - 53, South Jakarta, DKI Jakarta Province - 12190. The implementation of this research was carried out in December 2024 - February 2025. This research uses documentary data, namely the type of research data which includes: invoices, journals, letters, minutes of meetings, memos, or in the form of program reports. Documentary data contains what and when an event or transaction occurred, and who was seen in an event. The population of this study is the Property, Real Estate & Building Construction Sectoral Stock Price Index which can be obtained from the Indonesian Capital Market Library (ICaMEL), Indonesia Stock Exchange or in the statistical publication section of the official website of the Indonesia Stock Exchange. This study is a population study. The form of data collected by the researcher is quarterly data during the observation year set by the researcher, namely 2018 – 2023 .

RESULT

Data Stationarity Test and Degree of Integration

The first step in data processing using VAR / VECM is to test whether the data used in this study is stationary or not stationary by using the unit root test (Unit Root Test). In addition to determining the stationarity of the data, the unit root test is also used to determine what kind of VAR model will be used in a study.

Before conducting the unit root test, the Exchange Rate and Stock Price Index data of the Property, Real Estate & Building Construction Sector were changed into natural logarithm (ln) which functions to soften the data so that the distance between the data is not too high. In this study, the unit root test uses the Augmented-Dickey Fuller method.

If the data from the variables used are stationary at the level level, then the influence between variables can be directly seen using the Vector Auto Regression (VAR) method. However, if the data from the variables used are not stationary at the level level, then the degree of integration will be tested, namely data processing at the first difference level or Vector Error Correction Model (VECM).

If the absolute value of t-ADF is greater than the absolute value of its MacKinnon Critical Values, then the data has been stationary at the predetermined real level. In addition, it can also be seen from its probability value.

The unit root test in this study was conducted to see the stationarity of the variables GDP Growth Rate (GROWTHRATE), BI Rate (BIRATE), Inflation (INFLATION), Exchange Rate (LN_MIDDLECURITY) and Property, Real Estate & Building Construction Sector Stock Price Index (LN_IHSPROPERTY). The results of the unit root test (Unit Root Test) can be seen in the following table:

Table 1. Data Stationarity Test Results

Variables	ADF t-statistic	MacKinnon Critical Values (1%, 5%, 10%)	Information
GDP GROWTH RATE	-1.954816	-4.234972 -3.540328 -3.202445	Not Stationary
BIRATE	-3.578839	-4.219126 -3.533083 -3.198312	Stationary at 5% level
INFLATION	1.156159	-4.284580 -3.562882 -3.215267	Not Stationary
LN_MIDDLE COURSE	-1.399138	-4.211868 -3.529758 -3.196411	Not Stationary
LN_IHSPROPERTY	-2.805082	-4.219126 -3.533083 -3.198312	Not Stationary

Source: Eviews 10 Processing

From the Unit Root Test results table above, it can be seen that of all the variables studied, the only stationary variable is the BIRATE variable. Stationary because the absolute value of the ADF t-statistic of -3.578839 is greater than the MacKinnon Critical Values at the 5% level of -3.533083. While the variables GDP Growth Rate, Inflation, Exchange Rate and Stock Price Index of the Property, Real Estate & Building Construction Sector are not stationary because the absolute value of the ADF t-statistic is smaller than the MacKinnon Critical Values.

It can be concluded that the four variables have not met the data stationarity requirements, so to continue the data stationarity test, a degree of integration test will be carried out, namely data testing at the first level (first difference). The results of the degree of integration test at the first level can be seen in the following table:

Table 2. Degree of Integration Test Results

Variables	ADF t-statistic	MacKinnon Critical Values (1%, 5%, 10%)	Information
GDP GROWTH RATE	-57.02106	-4.234972 -3.540328 -3.202445	Stationary at 1% level
BIRATE	-4.555337	-4.273277 -3.557759 -3.212361	Stationary at 1% level
INFLATION	-5.108867	-4.284580 -3.562882 -3.215267	Stationary at 1% level

LN_MIDDLE COURSE	-5.307964	-4.219126 -3.533083 -3.198312	Stationary at 1% level
LN_IHSPROPERTY	-4.573299	-4.219126 -3.533083 -3.198312	Stationary at 1% level

Source: Eviews 10 Processing

From the table of results of the Degree of Integration Test above, it can be seen that all variables are stationary at the 1% level. All of these variables have an absolute value of the ADF t-statistic that is greater than the MacKinnon Critical Value . It can be concluded that all variables have met the requirements for data stationarity and can be tested further.

The results of the unit root test (Unit Root Test) indicate that the variables used are stationary at the first difference level. This indicates that the model used in this study is not a Vector Auto Regression (VAR).

Data Stationarity Test and Degree of Integration

The next step after the Data Stationarity Test and Degree of Integration is to determine the optimal lag length. Determining the optimal lag is useful for showing how long a variable reacts to another variable and is also useful for eliminating autocorrelation problems in a VAR system.

Optimal lag testing can be seen from the asterisks on the respective values of Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quin Criterion (HQ). The results of determining the optimal lag length can be seen in the following table:

Table 3. Optimal Lag Test Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	303.5171	NA	6.76e-14	-16.13606	-15.91837	-16.05931
1	430.8257	213.3278	2.72e-16	-21.66625	-20.36010	-21.20577
2	459.9431	40.92177	2.35e-16	-21.88882	-19.49421	-21.04460
3	549.9678	102.1902*	8.65e-18*	-25.40367*	-21.92060*	-24.17572*

Source: Eviews 10 Processing

From the Optimal Lag Test table above, the optimal lag length can be seen from the asterisks on the Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quin Criterion (HQ) values, which is at lag 3. So it can be concluded that the lag in this study uses lag 3.

Cointegration Test

The next step in processing the research data is the cointegration test. The cointegration test is a test used to determine the long-term and short-term relationships between research variables. The cointegration test conducted in this study is the Johansen cointegration test.

If the trace statistic and Max-Eigen statistic values are greater than the critical value, the equation is cointegrated, with H0 equal to non-cointegration and H1 equal to cointegration. In this context, when the trace statistic value is greater than the critical value, then reject H0 and accept H1 which means the equation is cointegrated.

In this study, the Johansen cointegration test is used to see the long-term relationship of the variables GDP Growth Rate (GDPGROWTHRATE), BI Rate (BIRATE), Inflation (INFLATION), and Exchange Rate (LN_MIDDLECURITY) against the Property, Real Estate & Building Construction Sector Stock Price Index (LN_IHSPROPERTY). The results of the Johansen cointegration test can be seen in the following table:

Table 4. Johansen Cointegration Test Results

Hypothesized No. of (CE)s	Trace Statistics	0.05 Critical Value	Max-Eigen Statistics	0.05 Critical Value
None*	141.3536	79.34145	61.12687	37.16359
At most 1*	80.22674	55.24578	33.15952	30.81507
At most 2*	47.06723	35.01090	30.13495	24.25202
At most 3	16.93228	18.39771	15.93133	17.14769
At most 4	1.000949	3.841466	1.000949	3.841466

Source: Eviews 10 Processing

From the Johansen Cointegration Test table above, it can be seen that the trace statistic and Max-Eigen Statistic values are greater than the critical value. In this context, the researcher rejects H0 and accepts H1, which means that the equation is cointegrated, so that the variables GDP Growth Rate, BI Rate, Inflation, and Exchange Rate have a long-term relationship to the Property, Real Estate & Building Construction Sector Stock Price Index.

From the Johansen Cointegration Test table above, it can also be seen that there are indications of 3 ranks that experience a long-term relationship. The number of ranks here is information that there is cointegration between the research variables used.

With the presence of cointegration, the model used in this study is the Vector Error Correction Model (VECM).

Ranger's Capacity Test

The Granger causality test is conducted to see the causal relationship between the variables in the model. This Granger causality test has no influence on the VECM analysis test used in this study. This Granger causality test is limited to seeing whether there is a two-way causal relationship between the variables GDP Growth Rate (GROWTHRATE), BI Rate (BIRATE),

Inflation (INFLATION), Exchange Rate (LN_MIDDLECURITY) and Property, Real Estate & Building Construction Sector Stock Price Index (LN_IHSPROPERTY).

The way to see the causal relationship between the existing variables is by looking at the F-Statistic value of each variable comparison. If the F-Statistic shows a number greater than the F-Table, then H0 will be rejected which means there is a relationship between the variables studied. Likewise, if the F-Statistic

value is smaller than the F-Table, then HO will be accepted which means there is no relationship between the variables studied. The F-Table value with a probability of 5% or 0.05 with df for the numerator (N1) equal to 5 and df for the denominator (N2) equal to 35 is 2.49. The results of the Granger causality test can be seen in the following table:

Table 5. Results of Granger Causality Test

Null Hypothesis	F-Statistic	Information
BIRATE → INFLATION	7.82590	There is a causal relationship one way between BIRATE and INFLATION.
LN_MIDDLE COURSE → GDP GROWTH RATE	17.6559	There is a one-way causal relationship between LN_KURSTENGAH and GDP GROWTH RATE
LN_MIDDLE COURSE ↔ LN_IHSPROPERTY	2.88900 3.05326	There is a two-way causal relationship between LN_KURSTENGAH and LN_IHSPROPERTY.

Source: Eviews 10 Processing

The Granger Causality Test Table above only contains variables that have a causal relationship either one-way or two-way to other variables. The F-Statistic value of these variables is greater than the F-Table value with a probability of 0.05, which is 2.49. Other variables that do not meet the F-Statistic requirement greater than the F-Table with a probability of 0.05 are stated to have no causal relationship to other variables.

So it can be concluded that based on the F-Table with a probability of 0.05, the Granger causality test produces that the BI Rate variable affects the Inflation variable, the Exchange Rate variable affects the GDP Growth Rate variable and the Exchange Rate variable and the Property, Real Estate & Building Construction Sector Stock Price Index variable influence each other.

Sector Error Correction Model (7ECM)

The next step in processing the research data is to estimate the Vector Error Correction Model (VECM). The Vector Error Correction Model (VECM) is carried out after the Johansen Cointegration Test produces cointegrated data.

VECM is used to determine whether or not there is a significant relationship between all research variables, both in the long term and the short term. In this study, VECM is used to see whether or not there is a significant relationship between GDP Growth Rate (GDPGROWTHRATE), BI Rate (BIRATE), Inflation (INFLATION), Exchange Rate (LN_MIDDLECURITY) and the Property, Real Estate & Building Construction Sector Stock Price Index (LN_IHSPROPERTY).

In this VECM estimation, the t-count value obtained is compared with the t-table, where with df of 35 and a probability of 1% or 0.01 is 2.43772, a probability of 5% or 0.05 is 1.68957 and a probability of 10% or 0.1 is 1.30621. If the t-count

value is greater than the t-table value, then it can be said that the variable has a significant relationship. The results of the Long-Term Vector Error Correction Model (VECM) estimation can be seen in the following table:

Table 6. Results of Long-Term Vector Error Correction Model

	GROWTH RATE GDP	DBIRATE	INFLATION	DLN_ CURRENCIES MIDDLE
DLN_ IHSPROPERTY	242.1831	-18.37425	-30.17060	4.929811
T-Statistic	[3.19055]	[-0.90403]	[-3.97675]	[2.85711]
Information	Positive and Significant	Negative and Not Significant	Negative and Significant	Positive and Significant

Source: Eviews 10 Processing

The Vector Error Correction Model (VECM) estimation table above is the result of long-term VECM estimation. In this estimation, the researcher uses T-Table with a probability of 5% or 0.05 of 1.68957. It can be seen that the variables of GDP Growth Rate, Inflation, and Exchange Rate have a T-Statistic that is greater than the T-Table that has been set by the author. While the BI Rate variable has a T-Statistic that is smaller than the T-Table, so it can be said that the BI Rate variable is not significant to the Property, Real Estate & Building Construction Sector Stock Price Index variable.

The long-term GDP Growth Rate variable has a significant positive relationship to the Property, Real Estate & Building Construction Sector Stock Price Index variable, which is 242.1831. This means that if the GDP growth rate variable increases by 1%, it will cause the Property, Real Estate & Building Construction Sector Stock Price Index variable to increase by 242.1831%.

The long-term inflation variable has a significant negative relationship to the Property, Real Estate & Building Construction Sector Stock Price Index variable, which is 30.17060. This means that if the inflation variable increases by 1%, it will cause the Property, Real Estate & Building Construction Sector Stock Price Index variable to decrease by 30.17060%.

The exchange rate variable in the long term has a significant positive relationship to the Property, Real Estate & Building Construction Sector Stock Price Index variable, which is 4.929811. This means that if the middle exchange rate variable increases by 1%, it will cause the Property, Real Estate & Building Construction Sector Stock Price Index variable to increase by 4.929811%.

The author attaches the results of the Short-Term Vector Error Correction Model (VECM) estimation in the following table:

Table 7. Results of the Short-Term Vector Error Correction Model

Error Correction	DLN_	SPEED	DBI	D	DLN_
	HIS PROPERTY	GROWTH GDP	RATE	INFLATION	EXCHANGE RATE MIDDLE
DLN_IHS PROPERTY(-3)	[-0.39144]	[2.89936]*	[-0.03542]	[0.62687]	[-1.15711]
GROWTH RATE GDP(-1)	[0.92305]	[-3.69018]	[-0.66313]	[-4.03855]*	[0.86111]
SPEED GDP GROWTH(-2)	[1.06335]	[-6.13790]	[0.90178]	[-4.28569]*	[0.79214]
SPEED GDP GROWTH(-3)	[0.76351]	[-12.7597]	[-1.24060]	[-4.40845]*	[0.95361]
DBIRATE(-1)	[-1.37382]*	[-0.19590]	[1.09214]	[2.03114]*	[1.82324]*
DBIRATE(-2)	[1.76392]*	[0.18159]	[-0.34820]	[-0.02709]	[-1.91030]*
INFLATION(-2)	[-2.92120]*	[-2.07762]*	[1.89033]*	[1.04920]	[2.65089]*
DLN_MIDDLE RANGE (-1)	[-0.35620]	[-1.90929]*	[-1.93442]*	[-0.86344]	[1.49350]
DLN_MIDDLE COURSE (-2)	[2.08707]*	[-2.01271]*	[0.40102]	[-1.38633]*	[-0.51723]
DLN_MIDDLE COURSE (-3)	[-1.58133]*	[0.72803]	[0.13084]	[0.40610]	[-0.63928]

Source: Eviews 10 Processing

The Vector Error Correction Model (VECM) estimation table above is the result of short-term VECM estimation. In this estimation, the researcher uses T-Table with a probability of 10% or 0.10 of 1.30621. If the t-count value is greater than the t-table value, then it can be said that the variable has a significant relationship.

In the short term, the exchange rate variable has a significant and positive effect on the Property, Real Estate & Building Construction Sector Stock Price Index in the second lag, which is 2.08707. This means that if the exchange rate variable increases by 1%, it will cause the Property, Real Estate & Building Construction Sector Stock Price Index variable to increase by 2.08707%.

The Inflation variable has a significant and negative effect on the Property, Real Estate & Building Construction Sector Stock Price Index in the second lag, which is 2.92120. This means that if the inflation variable increases by 1%, it will cause the Property, Real Estate & Building Construction Sector Stock Price Index variable to decrease by 2.92120%.

The BI Rate variable has a significant and negative effect on the Property, Real Estate & Building Construction Sector Stock Price Index in the first lag, which is 1.37382. This means that if the BI Rate variable increases by 1%, it will cause the Property, Real Estate & Building Construction Sector Stock Price Index variable to decrease by 1.37382%.

The BI Rate variable has a significant and positive effect on the Property, Real Estate & Building Construction Sector Stock Price Index in the second lag of 1.76392. This means that if the BI Rate variable increases by 1%, it will cause the Property, Real Estate & Building Construction Sector Stock Price Index variable to increase by 1.76392%.

The Exchange Rate variable has a significant and negative effect on the Property, Real Estate & Building Construction Sector Stock Price Index in the third lag of 1.58133. This means that if the Exchange Rate variable increases by 1%, it will cause the Property, Real Estate & Building Construction Sector Stock Price Index variable to decrease by 1.58133%.

GDP Growth, BI Rate, Inflation, and Exchange Rate. The changes are expressed in standard deviation (SD) units. The results of the Impulse Response Function (IRF) analysis can be seen in the following figure:

Impulse Response Function (IRF) image above shows that when there is a shock to the GDP Growth Rate, the Property, Real Estate & Building Construction Sector Stock Price Index will respond fluctuatively. In the second quarter, the Property, Real Estate & Building Construction Sector Stock Price Index responded positively. In the third to seventh quarters, it responded negatively, then responded positively again in the eighth to tenth quarters, and ended with a negative fluctuating response until the 40th quarter.

When there is a shock to the BI Rate, the Property, Real Estate & Building Construction Sector Stock Price Index will respond negatively until the third quarter. However, after that, it will respond positively fluctuating until the 40th quarter.

When there is a shock to Inflation, the Property, Real Estate & Building Construction Sector Stock Price Index will first respond positively until the third quarter. Furthermore, it will respond negatively with a value that tends to be stable until the end of the observation period.

When there is a shock to the exchange rate, the Property, Real Estate & Building Construction Sector Stock Price Index will respond negatively overall. The Property, Real Estate & Building Construction Sector Stock Price Index variable only responds positively to the exchange rate variable in the third quarter.

Forecast Error Variance Decomposition (FEVD)

The final step in processing the research data is to conduct a Forecast Error Variance Decomposition (FEVD) analysis. FEVD is a method used to separate the variation of a number of estimated variables into shock components, then the variance decomposition will provide information on the proportion or contribution of the movement of the shock influence on a variable to the shock of other variables in the current period and the future period.

In this study, FEVD was conducted to see the role of macroeconomic variables: GDP Growth Rate, BI Rate, Inflation, Middle Exchange Rate in explaining the variability of the Property, Real Estate & Building Construction Sector Stock Price Index over a period of 40 quarters (10 years). The researcher summarized the results of FEVD from each variable in periods 1, 5, 10, 15, 20, 25, 30, 35 and 40. The summary results of the Forecast Error Variance Decomposition (FEVD) test can be seen in the following table:

Table 8. Forecast Error Variance Decomposition (FEVD) Test Results

Period	DLN_IHS PROPERTY	GROWTH RATE GDP	DBIRATE	INFLATION	DLN_ CURRENCIES MIDDLE
1	100,0000	0.00000	0.000000	0.000000	0.000000
5	91.69931	5,193532	1.431310	1.053223	0.622623
10	89.13483	3.573512	5,206737	0.843333	1.241592
15	91.09087	2.958277	4,173204	0.776040	1.001611
20	90.94408	2.416250	4.866673	0.697325	1.075677
25	91.53994	2,165845	4.613937	0.673525	1.006757
30	91.57882	1.930116	4.813354	0.651138	1.026569
35	01.81238	1,800489	4.734895	0.642635	1.009599
40	91.90460	1,668390	4,793740	0.624782	1.008492

From the FEVD results on the Property, Real Estate & Building Construction Sector Stock Price Index, it can be seen that in the first quarter, the contribution to the variability of the Property, Real Estate & Building Construction Sector Stock Price Index was 100% from the index itself. This percentage then fluctuated until the end of the observation period. Then in the 4th quarter, the GDP growth rate was the variable that contributed the most to the variability of the Property, Real Estate & Building Construction Sector Stock Price Index, which was 5.505038%.

Other variables outside the GDP Growth Rate also contribute to the diversity of the Property, Real Estate & Building Construction Sector Stock Price Index with different values. The BI Rate variable is the second largest variable contributing to the diversity of the Property, Real Estate & Building Construction Sector Stock Price Index, which is 5.206737% in the 10th quarter.

Furthermore, the inflation and exchange rate variables play a small role in explaining the variability of the Property, Real Estate & Building Construction Sector Stock Price Index. The inflation variable only plays a role of 1.274224% in the 4th quarter and the middle exchange rate variable only plays a role of 1.241592% in the 10th quarter.

CONCLUSIONS AND RECOMMENDATIONS

1. Vector Error Correction Model (VECM) results :
 - a. The long-term GDP Growth Rate variable has a significant positive relationship to the Property, Real Estate & Building Construction Sector Stock Price Index variable, which is 242.1831. This means that if the GDP growth rate variable increases by 1%, it will cause the Property, Real Estate & Building Construction Sector Stock Price Index variable to increase by 242.1831%.
 - b. The BI Rate variable has a *F*-Statistic that is smaller than the *T*-Table, so it can be said that the BI Rate variable is not significant to the Property, Real Estate & Building Construction Sector Stock Price Index variable.
 - c. The long-term inflation variable has a significant negative relationship to the Property, Real Estate & Building Construction Sector Stock Price Index variable, which is 30.17060. This means that if the inflation variable increases by 1%, it will cause the Property, Real Estate & Building Construction Sector Stock Price Index variable to decrease by 30.17060%.
 - d. The exchange rate variable in the long term has a significant positive relationship to the Property, Real Estate & Building Construction Sector Stock Price Index variable, which is 4.929811. This means that if the middle exchange rate variable increases by 1%, it will cause the Property, Real Estate & Building Construction Sector Stock Price Index variable to increase by 4.929811%.

The results of data processing using the Vector Error Correction Model (VECM) above are in accordance with the hypothesis and theory that have been put forward by the author in Chapter 2 of this study, that there is a positive influence between the GDP growth rate and the exchange rate on the Property, Real Estate & Building Construction Sector Stock Price Index and there is a negative influence of the BI Rate and inflation on the Property, Real Estate & Building Construction Sector Stock Price Index.

2. According to the results of the Impulse Response Function (IRF):
 - a. When there is a shock to the GDP Growth Rate, the Property, Real Estate & Building Construction Sector Stock Price Index will respond fluctuatively. In the second quarter, the Property, Real Estate & Building Construction Sector Stock Price Index responded positively. In the third to seventh quarters, it responded negatively, then responded positively again in the eighth to tenth quarters, and ended with a negative fluctuating response until the 40th quarter.
 - b. When there is a shock to the BI Rate, the Property, Real Estate & Building Construction Sector Stock Price Index will respond negatively

- until the third quarter. However, after that, it will respond positively fluctuating until the 40th quarter.
- c. Real Estate & Building Construction Sector Stock Price Index will first respond positively until the third quarter. Furthermore, it will respond negatively with a value that tends to be stable until the end of the observation period.
 - d. When there is a shock to the exchange rate, the Property, Real Estate & Building Construction Sector Stock Price Index will respond negatively overall. The Property, Real Estate & Building Construction Sector Stock Price Index variable only responds positively to the exchange rate variable in the third quarter.
3. According to the results of the Forecast Error Variance Decomposition (FEVD), the contribution to the variability of the Property, Real Estate & Building Construction Sector Stock Price Index is 100% from the index itself. Then in the 4th quarter, the GDP growth rate was the variable that contributed the most to the variability of the Property, Real Estate & Building Construction Sector Stock Price Index, which was 5.505038%. The BI Rate variable was the second largest variable contributing to the variability of the Property, Real Estate & Building Construction Sector Stock Price Index, which was 5.206737% in the 10th quarter. Furthermore, the inflation variable only played a role of 1.274224% in the 4th quarter and the middle exchange rate variable only played a role of 1.241592% in the 10th quarter.

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