

Cointegration Analysis of Macro Economic Factors, Index FTSE, on the Indonesian Stock Exchange Period 2017-2022

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Abstract

This research was explain about analyzing and knowing the development of the global exchange stock price FTSE index by analyzing to the Indonesia's Stock Exchange (BEI) and to determine cointegration between FTSE 100, data Inflation, USD/IDR exchange Rates, and Interest Rate. Combined to IHSG. Quantitative research techniques were employed in this research. Data collection method was data from 5 years starting from 2017 to 2022 on a monthly basis. The sampling method is nonprobability sampling with a sampling technique, namely purposive sampling. The analysis was carried out using the Johansen Cointegration Test and VECM test which processed by Eviews 10 software. Results using *Granger Causality* Test, show that there are no significant short-term relationship between FTSE 100, Inflation, USD/IDR Exchange Rates, Interest Rate and Composite Stock Price Index (IHSG). Based on the Trace Test Critical Value > 0.05 which indicates that there is cointegration or a long-term relationship between several research variables. Then the Maximum Eigenvalue contains 4 Max-Eigen Statistics values > Critical Value = 0.05. These results show that the Maximum Eigenvalue Test also has the same results as the Trace Test, namely that there is cointegration between the research variables on long term. The short-term R-squared value of VECM is 0.881618, meaning that 88.16% of the variation proportion can be explained by FTSE, Inflation, Exchange Rates and Interest Rates. The remaining 11.84% can be explained by other variables outside the estimated model.

I. INTRODUCTION

A number of important issues and sentiments are currently being observed by many business observers in world exchange trading regarding the importance of data and important agendas that will occur related to Composite Stock Price Index (IHSG) trading and economic growth. where the predicted results are expected to be able to encourage Indonesia's economic and financial growth. IMF released its latest outlook Moderating Inflation and Steady Growth Open Path to Soft Landing. In their latest outlook, the IMF said the global economy would experience a 'soft landing' in 2024. [1] The IMF also raised its forecast for global economic growth higher, raising the outlook for the United States and China as the two largest economies in the world and citing a faster-than-expected decline in inflation. In the latest World Economic Outlook (WEO), growth this year will be around 3.1%, up 0.2 percentage points from the October estimate. Unexpected 'resilience' in developed and developing countries is the reason. The global growth projection for 2025 is unchanged, namely 3.2% in 2025. Despite the improvement, global growth is expected to remain below the historical average of 3.8% this year and next. The historical average for the 2000-2019 period is 3.8%. Lower growth due to the continued impact of rising interest rates, the withdrawal of government support related to the pandemic and still low levels of productivity.

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The IMF now estimates that the US economy will grow by 2.1 % , down slightly from the forecast of 2.5% in 2023. Meanwhile, China's economy is expected to achieve growth of 4.6 % this year. This is down from 5.2 % last year. For Indonesia, the IMF still maintains their projections. Indonesia's economy is estimated to grow 5.0 % in 2024 and 2025. The Financial Times Stock Exchange (FTSE) has again overhauled the list of stock constituents in the FTSE Global Equity Index. A number of shares listed on the Indonesian Stock Exchange are known to be candidates. [2] Through the September 2023 Annual Review report, it is explained that the index changes in the quarterly review will take effect on Monday, September 18 2023. Several shares listed on the Indonesian Stock Exchange are also included in the list. including PT Petrindo Jaya Kreasi Tbk (CUAN) PT Asuransi Tugu Pratama Indonesia Tbk. (TUGU) or Tugu Insurance, which is a subsidiary of PT Pertamina (Persero) and PT. Darma Henwa Tbk (DEWA) (Indonesian Stock Exchange, 2024). Advanced economies will experience inflation averaging 2.6%, down four-tenths of a percentage point from October projections, with inflation set to reach the central bank's target of 2% by 2025. In contrast, inflation will average 8.6%. 1% in emerging market countries and developing countries. economy in 2024, before falling to 6% in 2025

Indonesia's inflation achievement in 2023 will be maintained stable and under control within the target range of $3\% \pm 1$. The inflation achievement in 2023 was recorded at 2.61% (yoy) or decreased compared to the realization in 2022, which was 5.51% (yoy). [3] Furthermore, outside the period affected by the pandemic (2020-2021), realized inflation was the lowest since 2000. Inflation developments in December 2023 are influenced by movements in all inflation components.

The domestic inflation rate is quite under control even though it experienced an increase in November 2023. [4] General inflation in November 2023 was recorded at 2.86% on an annual basis, higher than the previous month's 2.56%. The increase in inflation was caused by the impact of El Nino which caused the prices of agricultural commodities such as red chilies, cayenne peppers and shallots to rise. This price spike followed rice which had previously become more expensive. IDR to USD exchange rate throughout 2023 is quite surprising to market players. This is because the rupiah almost touched the psychological level of IDR 16,000/US\$ in October.

Figure 1. Movement of USD/IDR exchange rate during 2023



Source: www.cnbcindonesia.com

The Financial Services Authority noted that throughout October 2023 (as of October 27) foreign investors had withdrawn funds worth IDR 6.37 trillion from the Indonesian capital market. Meanwhile, from the debt market, foreigners released up to IDR 13.63 trillion of Indonesian bonds throughout October 2023, which resulted in pressure on IDR . Clarity in the direction of monetary policy in developed countries has encouraged global financial market uncertainty to begin to ease. In this regard, capital flows have so far begun to return and reduce pressure on weakening exchange rates in emerging market countries, including Indonesia. The influx of foreign portfolio flows amidst attractive returns on domestic financial assets further strengthened the rupiah's position.

Many factor affecting to Indonesia Stock Exchange such as infolation, interest rate and exchange rate as a strong factor that will affect from macro economics, beside other factor that came from micro factors such as demand and supply. The obtain evidence of cointegration between stock market indices And various variable macroeconomics, including increase in oil prices (Tsoukalas, 2023) find proof strong exists connection between stock prices and exchange rates.

II. LITERATURE REVIEW

Capital Market

Offering and trading are fundamental things in the capital market as well as securities trading, securities issuing institutions and other related institutions. The source of funds can be received by the company by selling its shares to the market. [5] the public, government and private institutions can buy shares easily. One of the developments in new market opportunities can come from the capital market. where the share owner's profit is the dividend that can be distributed on the shares owned. Another function of trading in the capital market is equality in income. [6] Capital market integration is a measure that shows how far changes in stock prices in the capital market that occur in the reference market (market at a higher level) will cause changes in the follower market or between one capital market and another capital market. [7] The increasingly volatile and dynamic cross-border integration of capital markets creates real challenges for governance.

FTSE's relationship with IHSG.

Despite the economic crisis in the US, at the beginning In 2010 there was a debt crisis in Europe. One of European countries affected by the debt crisis that is England. The UK economy known as a Superpower since ancient times, in it was entering a gloomy period. [8] As a developed country The UK economy tends to have an impact on the economies of developing countries, one of them is Indonesia .Effect of other country economics condition will affect to indonesia's economic. Research from (I wayan Agus, 2015) conclude that FTSE index not effecting to Indonesian IHSG for the period September 2008-December 2013. Other research (Srikanth and Aparna, 2012) found that the FTSE100 had an effect on other countries' capital markets

Relationship between Inflation and IHSG.

Based on research [3] on inflation has no effect on IHSG, exchange rate have affected to IHSG, interest rates have a negative and significant effect on IHSG Activity inflation No influence change stock price. Other research (Matthew, 2021) The inflation rate had no effect on the IHSG. Research results from (Maharani, 2024) show that inflation, interest rates and money supply have a positive and significant effect on the composite stock price index. Inflation can result in a decline in consumer confidence in capital market conditions. Investors who are worried about capital market conditions usually choose to withdraw their funds. Furthermore, the effect of inflation on stock prices also decreased. Even though high inflation rates put pressure on stock prices, not all companies perform poorly when inflation occurs. Therefore, investors must be careful in making investment policies in periods of inflation

Exchange Rate with IHSG.

Research from [9] shows The results exchange rate variable has a single way relationship with the IHSG. Other research from [10] states any of two-way relationship or mutual influence between the IHSG and the value of the rupiah/US\$. The research results show that each endogenous variable is not stationary and has cointegration. The best model for modeling inflation, NTR and IHSG variables for 2010-2018 is the VECMX(2) model. Perception of model equation means that factors has a significantly positive influence on changes in NTR and a significantly negative influence on changes in IHSG .(Husana, 2022) Changes in exchange influence due to stock prices. this means, trading on the stock exchange will become increasingly sluggish, because the high value of the currency encourages investors to invest in the money market.

Interest Rate with IHSG

The interest rate is a measure of the investment profits that investors can obtain Interest rates can influence investor decisions to invest in shares so that it can cause increases and decreases Composite Stock Price Index. According to Tandelilin on [11] If there is an increase in ethnic groups Bank interest will be able to make investors move investments from shares to savings or deposits that have higher interest rates compared to owning shares higher risk. This will cause demand for shares to decrease in the long run a certain time so that it can cause the JCI movement to go down.

Hipotesis

Based on study theoretical And connection between variable Which has discussed in on, so hypothesis that has formulated in study This are as follows:

H0: There is no cointegration between FTSE , Inflation, Exchange Rate , Interest Rates with IHSG.

H1: There is cointegration between FTSE , Inflation, ExchangeRate , Interest Rates with IHSG.

III. METHODS

This research method uses quantitative research. The population in this study is the total stock prices on the IDX as seen through the Composite Stock Price Index (IHSG) during the period 2017-2022.

For a comprehensive analysis of financial market performance and related economic factors in Indonesia during the period January 2017 to December 2022, a total of 72 samples were carefully selected. The data used includes the closing value of JCI every month, FTSE stock exchange data, inflation rate measured by the national consumer price index published by Bank Indonesia, Bank Indonesia's monthly interest rate, and the USD / IDR exchange rate. Through consistent data analysis over a set period of time, it is expected to gain a deep understanding of market trends and the impact of economic variables on financial market activities in Indonesia.

Therefore the observation data is used purposive sample. VAR (Vector Autoregression) analysis is used because it is based on [12] it is said that this analysis treats all variables are endogenous (not differentiated independently or dependent). The sample selected in this research is *datatime series* Which form data inflation Indonesia, IDR Rupiah to USD , FTSE, Interest Rates And IHSG Which proxied. Secondary data in this research was obtained from www.investing.com , And www.bi.go.id . In study This there is a number of testing Which done that is Test Statistics Descriptive, Test stationarity, Test Long lag , Test *Granger Causality* , Test Cointegration, and Estimate VAR/VECM

IV. RESULTS

Test Statistics Descriptive

Descriptive statistics examples in a research study include the mean, median, maximum and minimum. Studies also frequently cite measures of dispersion including the standard deviation, variance, and range. These values describe a data set just as it is, so it is called descriptive statistics. [13].

Table 2. Results Test Statistics Descriptive

SBI	IDX	FTSE	INFLATION	SBI	USD
Mean	6098.322	3129.854	2.969861	4.506944	14252.26
Median	6037.290	3192.045	3.130000	4.375000	14257.50
Maximum	7228.910	3613.930	5.950000	6.000000	16300.00
Minimum	4538.930	2423.840	1.220000	3.500000	13321.00
Std. Dev.	618.0662	261.9906	1.134066	0.850613	609.3555
Skewness	-0.350847	-1.174520	0.443132	0.386550	0.676863
Kurtosis	2.981092	4.108388	2.931140	1.949320	4.039121
Jarque-Bera	1.478193	20.23953	2.370620	5.104841	8.737030
Probability	0.477545	0.000040	0.305651	0.077893	0.012670
Sum	439079.2	225349.5	213.8300	324.5000	1026163.
Sum Sq. Dev.	27122410	4873372.	91.31350	51.37153	26363302
Observations	72	72	72	72	72

Source : Data Calculation

Based on results Test Statistics Descriptive on table 1 can outlined the result as following:

- a. IHSG
 Based on Test Statistics Descriptive on variable IDX obtained amount observation as much 72 , mark *mean* as big as 6098.322 And mark *median* as big as 6037.290 . Then mark *maximum* as big as 7228.910 And mark *min* to 4538.930 . Mark *standards deviation* Which found interesting this is 618.0662 .
- b. FTSE
 Based on Test Statistics Descriptive on variable FTSE obtained amount observation as many as 72, value *The mean* is 3129.854 and *median value* is 3192.045 . Then assess *The max value* is 3613,930 and *min value* is 537,0000. The *std* value found in this test as big as 261.9906 .
- c. INFLATION

Based on Test Statistics Descriptive on variable INFL obtained amount observation as much 72, *mean* value is 2.969861 and the *median value* is 3.130000 . Then the *max value* is 5.950000 and the *min value* is 1.220000 . The *standard deviation* values found in testing this is 1.134066 .

d. INTEREST RATE (SBI)

Descriptive Statistical Test on the INTEREST RATE variable , the number of observations was obtained 72, mark *mean* as big as 4.506944 And mark *median* as big as 4.375000 . Then *max* as big as 6,000000 and a *min value* of 3,500000 . The *deviation* values found in testing This is 853.5855.

e. EXCHANGE RATE (USD)

Descriptive Statistics Test on the KURS variable, the number of observations was obtained 72, mark *mean* as big as 14252.26 And mark *median* as big as 14257.50 . Then mark *maximum* as big as 16300.00 and the *minimum value* is 13321.00 The *deviation* values is 609.3555

Test Stationary

Table 3. Results Test Stationarity

Results Test ADF On Level Levels		
Data	Probability ADF Test Statistics	Information
IHSG	0.4762	No Stationary
FTSE	0.1254	No Stationary
INFLATION	0.2711	No Stationary
INTEREST RATE	0.5144	No Stationary
EXCHANGE RATE	0.1254	No Stationary
Results Test ADF On Level 1st Difference		
Data	Probability ADF Test Statistics	Information
IHSG	0,000	Stationary
FTSE	0,000	Stationary
INFLATION	0,000	Stationary
INTEREST RATE	0,000	Stationary
EXCHANGE RATE	0,000	Stationary

Source: Processed data

Based on the ADF Test results in table 2, the results of all ADF Probability *Test values are obtained Statistics* $> \alpha = 0.05$. So it can be concluded that H_0 is not rejected, which means all the variables tested at the *level* it is not stationary so that the stationary test can be continued at the *first difference level* . Test results stationary *first differences* on table 2 shows all ADF Probability values *Test Statistics* $< \alpha = 0.05$ Which means H_0 is not rejected and data stationary on *first differences*.

Test Long Lag

Table 4. Results Test Long Lag

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1618.887	NA	1.62e+15	49.20871	49.37459	49.27425
1	-1274.124	626.8428	1.00e+11*	39.51890*	40.51420*	39.91219*
2	-1249.692	40.71953*	1.03e+11	39.53612	41.36084	40.25715
3	-1232.588	25.91540	1.36e+11	39.77539	42.42952	40.82416
4	-1210.858	29.63171	1.60e+11	39.87448	43.35803	41.25100
5	-1181.117	36.05028	1.55e+11	39.73080	44.04376	41.43506
6	-1157.793	24.73707	1.94e+11	39.78161	44.92398	41.81360

Source: Results processing data use Eviews 9.

Determining the optimal lag can be seen from the smallest AIC value. Based on test results The optimal *lag* in table 3 is the most optimal *lag with the smallest AIC value criteria is lag 2* (showed with signs star).

Test Granger Causality

The Granger test will show the relationship between variables. [4] If one variable causes another variable, that means that variable helps predict the future value of the other variable.

Tabel 5. Granger Causality Test

Null Hypothesis:	Obs	F-	
		Statistic	Prob.
FTSE does not Granger Cause IDX	72	1.47028	0.2295
IDX does not Granger Cause FTSE		2.30900	0.1333
INFLASI does not Granger Cause IDX	72	0.24236	0.6241
IDX does not Granger Cause INFLASI		14.8227	0.0003
SUKU_BUNGA does not Granger Cause IDX	72	1.63277	0.2057
IDX does not Granger Cause SUKU_BUNGA		10.8634	0.0016
USD does not Granger Cause IDX	72	0.12562	0.7241
IDX does not Granger Cause USD		4.73293	0.0331
INFLASI does not Granger Cause FTSE	72	0.26770	0.6066
FTSE does not Granger Cause INFLASI		4.44446	0.0387
SUKU_BUNGA does not Granger Cause FTSE	72	0.22201	0.6390
FTSE does not Granger Cause SUKU_BUNGA		5.74377	0.0193
USD does not Granger Cause FTSE	72	0.29334	0.5899
FTSE does not Granger Cause USD		2.08742	0.1531
SUKU_BUNGA does not Granger Cause INFLASI	72	2.72352	0.1035
INFLASI does not Granger Cause SUKU_BUNGA		18.9848	5.E-05
USD does not Granger Cause INFLASI	72	0.05559	0.8143
INFLASI does not Granger Cause USD		0.52035	0.4732
USD does not Granger Cause SUKU_BUNGA	72	9.74000	0.0026
SUKU_BUNGA does not Granger Cause USD		0.27997	0.5984

Source: Results Data Processing

Granger Causality Test in table 4, you can see the null hypothesis value for each There is no significant *prob* value $< \alpha = 0.05$ in the pair of stock indices with macroeconomic variables so there is no connection because consequence or connection each other influence between variable. Only hypothesis zero USD *does not Granger Cause* INTEREST RATES alone have a *prob* value $< \alpha = 0.05$ so USD own connection with INTEREST RATE whereas on the contrary hypothesis zero INTEREST RATE *does note GrangerCause* USD has a *prob* value $> \alpha = 0.05$, which means it does not have a cause and effect relationship so on to the hypothesis zero so there is connection One direction from USD to INTEREST RATE.

Test Cointegration

Table 6. Results Test Cointegration

Test Trace				
Hypothesized No. of CE(s)	Eigenvalues	Trace Statistics	0.05 CriticalValue	Prob.**
None *	0.472767	76.47639	69.81889	0.0133
At most 1	0.209385	32.30867	47.85613	0.5951
At most 2	0.106317	16.09756	29.79707	0.7054
At most 3	0.066234	8.341685	15.49471	0.4296
At most 4	0.051018	3.613185	3.841466	0.0573
Uji Maximum Eigenvalue				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 CriticalValue	Prob.**
None *	0.472767	44.16772	33.87687	0.0021
At most 1	0.209385	16.21111	27.58434	0.6478

At most 2	0.106317	7.755878	21.13162	0.9180
At most 3	0.066234	4.728500	14.26460	0.7756
At most 4	0.051018	3.613185	3.841466	0.0573

Source: Results processing data

Trace Test in table 5, there are 4 *Trace Statistics* values > *Critical Value* = 0.05 indicated there is cointegration or connection period long in between a number of variable study. Then the *Maximum Eigenvalue Test* in table 5 also contains 4 *Max-Eigen Statistics* values > *Critical Value* = 0.05. These results show that the *Maximum Eigenvalue Test* also has the same results like Test *Trace* that there is cointegration in between variable – variable study.

ESTIMATE VAR/VECM

Vector autoregression (VAR) is a sophisticated statistical model used to measure and analyze the relationship between several variables over time. [6] It is a stochastic process model, meaning it models randomness in the form of data points that can be observed at different times.

Table 7 . Results Test VECM

	IDX	FTSE	INFLASI	SUKU_BUN GA	USD
IDX(-1)	1.148309 (0.16624) [6.90773]	0.209857 (0.09315) [2.25288]	0.000161 (0.00022) [0.72495]	0.000165 (9.0E-05) [1.83015]	-0.245516 (0.26661) [-0.92087]
IDX(-2)	-0.256796 (0.18632) [-1.37826]	-0.124164 (0.10440) [-1.18926]	0.000128 (0.00025) [0.51448]	-0.000247 (0.00010) [-2.44093]	0.503648 (0.29882) [1.68544]
FTSE(-1)	-0.055118 (0.30794) [-0.17899]	0.446640 (0.17255) [2.58840]	-4.48E-05 (0.00041) [-0.10914]	0.000143 (0.00017) [0.85382]	0.029693 (0.49388) [0.06012]
FTSE(-2)	-0.007706 (0.28679) [-0.02687]	0.217283 (0.16070) [1.35209]	-2.77E-05 (0.00038) [-0.07253]	0.000189 (0.00016) [1.21069]	-0.403658 (0.45996) [-0.87759]
INFLASI(-1)	121.2199 (95.8890) [1.26417]	-32.93533 (53.7317) [-0.61296]	0.866906 (0.12783) [6.78149]	0.064158 (0.05210) [1.23156]	-9.223461 (153.790) [-0.05997]
INFLASI(-2)	-123.7642 (97.8812) [-1.26443]	35.83887 (54.8481) [0.65342]	0.081786 (0.13049) [0.62676]	-0.026182 (0.05318) [-0.49235]	3.246807 (156.985) [0.02068]
SUKU_BUNGA(-1)	128.0210 (207.949) [0.61564]	132.9901 (116.525) [1.14130]	-0.006479 (0.27723) [-0.02337]	1.341829 (0.11298) [11.8771]	274.2243 (333.515) [0.82222]
SUKU_BUNGA(-2)	-153.0478 (202.262) [-0.75668]	-134.1932 (113.338) [-1.18401]	-0.035461 (0.26964) [-0.13151]	-0.389691 (0.10989) [-3.54631]	-289.0795 (324.394) [-0.89114]
USD(-1)	0.016337 (0.11415) [0.14311]	-0.010217 (0.06397) [-0.15973]	2.35E-06 (0.00015) [0.01545]	0.000167 (6.2E-05) [2.68881]	0.606851 (0.18308) [3.31464]

USD(-2)	0.000773 (0.10656) [0.00725]	-0.075900 (0.05971) [-1.27114]	-2.72E-05 (0.00014) [-0.19122]	-2.18E-05 (5.8E-05) [-0.37601]	0.073535 (0.17090) [0.43028]
C	744.1227 (1446.10) [0.51457]	1749.987 (810.327) [2.15961]	-0.812192 (1.92786) [-0.42129]	-2.499443 (0.78565) [-3.18138]	4277.392 (2319.30) [1.84426]
R-squared	0.881618	0.802093	0.939630	0.982340	0.679976
Adj. R-squared	0.861553	0.768550	0.929398	0.979346	0.625734
F-statistic	43.93863	23.91202	91.83096	328.1807	12.53610
Log likelihood	-473.3894	-432.8463	-9.974519	52.86165	-506.4572

Based on the F-statistic value = 43.93863, it has a bigger value than F-table = 2.34. These means that are short-term relationship between FTSE, Inflation, Interest Rate and Exchange Rate to IHSG during period observation. Mark R-squared period shortVECM is 0.881618, meaning that 88.16 % of the variation proportion can be explained by FTSE, Inflation, Exchange Rates and Interest Rates to IHSG . The rest as big as 11.84% % can explained by variable other in outside model Which estimated.

V. CONCLUSIONS

The results of this research are available connection cointegration between FTSE , Inflation, Interest Rates and Mark Swap with IHSG. Connection cointegration Between This research variable has answered the first problem formulation that was formulated in study that is cointegration between FTSE , Inflation, Exchange Rates and Interest Rates with IHSG and also rejects the null hypothesis from this research which states that there are cointegration between FTSE , Inflation, Exchange Rates and Interest Rates, with IHSG, but in the short term there is no relationship between these variables. However, the results of this research actually have different results from what (Suryanta, 2011) found No exists cointegration relationship between country ASEAN 4.

Apart from that, this research also found that inflation has a cointegration relationship with Then it was also found that inflation and IHSG had a negative relationship. This research also found that there was no short-term relationship between inflation and IHSG and the results are also different research by [14]which find there is a short-term relationship between inflation and *Common Stocks* . The results of this research show that it is not only stock indices in other countries (FTSE) which influences the movement of the domestic stock index (IHSG). There are several factors others such as inflation and influencing exchange rates JCI movement. So that investors expected can notice circumstances macroeconomics something country before do investment.

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