THE EFFECT OF MACROECONOMIC FACTORS ON THE JAKARTA COMPOSITE INDEX IN INDONESIA 2013-2020 PERIOD

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ABSTRACT

This study examines the influence of macroeconomic factors on stock prices in Indonesia in the range of 2013 to 2020. The macroeconomic factors in question are inflation, interest rates, exchange rates, money supply, world oil prices, and the population. The sampling technique used is a saturated sample so that the entire population is used as the unit of analysis. The use of data then focuses more on secondary data obtained through the Indonesia Stock Exchange (IDX). In the process, data analysis is carried out through time-series data regression analysis using Eviews 9. Software. This study then shows the results that the macroeconomic factors used have a partial effect on stock prices. The significant effect is shown by inflation and world oil prices, while the insignificant effect is shown by interest rates, exchange rates, and the money supply. This study also shows that the five macroeconomic factors together have a significant and simultaneous influence on stock prices.

Keywords: Inflation, Interest Rate, Exchange Rate, Money Supply, Oil Price, Stock Price

INTRODUCTION

Arbitrage Price Theory (APT) and Capital Asset Pricing Model (CAPM) are two different models. In contrast to CAPM, which only involves one factor and beta, APT involves more factors, including non-company factors. This situation causes the APT to perform better than the CAPM in describing the expected return on risky assets. Several studies have shown that the APT model is superior in analyzing risky assets in the US stock market (Chen, 1983; Chen, Roll & Ross, 1986; Connor & Korajczyk, 1988). Consequently, many academics have begun to believe that stock prices are related to macroeconomic and financial factors.

Some scholars have studied the relationship between macroeconomic factors and stock prices since the 1970s in many developed countries, such as the United States and European Union countries (Fama, 1981; Mukherjee & Naka, 1995; Cheung & Ng, 1998; Nasseh & Strauss, 2000; Chaudhuri & Smile, 2004). The macroeconomic variables in question are interest rates, inflation, money supply, gross domestic product, changes in international capital exchange rates, and political and economic shocks (Afonso & Sousa, 2012). However, the APT pattern in emerging market countries shows inconsistencies. One of them is Indonesia, which shows a pattern of inconsistency or volatility between the Jakarta Composite Index (JCI) and macroeconomic factors.

Then the inconsistent pattern of macroeconomic influence on stock prices can be seen from several studies that analyze the multifactor effect of macroeconomics on stock prices in several emerging market countries, including: Research in Bangladesh, India and Pakistan conducted by Rahman & Uddin (2009) stated that there was no cointegration relationship between stock prices

and exchange rates, while Wongbangpo & Sharma (2002) conducted research in Indonesia, Malaysia, Philippines, Singapore, and Thailand. States, money supply, interest rates, and exchange rates, are influential factors. Coleman & Tettey (2008) in Ghana stated that loan interest rates, inflation, money supply, and exchange rates were influential factors. Meanwhile, research conducted by Naik & Puja (2012) in India in the period 1994-2011 & Shahid Ahmed (2008); Robert (2008) in Brazil, Russia, India and China in the period 1999-2006 showed that there was no influence between the value of exchange against stock prices.
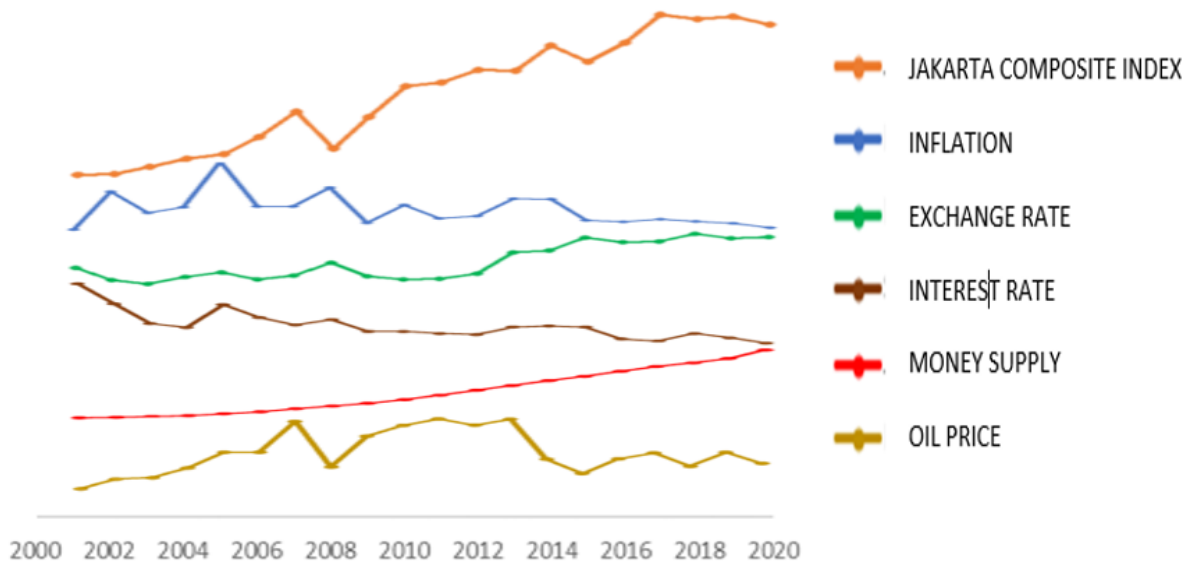

FIGURE 1
THE PATTERN OF VOLATILITY OF THE JAKARTA COMPOSITE INDEX MOVEMENT AND MACROECONOMIC FACTORS IN INDONESIAN 2001 TO 2020

Figure 1 shows the pattern of inconsistencies between the JCI and several macroeconomic factors in Indonesia. In the figure, it is apparent that the JCI is not in line with the inflation rate. The JCI increase initiated an inflation decrease in 2005-2006. Meanwhile, the JCI decline triggered an increase in inflation in 2007-2008. Both then experienced a decline simultaneously in 2014-2015. We can all observe the pattern of inconsistency from the relationship between the JCI and the exchange rate. In this context, the JCI decreased while the exchange rate increased in 2007-2008, the JCI increased while the exchange rate declined in 2009-2010, and the JCI increased while the exchange rate moved sideways in 2016-2017.

Furthermore, erratic movements are also visible in the JCI pattern and interest rates. In 2001-2004, interest rates decreased while the JCI increased. After that, the years 2005-2006 exhibited an upward trend in the JCI and interest rates, while 2013-2015 revealed an increase in the JCI and sideways movement of interest rates. Nevertheless, the JCI possesses the same pattern of movement as the money supply and oil prices.

This paper then aims to find out the macroeconomic description and the JCI in Indonesia and the influence of macroeconomic factors on the JCI, either partially or simultaneously. The macroeconomic factors focus on inflation, interest rates, exchange rates, money supply, and world oil prices. The period that is the focus of the research is about eight years, starting from 2013 to 2020.

LITERATURE REVIEW & HYPOTHESES

Developed by Ross (1976), Arbitrage Pricing Theory (APT) proposes a multi-factor approach to explain asset prices through Arbitrage Pricing Theory (APT). This APT model is based on the law of one price (law of one price) where the same asset cannot be sold at different prices to earn arbitrage profits (buying low-priced assets, at the same time selling at a higher price so as to earn a risk-free profit). Therefore, if there is a difference between the purchase price of the asset and the selling price of the asset, the market will immediately return the price of the asset to its equilibrium point. The APT model assumes that the return on securities is a linear function of various macroeconomic factors and their sensitivity to change. These factors are denoted by factor-specific coefficients that measure the sensitivity of assets to each factor. APT is a different approach to pricing assets and it derives its basis from the law of one price.

Ross (1976) adds that the patron will sell the stock if the expected risk premium on the stock is lower. The patron will buy the stock if the risk premium is higher, until both sides of the equation are balanced. Investors can get this formula back into balance by using the term arbitrage.

This APT theory explains the price at which mispriced assets are expected to be so. It is often seen as an alternative to the Capital Asset Pricing Model (CAPM), as APT has more flexible assumption requirements. While the CAPM formula requires the market's expected rate of return, the APT uses the expected risky asset return and the principal risk of a number of macro-economic factors. Arbitration uses the Arbitrage Pricing Theory model to benefit by taking advantage of mispriced securities (Zoheir et al., 2015). A mispriced securities will have a price different from the price theoretically predicted by the model. By taking a short position on overpriced (overvalued) securities, while simultaneously taking a buy position on a portfolio that uses APT calculations, arbitrageurs are in a position to take theoretically risk-free profits.

Arbitrage Pricing Theory is based on five basic assumptions, namely (Akpo, Hassan & Esuike, 2015) the capital market is in a perfectly competitive condition, 2) investors have the same expectation of return on each stock, 3) this return expectation comes from of a number of (n) factors that influence linearly, 4) the loading factor accommodates all the systematic risks of the analyzed assets, so that the error terms are not correlated with each other cross sectional or time series, 5) the number of general factors (systematic) is much less when compared to with the number of assets analyzed. From the assumption that investors believe that the return on securities will be determined by a factorial model with risk factors.

According to Azeez & Yonezawa (2003) in the APT model there is no formal theory to be able to choose the economic factors that are included in the APT model. Meanwhile, according to Berry, et al., (1988) correct choices in determining groups of macroeconomic variables include: a) Macroeconomic variables can be made on an empirical basis, b) Factors must adequately explain asset returns, c) Macroeconomic variables must pass the necessary statistical tests to qualify as appropriate APT factors, d) The actual return on assets must show reasonable sensitivity in this actual factor, and e) The factors must have a non-zero value in the APT model.

In addition, Berry, et al., (1988) make a good and simple instruction if the type of variable can qualify as a risk factor in the Arbitrage Pricing Theory Model. The risk factors described by Berry et al must have three characteristics, namely: a) In each initial period, the factors that enter the APT must be completely unpredictable on the market, b) Each APT factor must have a broad influence on the stock, and c) Relevant factors must affect the expected return *i.e.,* they must have a non-zero price.

The use of APT theory in research is based on the APT explanation which states that there are at least 3 or 4 factors that influence the price development of securities. This shows that the APT theory encourages the development of research based on variables or factors that are thought to influence changes in a security. These factors can be seen from the company's fundamental

performance, stock market performance, or market and economic conditions (Weston & Copeland, 1997). Based on this explanation, this study focuses on four macroeconomic factors regarding their effect on stock prices. Based on these considerations, the APT theory is more used than the CAPM theory.

Effect of Inflation (X1) on Stock Prices (Y)

Inflation is an increase in prices that occurs as a whole and continuously. This shift can be a negative signal for shareholders because it can affect the company's stock price. Research by Abdullah & Hayworth (1993); Mahpudin (2020) shows that inflation affects stock prices positively. Meanwhile, Kim (2003); Sabilla & Kurniasih (2020) show that inflation harms stock prices. This research then proposes the following hypothesis:

H1   Inflation has a significant effect on stock prices.

The Effect of Interest Rates (X2) on Stock Prices (Y)

Historically, Bank Indonesia tends to increase interest rates when inflation occurs. This action can increase the company's burden because it is related to bank debt and reduce its profit level, resulting in depressed stock prices. Research conducted by Abdullah & Hayworth (1993); Sujai (2001); Chasanah (2007) show that interest rates have a positive effect on stock returns. However, Alam & Uddin (2009), Yogaswari, Nugroho & Astuti (2012); Amarasinghe, (2015) state that stock prices are negatively affected by changes in interest rates. Thus, the hypothesis proposed in this study is:

H2   Interest rates have a significant effect on stock prices.

Effect of Exchange Rate (X3) on Stock Price (Y)

The exchange rate is the value of a currency against another currency (Salvatore, 1997). Theoretically, the value of the unit of domestic currency per foreign currency will have a positive relationship to stock prices. Sabilla & Kurniasih (2020); Mahpudin (2020) emphasized that the exchange rate has a significant effect in a positive direction on the stock price index. However, the research conducted by Wahyudi, et al., (2017) explicates that the exchange rate affects stock prices in a negative direction. This research then carries out the hypothesis that:

H3   The exchange rate has a significant effect on stock prices.

The Influence of the Money Supply (X4) on the Stock Price (Y)

The supply of money in circulation certainly has a particular impact on the national economy. Historically, when a country experienced a very rapid increase in the money supply, the country experienced hyperinflation. This condition then also affects the stock price. Abdullah & Hayworth (2001) show that money growth in a country has affected stock prices in a positive direction. This argument is not in line with Sujai (2001), which states that the money supply hurts stock prices. Meanwhile, Ibrahim & Yusoff (2001) show that the money supply and stock prices have a positive relationship in the short term and a negative relationship in the long run. This study then carries out the hypothesis that:

H4   The money supply has a significant effect on stock prices.

The Effect of World Oil Prices (X5) on Stock Prices (Y)

The decline in oil prices can have both positive and negative impacts on several stock sectors. Companies operating in the consumer goods and transportation sectors usually feel a positive impact. Meanwhile, oil and gas companies, commodities, Crude Palm Oil (CPO), and biodiesel suffer from the negative impact. Research by Masih, Peters & De Mello (2011); Ray (2012); Sabilla & Kurniasih (2012) shows that oil prices have a significant positive effect on stock prices. Meanwhile, Salisu & Isah (2017) show that stock prices of oil exporting and importing countries respond asymmetrically to changes in oil prices. Therefore, this study carries the hypothesis that:

H5   World oil prices have a significant influence on stock prices.

Because five hypotheses have a similar direction, we propose an additional hypothesis that:

H6   Macroeconomic factors (inflation, interest rates, exchange rates, money supply, and oil prices) together have a significant influence on stock prices.

RESEARCH METHODS

This study applies a quantitative method with a descriptive and verification design. The descriptive method aims to determine facts with the proper interpretation and accurately describe the nature of certain phenomena (Nazir, 2003). Meanwhile, verification or causality research intends to test the causal relationship between the independent and dependent variables. This study then uses an associative descriptive approach to present a structured, factual, accurate picture of facts and relationships between variables. This approach aims to identify factors in all economic sectors listed on the Indonesia Stock Exchange (IDX).

The population used is all companies listed on the IDX. This research also examines inflation, exchange rates, interest rates, money supply, and world oil prices obtained from the official IDX website. Due to using the saturated sample technique, this study uses the entire population as the unit of analysis. The research period then lasted for eight years, starting from 2013 to 2020.

In conducting the analysis, this study uses a time-series data regression model using Eviews 9 software. Before that, we carried out descriptive statistical analysis to understand macroeconomic factors and stock prices. We also conducted a stationarity test to examine whether the data used is stationary or not. We then tested the hypothesis using regression analysis to determine macroeconomic factors' partial and simultaneous effect on stock prices. We applied the t-test to examine the partial effect, while the F-test tested the simultaneous effect.

The multiple regression equation used is as follows:

$$JCI = \alpha + \beta_1 INF + \beta_2 ER + \beta_3 IR + \beta_4 MS + \beta_5 OP + \varepsilon \qquad (1)$$

Noted that JCI=Jakarta Composite Index; INF=Inflationi (X1); ER=Exchange Rate (X2); IR=Interest Rate (X3); MS=Money Supply (X4); OP=Oil Price (X5); ε=error.

RESULTS

An overview of macroeconomic factors and stock prices is noticeable through descriptive statistical analysis results in the following table 1.

Table 1 DESCRIPTIVE STATISTICS					
	N	**Minimum**	**Maximum**	**Mean**	**Std Dev.**
Inflation	96	1.320000	8.790000	4.421250	1.989826
Interest Rate	96	3.750000	3.750000	5.885417	1.291631
Exchange Rate	96	9667.000	16367.01	13206.99	1371.515
Money Supply	96	3268789	6900049.	4934760.	988680.6
Oil Price	96	18.84000	107.6500	61.94354	21.90776
IHSG	96	4195.090	6605.530	5359.697	666.2094

Furthermore, we carried out the stationarity test to see whether the time series data used were stationary or not. This data can be stationary if the average value and variance do not change systematically within a certain period. We conducted the stationarity test using a unit root test at the first different levels. We chose these levels because, at the level unit root test, the probability values of X and Y exceeded 0.05, so they were not stationary and had a tendency to spurious regression. Stationarity test results are evident in table 2.

Tabel 2 STATIONARITY TEST		
	Prob.	**Lag**
Inflation	0.0000	1
Interest Rate	0.0000	0
Exchange Rate	0.0000	0
Money Supply	0.0001	0
Oil Price	0.0000	0
IHSG	0.0000	0

In table 2, it is evident that the variables of inflation (X1), interest rates (X2), exchange rates (X3), money supply (X4), oil prices (X5), and stock prices (Y) have probability values below 0.05. This figure indicates a long-term relationship between variables X and Y. Therefore, it is necessary to carry out regression analysis by performing a partial test or t-test to see the nature of the relationship between variables X and Y. The results of the t-test are noticeable in table 3.

Table 3 T-TEST OF MACROECONOMIC FACTORS AND STOCK PRICE				
	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
Inflation	-107.9327	53.44499	-2.019510	0.0464
Interest Rate	-37.18269	76.47927	-0.486180	0.6280
Exchange Rate	0.053884	0.104687	0.514713	0.6080
Money Supply	0.000282	0.000178	1.589360	0.1155
Oil Price	10.68949	3.945878	2.709026	0.0081

Table 3 shows that the inflation variable (X1) has a negative coefficient value and a probability of 0.0464<0.05. This figure means that inflation has a negative and significant effect on stock prices. Therefore, the first hypothesis can be proven true. Furthermore, the interest rate variable (X2) has a negative coefficient value, but the probability is 0.6280>0.05. The effect of interest rates on stock prices is then negative and insignificant.

Meanwhile, the exchange rate variable (X3) has a positive coefficient value with a probability of 0.6080>0.05, with a positive and insignificant effect. The money supply variable (X4)

also displays a positive coefficient and probability of 0.1155>0.5. This circumstance causes the money supply to have a positive and insignificant effect on stock prices. The calculation of the three variables (X2, X3, X4) shows that H2, H3, and H4 cannot be proven. Furthermore, the oil price variable (X5) has a positive coefficient value with a probability of 0.0081<0.05, which holds a positive and significant effect on stock prices. This calculation shows that H5 is verifiable.

In order to determine whether there is a simultaneous effect between all variables X and Y, we conducted a simultaneous test or F test. The results of these tests are present in the following table 4.

Table 4
F-TEST OF MACROECONOMIC FACTORS AND STOCK PRICE

R-Squared	Adjusted R-squared	F-statistic	Prob(F-statistic)
0.439661	0.408531	14.12340	0.000000

In table 4, it is apparent that the probability value of the F-statistic is 0.000000<0.05. Therefore, the five macroeconomic variables simultaneously have a significant and simultaneous influence on stock prices. The adjusted R-squared value also shows the number 0.408531 or 40.8%, which means that the influence of macroeconomic variables on stock prices is quite good. Thus, H6 can be proven true through this research.

DISCUSSION

The results showed that not all macroeconomic factors have a partial influence on stock prices. In this context, only inflation and world oil prices have a significant effect on stock prices. Inflation has a negative effect, while oil prices have a positive effect. These results follow research conducted by Kim (2003) that inflation affects stock prices negatively. In addition, Ray (2012) also shows that oil prices have a significant effect and positively affect stock prices.

However, this study concludes that interest rates, exchange rates, and the money supply do not significantly affect stock prices. This conclusion is per the research results by Baramuli (2009), which reveals that interest rates do not affect stock returns. Wahyudi, et al., (2017) also state that stock prices are not significantly affected by currency exchange rates. Research by Baranidharan & Dhivya (2020) also shows that the money supply has no significant effect on stock prices. This figure is in line with Mahpudin's research (2020) which results that the money supply has no long-term and short-term effect on stock prices.

Indeed, not all macroeconomic factors have a significant influence on stock prices. However, a number of these factors simultaneously have a significant and simultaneous influence on stock prices. The adjusted R-square value of 40.8% supports the results, which means that the overall effect of macroeconomic factors on stock prices is quite good.

CONCLUSION

This study shows that, partially, macroeconomic factors significantly influence stock prices or IHSG in Indonesia in the range of 2013 to 2020. On the one hand, inflation significantly affected stock prices are in a negative direction and world oil prices in a positive direction. On the other hand, the effect of interest rates, exchange rates, and the money supply on stock prices proved insignificant. However, the results also show that the five macroeconomic factors (inflation, interest rates, exchange rates, money supply, and oil prices) have a significant and simultaneous influence on stock prices.

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