

The Movement of Indonesia's Foreign Exchange Rates and Other Macroeconomic Variables to its Stock Market Volatility in a Pandemic Setting

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Abstrak

Tulisan ini bertujuan untuk mengkaji pengaruh nilai tukar mata uang asing terhadap indeks saham gabungan Indonesia, IHSG. Untuk menyempurnakan analisis, beberapa variabel makroekonomi lainnya seperti suku bunga, harga minyak, harga emas, serta tingkat inflasi juga ditambahkan seperti yang dikemukakan oleh penelitian sebelumnya. Penambahan kasus infeksi baru COVID-19 sebagai variabel moderasi untuk menguji apakah dapat memperkuat atau memperlemah korelasi masing-masing variabel makroekonomi yang diuji terhadap pasar saham. Parameter penelitian ini secara khusus difokuskan di Indonesia untuk melengkapi kekurangan penelitian yang dilakukan untuk topik yang sama dan/atau dalam setting yang sama. Studi ini menemukan semua variabel makroekonomi yang diuji dalam analisis secara bersamaan mempengaruhi indeks pasar saham Indonesia. Ketika masing-masing makroekonomi diuji secara terpisah, hasil pengujian menemukan bahwa meskipun arah dampaknya bervariasi, semua variabel kecuali harga emas ditemukan memiliki pengaruh yang signifikan terhadap pasar saham di Indonesia. Variabel moderasi, COVID-19, juga ditemukan memiliki pengaruh penting dalam mendukung dampak semua korelasi yang diuji kecuali dalam moderasi untuk nilai tukar dan harga minyak.

Kata kunci: Nilai tukar, variabel makroekonomi, COVID-19, IHSG.

Abstract

This paper aims to examine the impact of foreign exchange rates on Indonesia's composite stock index, the JKSE. To perfect the analysis, several other macroeconomic variables such as interest rates, oil prices, gold prices, as well as inflation rates were also added as proposed by preceding research. COVID-19 new infection cases were added as a moderating variable to test whether it can strengthen or weaken the correlation of each macroeconomic variable tested against the stock market. The parameter of this study is specifically focused on Indonesia to complete the lack of sufficient research conducted for the same topic and/or in the same setting. The study found all the macroeconomic variables tested in the analysis concurrently influence Indonesia's stock market index. When each macroeconomic was tested separately, the test results found that although the direction of the impact varies, all the variables except for gold price were found to have a significant impact on the stock market in Indonesia. The moderating variable, COVID-19, was also found to have a notable influence on substantiating the impact of all the correlations tested except in moderating for exchange rates and oil price.

Keywords : Exchange rates, macroeconomic variables, COVID-19, JKSE.

INTRODUCTION

Developing countries such as Indonesia struggle with its economical spread [1]. Data obtained from The World Bank shows that the stock market capitalization of Indonesia takes up roughly 46.87% of the country's economy, hence it is evident that studying the

stock market and its trends play a vital role in boosting Indonesia's economic growth. Several studies have proven foreign exchange rates to have significant correlations to stock indices [2]. A study conducted by Habibi & Lee (2019) in 7 different countries, namely Canada, Germany, Italy, France, the UK, the US, and Japan,

concluded slightly different results for each country – although all led to the finding that there was a significant correlation connecting the movement of rates of foreign exchange to stock prices in those G7 countries. Furthermore, Arthanari (2018) cited in his research that investors in less technologically advanced countries tend to invest in the stock market whenever a country's currency value depreciates – in hopes of obtaining higher returns and taking advantage of the short term fluctuation which happens more often than not in less developed countries; Arthanari (2018) mentioned that this habit causes the demand in the stock market to rise when foreign exchange markets fall – drafting an asymmetric graph on the impact of exchange rates to the stock market.

Some experts, however, argue that there is more than meets the eye; a study done by Hassani (2014) cites that along with foreign exchange rates, other macroeconomic considerations, for instance, interest rates and inflation rates also play a part in directly impacting stock market indices. Another study conducted by Mechri, et al. (2019) studying the influence of exchange rates on a country's stock returns found that gold prices and oil prices, along with interest rates and inflation rates are other macroeconomic factors that move the stock returns; other than exchange rates. The study of how much each macroeconomic variable contributes to the stock market indices varies between almost every researcher in every country Habibi & Lee (2019). In addition, newer research has established shreds of evidence wherein the COVID-19 pandemic from early 2020 has had significant corollaries to all these macroeconomic variables; which consequently affects the stock market [7].

In addition, stock prices have always reacted to large-scale global disasters over the years – as mentioned by Seetharam (2015), global disasters give a certain sense of uncertainty among investors and can be one of the biggest sources of the plummeting of stock markets. Another research by Baker & Bloom (2013) purposefully studied a country's macroeconomic variables' impact on its stock market – in various exogenous shock settings; these exogenous shocks as defined by Baker & Bloom (2013) included terrorist attacks, revolutions, political incidents,

as well as natural disasters. The study done by Baker & Bloom (2013) concluded that although a country's macroeconomic variables affect the stock market greatly, in a setting where investors face uncertainty after natural disasters; the impact is measurably inconsistent.

The period of this study about the impact of exchange rates as well as other macroeconomic variables is during the outbreak of a SARS-CoV-2 pandemic; also known as COVID-19. The first infected case of the COVID-19 pandemic outbreak emerged in December 2019 in Wuhan, China. Although the first reported case only made its way to Indonesia by March 02, 2020 [10]. Devi et al. (2020) cited that the COVID-19 pandemic undeniably affects the country's economic performance in an unfavorable way – slowing the country's economy to a crawl – which in consequence, puts pressure on the Indonesia stock exchange and its financial performance. Amidst the COVID-19 outbreak, country leaders have been implementing movement control orders in hopes of slowing down the growth of the pandemic, people's incomes, as well as the country's economy, have taken a huge toll because people are not leaving their houses – people not leaving their houses means little to no economy running [11]. However, that isn't always the case, with the fall of several economic sectors following the pandemic, some other sectors such as healthcare, IT, as well as basic food commodities, in contrast, generated higher returns since the pandemic outbreak [12].

COVID-19 isn't the only global disaster that has affected a country's economic performance [11], the SARS outbreak in 2002 which around 8089 infected cases and approximately 700 death cases worldwide, caused a 1.9% fall in Indonesia IDX Composite (Knobler et al., 2004). However, the following year in 2003, the first Avian Influenza case was reported in Indonesia, which then spread to 31 provinces and 293 cities in Indonesia; that outbreak contrastingly generated an abnormal rise in stock returns of 38.29% [14]. Later in 2009, the Indonesia stock exchange transactions sharply ceased from what was then Rp. 6,4 billion, dropped to a steep 60% fall to Rp. 2,39 billion from the approximate 150,000 cases of H1N1 Swine Flu that were reported.

There is a pronounced pattern wherein whenever there is a large-scale movement restriction, the stock returns of a country will inevitably move – despite whether it is a positive or a negative correlation, the interdependence is apparent. The findings of previous research regarding the consequence of rates of foreign exchange to the stock market, in addition to the codependency of a country's macroeconomic variables, as well as the urgency in the recent COVID-19 pandemic outbreak prompted the exigency for this study.

METHOD

The study period of this research starts from the first reported case in Indonesia – using daily data specifically from the first infected case of COVID-19 in Indonesia, which is March 02, 2020 – February 28, 2022 – this provides the research with 729 data samples. The dependent variable which is the stock market index that is being used is Indonesia's Stock Composite Index (JKSE) – more specifically the open price of JKSE, while the exchange rate being employed is the middle rate of IDR to USD which is calculated by adding the selling price and buying price – then dividing it by two to derive its average middle rate. The interest rates are numbers from the BI-7 Day Reverse Repo Rate because the B1-7 Day Reverse Repo Rate is the most used reference in setting bank interest rates, whereas the gold price used is USA's gold price converted to USD. The oil price used in this research is the Brent oil price of Europe – denominated by DCOILBRENTU, in USD. Exchange rates, JKSE, oil price, and gold price on non-trading days such as public holidays and weekends will follow the price on the previous day the non-trading day.

In this study, all of the data are gathered and collected from official sources; wherein exchange rates, inflation rates, and interest rates are all obtained from Bank Indonesia's official website, <https://www.bi.go.id>. Gold price and stock market index are obtained from Yahoo Finance

through its official website <https://finance.yahoo.com>, the oil price is obtained from The Fred through its official website <https://fred.stlouisfed.org>. Lastly, the COVID-19 number of cases is obtained from Indonesia's official COVID-19 data site, <https://covid19.go.id>

A quantitative approach is used in this research. This study utilizes time-series data to be analyzed to study data changes that can be influenced by time or previous observations. To draft a model that is appropriate for forecasting data, a few stages of the process in time series analysis must be performed consecutively, namely: descriptive statistics analysis, outlier test, and the classical assumption test (including normality test, multicollinearity test, and autocorrelation test), before moving forward with hypothesis tests which include The F-Test, The T-Test, and the coefficient of determination test. The data testing is processed using SPSS as the processing software. Before processing all the data and performing the various tests in SPSS, some of the data used were converted to a natural logarithm form with the written formula $e^{\ln x}$ to derive a smaller value for more simplified and accurate test results. All of the variables except inflation rate and interest rates were converted to a natural logarithmic form before being processed

RESULTS AND DISCUSSION

Table 1 shows the descriptive statistics of this research. The research covered the daily data from March 02, 2020 – to February 28, 2022 – providing 729 data samples to be analyzed in this research. Out of the 729 data samples, as many as 78 data were outliers that had to be eliminated. As many as 651 data were left after removing all the outlier data. All the data used were the raw data that did not go through any process of data transformation.

Table 1: Statistic Descriptive

Variables	N	Minimum	Maximum	Mean	Std. Deviation
IDX Composite Index	651	4,480.61	6,896.75	5,857.96	655.21
Exchange Rate	651	13,875	15,643	14,428	295.94
Inflation Rate	651	0.0132	0.0267	0.0165	0.0030

Interest Rate	651	0.0350	0.0450	0.0375	0.0033
Oil Price	651	9.12	101.66	60.86	18.80
Gold Price	651	1,688.40	2,055	1,832.66	72.98
COVID-19 New Cases	651	92	64,718	7,969.19	11,749

Secondary data processed, 2022

Table 1 which represents the descriptive statistics of the research variables showed that the indicates that the minimum and maximum value of the independent variable employed in this research had a relatively large gap in terms of its difference and average value, showing a high volatility rate during the study period. The exchange rate variable which was proxied by the USD to IDR Middle Rate showed that the exchange rate had an even closer gap in terms of its difference in value and average value as compared to the price of the IDX Composite Index, showing lower fluctuation rates with its standard deviation value which is 0.0033. The inflation rate is statistics reflecting the time of the study falls within the Indonesian government's target rate of 2-4% in terms of its minimum, maximum, and its mean value. As for the interest rate variable, Table 1 showed that the lowest, highest, and average interest rate benchmark had changed more than 1% in the period of the study. As for oil price, the descriptive statistics table signifies that oil price fluctuated greatly during the study period, as great as a \$92.54 gap. This gap is beneficial for the re-search, as it can better highlight the hypothesis that was formulated for the research. The gold price variable as shown in Table 1 also fluctuated greatly, more specifically, the difference in gold prices from the 2nd of March 2020 to the 28th of February 2022 is an outstanding \$367.60 gap – suggesting high fluctuation rates. Lastly, COVID-19 as the moderating variable in this research as shown in the descriptive statistics table has a minimum value of 92 infections, although this is after removing all the outliers before processing the data in a descriptive statistics table. The maximum value of COVID-19 new cases is 64,718 new infections in one day, with an average of 7,969 COVID-19 infection cases and a standard deviation value of 11,749.

An outlier test is performed in this research to get rid of any abnormalities in the data, which are data that have values that are very far from the general value, or in other words, have

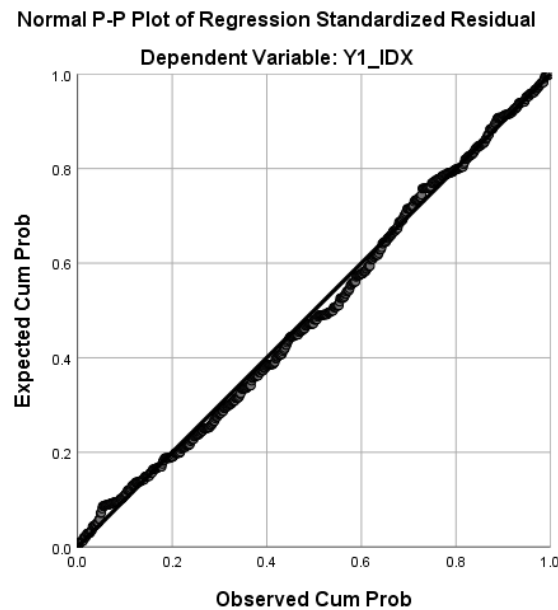
extreme values. The existence of these outliers can affect the results of assumption tests, such as tests of normality, linearity, and homogeneity of variance. Data can be considered as outliers if they are not within the -2.5 to 2.5 range (Sugiyono, 2017)

In this research, there are as many as 729 data samples generated, from the daily data of the research period from March 02, 2020 – to February 28, 2022. An outlier testing was carried out on the 729 data samples to get rid of extreme, also known as outlier data, and to obtain observational data that met the requirements to be used as research samples. According to Sugiyono (2017), data samples that do not fall within the range of -2.5 to 2.5 can be considered outlier data, so any data samples that do not fall within the range of -2.5 to 2.5 need to be removed before proceeding with further steps in the study.

Based on the results of outlier testing using the Standardized Deleted Residual (SDR) method, 78 data had values that were larger than 2.5 and smaller than -2.5 out of a total of 729 data tested. The 78 outlier data needs to be excluded from the test because it did not comply with the SDR fair value limit, the exclusion of the outlier data ensures that the data sample is normal. After deleting the 78 data extreme (outlier), the remaining data amounted to 651 data and was used for further testing.

The next step of the classical assumption test is conducting the normality test to to evaluate whether the data to be used to test the hypothesis, namely data from the dependent and independent variables used is distributed in a normal way. To examine whether the data is normally distributed, this study uses the Normal P-P Plot of Regression Standardized Residual in SPSS. According to Cleff (2019), the data being studied is considered to be normally distributed when the dots representing the data in the test scatters to form an approximately straight line that points upward – the straighter the line, the better the distribution of the data.

Figure 1: Normality Test Results



Secondary data processed, 2022

The findings of the normality test in this regression model are presented in a normal probability plot graph. Figure 1 illustrates the Normal P-P Plot of Regression Standardized Residual. The figure demonstrates that the data distribution points of the Normal P-P Plot of Regression Standardized Residual are spread out well, and follow the direction of the diagonal line which is the normal distribution line. Therefore, this regression model has a normal data distribution and is eligible to be tested. The subsequent classical assumption test is the multicollinearity test. The multicollinearity test is

conducted in the study to intend to determine whether each of the independent variables is linearly related or correlated with each other. According to Cleff (2019), the value of VIF can be used to determine whether the data has any multicollinearity issues; if the VIF value is smaller than 10 with a tolerance value of smaller than 0.1, then the data can be said to contain multicollinearity. If the value of VIF is larger than 10 with a tolerance value of larger than 0.1, then the data can be said to contain multicollinearity. The findings of the multicollinearity test in this regression model are summarized in Table 2.

Table 2: Multicollinearity Test Results

Variables	Collinearity Statistics		Description
	Tolerance	VIF	
Exchange Rate	0.423	2.364	There is no multicollinearity
Inflation Rate	0.200	5.001	There is no multicollinearity
Interest Rate	0.256	3.901	There is no multicollinearity
Oil Price	0.267	3.750	There is no multicollinearity
Gold Price	0.435	2.299	There is no multicollinearity

Secondary data processed, 2022

Upon the findings of the test answers, the VIF value for each research element in this regression model is not larger than 10, with a tolerance value of not less than 0.1. On that account, the findings

of this test can then be said that multicollinearity is found to be non-existent between the independent elements in this model of regression.

After performing the multicollinearity test, an autocorrelation test is also conducted to examine whether there is a correlation between the confounding error (residual) inter-periodically. The autocorrelation test is carried out in this study to be able to test the regression model that will be used is used, to study if there is a connection in the middle between the flaw in the observation and the flaw in the previous observations. If there is a connection between observations, in a time series, it can be said that there is an autocorrelation problem. According to

Greene (2018), data declared is said to meet the criteria if the data is declared not to contain autocorrelation, the data is said to contain autocorrelation if the results of the test shows that the Durbin Watson data has a significance value that is smaller than the significant level determined (0.05).

The results of the autocorrelation test in this research are summarized in Table 3 as presented below:

Table 3: Autocorrelation Test Results

Dependent Variable	Durbin-Watson	Description
IDX Composite Index	1.646	There is no autocorrelation

Secondary data processed, 2022

The outcome of the autocorrelation test shows that Durbin Watson's value in the model of regression for the dependent variable IDX Composite Index is between -2 and 2, which is 0.157. Therefore, a conclusion can be drawn that an autocorrelation problem does not exist in this test, or this model of regression is free from any inter-period correlation so it is feasible to be tested.

After passing all the classical assumption test to determine that the test data is feasible to be tested, the research can then move on with conduction the hypothesis tests which includes the F-test and the T-test. The F-Test is performed

in this research to examine the impact of all the dependent variables on the independent variable. Two sets of F-Test were examined in this research, the first set of the F-Test excludes COVID-19 as the moderating variable and is summarized in Table 4. While the second set of the F-Test includes COVID-19 as a moderating variable to see whether COVID-19 new infection cases strengthen or weaken the relationship of the macroeconomic elements tested towards the IDX Composite Index. Table 4 which summarizes the result of the first set of the F-Test is presented below:

Table 4: F-Test Results

Dependent Variable	F	Sig.	Description
IDX Composite Index	1431.022	0.000	Significant

Secondary data processed, 2022

Upon the outcome of the F-test or ANOVA test, the F-value of 1431.022 was obtained. The significance value in this regression model is 0.000 and less than the probability level of 0.05, the conclusion drawn is that this regression model can be used to predict the effect of the rates of exchange, rates of inflation, rates of interest, price of oil, and price of gold to the independent variable IDX Composite Index. The

findings of the F-test for the model of regression are summarized in Table 4.

COVID-19 was then added as a moderating variable between the 5 macroeconomic variables and the new number of COVID-19 infections daily, and another set of the F-Test was conducted. The results of the F-test for the regression model with COVID-19 as a moderating variable are presented in Table 5 as shown below:

Table 5: F-Test Results

Dependent Variable	F	Sig.	Description
IDX Composite Index	1021.839	0.000	Significant

Secondary data processed, 2022

After adding COVID-19 as the moderating variable, the F-value of 1431.022 then decreased to 1021.839, with a significance value of still 0.000 – the same as before the moderating variable of COVID-19 was added. This means that overall, the influence of COVID-19 as a moderating variable in the five macroeconomic elements studied in the IDX Composite Index is insignificant.

The next step of the hypothesis test is utilizing the outcome of the T-Test to examine the influence of each independent variable on the dependent variable. In this research, two T-Tests were examined to obtain the most accurate results, the

first T-Test conducted is summarized in Table 6, and it represents all the independent variables but the moderating variable COVID-19 was not in the equation. COVID-19 new infection cases are added as a moderating variable in the second T-Test examined. Table 6 shows that the constant value of the IDX Composite Index variable as a measurement of the stock market index is 25.519, which states that in a ceteris paribus condition where the value of the independent variable is considered constant, the stock market index has a value of 25.519. Table 6 is as presented below:

Table 6: T-Test Results without COVID-19 as the Moderating Variable

Variables	Unstandardized Coefficients		t	Sig.	Description
	B	Std. Error			
(Constant)	25.519	0.733	34.819	0.000	
Exchange Rate	-1.618	0.068	-23.950	0.000	Significant
Inflation Rate	23.671	3.632	6.517	0.000	Significant
Interest Rate	-47.079	4.465	-10.545	0.000	Significant
Oil Price	-0.066	0.030	-2.229	0.026	Significant
Gold Price	0.048	0.060	0.794	0.427	Insignificant

Dependent Variable : IDX Composite Index

Secondary data processed, 2022

Table 6 presents that the significance value of the exchange rates variable (represented by USDIDR Middle Rate), inflation rates, interest rates (represented by BI-7Day-RR), is 0.000 – this finding suggests that exchange rates, inflation rates, and interest rates, all had significant influences to the dependent variable which is IDX Composite Index. Oil price (represented by DCOILBRENTTEU) was also found to have a significant impact on IDX Composite Index, with its significance value of 0.026 which is below 0.050. However, the significance value of gold

price was found to be 0.427, which is larger than 0.050, In other words, all the independent variables except gold price can be concluded to have a significant impact on the IDX Composite Index.

Another coefficients test was run to study an additional COVID-19 variable, all the independent variables were multiplied by the moderating variable (COVID-19) before processing the coefficients test. The T-Test results with COVID-19 added as the moderating variable is presented in Table 7 as follows:

Table 7: T-Test Results with COVID-19 as the Moderating Variable

Variables	Unstandardized Coefficients		t	Sig.	Description
	B	Std. Error			
M1	3.550	0.010	1.845	0.066	Insignificant
M2	-2.640	0.479	-5.513	0.000	Significant
M3	2.368	0.656	3.611	0.000	Significant
M4	0.008	0.005	1.664	0.097	Insignificant
M5	-0.012	0.004	-2.638	0.009	Significant

Dependent Variable : IDX Composite Index

Secondary data processed, 2022

The test results after adding moderating variables then show a different set of results. In Table 7, the abbreviation M1 represents the exchange rate variable moderated by COVID-19, M2 represents the inflation rates variable moderated by COVID-19, M3 represents the interest rates variable moderated by COVID-19, M4 represents the oil price variable moderated by COVID-19, while M5 is the abbreviation for the gold price variable moderated by COVID-19.

The T-Test results as presented in Table 7 shows that COVID-19 significantly moderates the relationship between inflation rates and the IDX Composite Index, interest rates and the IDX Composite Index, and gold price and the IDX Composite Index.

The regression equation of this research model is presented as follows:

IDX Composite Index

$$\begin{aligned}
 &= 25.519 + -1.618X1 \\
 &+ 23.671X2 + -47.079X3 \\
 &+ -0.066X4 + 0.048X5 \\
 &+ 3.550X6 + -2.640X7 \\
 &+ 2.368X8 + 0.008X9 \\
 &+ -0.012X10 + e
 \end{aligned}$$

Description:

$X1 = \text{Exchange Rate}$

$X2 = \text{Interest Rate}$

$X3 = \text{Inflation Rate}$

$X4 = \text{Gold Price}$

$X5 = \text{Oil Price}$

$X6 = \text{Exchange Rate} \times \text{COVID} - 19 \text{ New Cases}$

$X7 = \text{Interest Rate} \times \text{COVID} - 19 \text{ New Cases}$

$X8 = \text{Inflation Rate} \times \text{COVID} - 19 \text{ New Cases}$

$X9 = \text{Gold Price} \times \text{COVID} - 19 \text{ New Cases}$

$X10 = \text{Oil Price} \times \text{COVID} - 19 \text{ New Cases}$

$e = \text{Error}$

H1A: Exchange rates have a significant impact on Indonesia's composite stock index.

As summarized in Table 6, exchange rates had a sig. value of 0.000 and a -1.618 beta value. This test outcome shows that the dependent variable which is the exchange rate has a significantly negative impact on the stock market index in Indonesia, The JKSE Index, also known as the IDX Composite Index. In other words, based on the historical data of Indonesia's foreign exchange rates to United States Dollars, the fall of the JKSE

Index can be related to the rise of exchange rates – vice versa, the rise of exchange rates can influence the fall of stock market index price.

This bilateral connection between exchange rates and the stock market index is likely due to the investing behavior of investors – when rates of exchange are on the pedestal of generating high returns, investors tend to withdraw their funds from the market and invest them in the foreign exchange market rates to generate a higher percentage of returns, and because the price of stocks in the stock market is largely affected by the law of supply and demand, this causes the fall of demand in the stock market, which consequently impacts the price of stocks and the overall composite index. Quoting from previous research on the same topic, Tsaurai (2018) also discusses that when exchange rates can generate a more attractive rate of return, investors would want to jump into the opportunity to take advantage of the short high. This conjecture is also supported by Halisa & Annisa (2020) who also found similar research results regarding the relationship of the two variables in H1A and elaborates the causation of that to be peoples' investing habits of the constant search for a higher return.

Another group of researchers, Hidayat and Saefullah (2019) proposes another argument as to why the stock market falls when the exchange rate market rises, which is that Indonesia is a country that imports more than it exports. This means that when foreign exchange rates ascents, so do the cost of production of a lot of companies in Indonesia that import its basic production goods and machinery. The increase in the cost of production decreases companies' earnings and devalues their stock prices.

H1B: COVID-19 can significantly moderate the relationship between exchange rates and Indonesia's stock composite index

The outcome of the previous hypothesis has been proven that exchange rates do have a significant

impact on Indonesia's composite stock market index. The second hypothesis aims to examine if adding COVID-19 as a moderating variable will strengthen or weaken the impact of exchange rates on the stock market index. The T-Test results in Table 7 show the significance value of exchange rates when moderated by COVID-19 to be 0.066, with a beta value of 3.550. This means that COVID-19 does not weaken or strengthen the connection between exchange rates and the IDX composite index. This is likely because COVID-19 is a global pandemic that happened internationally across the globe, Shear et al. (2021) mentioned that a pandemic like COVID-19 adds uncertainty to investors' behaviors, but not so much so that it can moderate the relationship of exchange rates and the stock market.

H2A: Inflation rates have a significant impact on Indonesia's composite stock index.

Table 6 shows that the significance value of the inflation rate in the T-Test results is 0.000, and the beta value is 26.671. This result means that the inflation rate has a significantly positive impact on the IDX composite index, wherein whenever the inflation rate rises, the stock market index tends to move in a lateral direction. The reason why the growth of the inflation rate might also cause the stock market prices to rise might be related to the law of supply and demand – the rise of the inflation rate is arguably due to the rise of demand for commodity goods.

Few researchers have found similar results, but Wulandari et al. (2019) who did find the same results explains the same conjecture as this research. Dalimunthe (2018) explains that the rise in inflation gives a positive signal to investors, this is because inflation rates can increase due to the increase in consumers' willingness to buy commodity goods, so the income of commodity goods will still be stable – if not, higher. All the while the cost of production still stays the same. This greatly increases the earnings of companies in basic commodity sectors, which also increases investors' sentiment to invest in these types of

stocks and increases the stock market's value. Dewi & Artini (2016) also found that an increase in inflation rates also increases a few vital stock market leaders, and elaborates that the rise of inflation pushes companies to generate higher earnings per share, which then increases their stock value.

H2B: COVID-19 can significantly moderate the relationship between inflation rates and Indonesia's stock composite index

Hypothesis 2B aims to clarify whether COVID-19 as a moderating variable strengthens or weakens the relationship of inflation rates to the IDX Composite Index. Based on the T-Test results that were presented in Table 7, the significance value of the moderating inflation rate when moderated by COVID-19 shows a value of 0.000, and the beta value is -2.460. This means that COVID-19 does affect the connection of the inflation rate as an independent variable to the IDX Composite Index as the dependent variable. Elaboratively, the new confirmed cases of COVID-19 can weaken the impact of inflation rates on the IDX Composite Index.

H3A: Interest rates have a significant impact on Indonesia's composite stock index.

Most previous research has found interest rates as one of the macroeconomic variables that can significantly affect the stock market's performance. The findings of this research are in line with the findings of previous research performed. As summarized in Table 6, the T-Test results that examine the influence of interest rates on the IDX Composite Index show the value of significance to be 0.000, and the beta value is -47.079, which means that interest rates affect the stock market in a significantly negative way. That is to say that the rise of interest rates can cause the crash of the stock market in Indonesia.

According to Khan & Ali (2015) the rise in interest rates provided by the bank triggers investors to move their funds from the stock market and

inject them into bank investment instruments instead. After all, investment instruments provided by the bank are perceived to be the more secure instruments of investments as compared to the stock market [24]. So consequently, when banks provide a greater interest rate to investors, investors are willing to forgo the high but volatile returns generated by the stock market and move their funds to the investment instruments provided by fixed-income instruments instead. This was backed up by Suriyani & Sudiartha (2018) who rationalized their similar findings by clarifying that investment instruments from national banks give a higher sense of security, despite the low returns – so when the returns offered are raised, it creates an attractive deal for investors to take advantage of, given the same low risk.

H3B: COVID-19 can significantly moderate the relationship between interest rates and Indonesia's stock composite index

After examining whether interest rates can significantly affect the IDX Composite Index, hypothesis 3B then investigates whether the effect of interest rates on the IDX Composite Index can be weakened or strengthened by COVID-19 as a moderating variable. Based on the T-Test results that were summarized in Table 7, the interest rates variable when moderated by COVID-19 provided a significance value of 0.000 and a negative beta value of -2.640 – meaning that COVID-19 does affect the relationship between rates of interest and the stock market. The beta value of -2.640 shows that COVID-19 weakens the dependency of the IDX Composite Index on rates of interest.

H4A: The price of oil has a significant impact on Indonesia's composite stock index

The impact that the price of oil brings to the stock market as presented in Table 6 shows the value of significance to be 0.026, with a beta value of -0.066. These results propose that the price of oil significantly and negatively affects the stock

market. That is to say that the rise of oil prices does correlate to the crash of the stock market, as proven in this research.

Analyses from previous researchers have found this significant impact to be even more accurate for oil-exporting countries, such as Indonesia. A rise in the price of oil tends to lower the rate of expected growth in the economy, which then increases the expected rate of inflation over brief horizons, consequently lowering the expected income of companies, and ultimately resulting in the dampened price of stocks [26]. However, other researchers debate the difference between causation and correlation, Kelikume and Muritala (2019) cited in their study that the relationship between the price of gold and the stock market isn't always bilateral, as the impact can sometimes be significantly positive as well because of the diversity of industries in the world – and the explanation to why that is that the increase of the price of oil can drive new employment opportunities, for it becomes viable economically for companies in the oil industry to take advantage of the high-cost shale oil deposits. However, the high price of oil also impacts consumers and businesses with higher transport and manufacturing [28]. The low price of oil damage the distinctive oil activities, but is profitable for manufacturing and other business sectors where the cost of fuel is one of the main concerns [29]

H4B: COVID-19 can significantly moderate the relationship between oil price and Indonesia's stock composite index

Hypothesis 4A has substantiated that the price of oil impacts the IDX Composite Index of Indonesia. Hypothesis 4B then intends to show that COVID-19 can influence the impact of oil price on the IDX Composite Index, whether the influence can strengthen the impact or weaken it. As presented in Table 7, the T-Test results show that the moderating variable, COVID-19, has a significance value of 0.097, with a beta value of 0.008. The results insinuate that COVID-19 new infection

cases are insignificant in moderating the two variables in hypothesis 5.1 In other words, COVID-19 does not weaken nor strengthen the impact of oil price on the IDX Composite Index.

H5A: The price of gold has a significant influence on Indonesia's composite stock index

The influence of the price of gold on the IDX Composite Index is measured by the T-Test and is shown in Table 6. Table 4.6 shows that the significance value of the price of gold in the IDX Composite Index is 0.427, with a beta value of 0.048, this means that the T-Test results show that the price of gold has an insignificant impact on the stock market in Indonesia.

The basis of how the price of gold is found to be insignificant is presumably because gold is just a minor factor in the pool of macroeconomic variables that affect Indonesia's stock market. Previous findings such as one by Umer (2016) that concluded identical results, stated that the price of gold on its own is not likely to be able to fluctuate in the whole stock market, but instead when it is combined with other macroeconomic elements, the gold price can play a part in shifting the performance of the stock market. Basit (2020) second this assumption and suggests that the price of gold on its own is incapable of kicking off a volatile effect in the stock market, but the research did find that when the gold price is completed with other macroeconomic elements, the pool of macroeconomic elements then significantly impacts the stock market. This result was also backed up by Hamzah et al. (2021) and Sutanto (2013). Additionally, Utama and Puryandani (2020) also found that in 2017, the stock market index Sri-Kehati increased 4.23% in credit to the great performance of Indonesia's top public companies, but the researchers found no correlation between gold price towards the appreciation of the stock market index

Another assumption as to why the gold price is found to be insignificant is the research is also likely because of how gold is a long-term

investment instrument – when investors invest in gold, the perceived mindset is that gold is something to be invested in for at least 5 years and above, as its price rarely fluctuates. Research by Al-Ameer et al. (2018) found there to be a significant long-run relationship between the price of gold and the movement of the Frankfurt Stock Exchange, but an insignificant impact was found between the two variable's short-run correlation. Since this research data only covered 729 days, it may be one of the ground reasonings for the insignificant finding of the relationship.

H5B: COVID-19 can significantly moderate the relationship between gold price and Indonesia's stock composite index

After proving the existence of impact on gold price on the market of stocks in Indonesia, hypothesis 5B then aims to prove that COVID-19 can weaken or strengthen the relationship between the two variables tested in hypothesis 5A. Based on the T-Test results shown in Table 7, the value of significance in gold price when moderated by COVID-19 and tested against the IDX Composite index is 0.009, with the beta value -0.012. These findings show that COVID-19 does affect the relationship of the gold price to the

stock market. The beta value of -0.012 demonstrates that the result is negative. In other words, COVID-19 can weaken the impact of gold price on the IDX Composite Index.

Citing to a previous study analyzed by Tanin et al. (2021) investing in gold is perceived as a haven for investors, as the volatility of gold price rarely fluctuates – as certainly fluctuates less than the stock market. The existence of any global crisis causes stock prices to crash, as the rate of inflation rises and the expenses of companies rise with it, additionally, this also creates a loss of trust in investors in the stock market, further crashing the price of stocks [36]. All of these factors then push investors to invest in more stable investment instruments instead – and that is usually withdrawing from the stock market to hedge their funds in buying gold, the safe haven perceived by investors [37]

After all the hypothesis have been proven, The coefficient of determination test is conducted in this research to examine the extent of the research model in explaining the dependent variable. The result of the coefficient of determination test is summarized below:

Table 8: Coefficient of Determination Test without COVID-19 as Moderating Variable

Dependent Variable	Adjusted R Square	Std. Error of The Estimate
IDX Composite Index	0.917	0.037

Secondary data processed, 2022

The coefficient of determination in Table 8 shows a numerical value of 0.917, which indicates that the independent variables in this study (exchange rates, interest rates, inflation rates, oil price, and gold price) can explain the dependent variable (IDX Composite Index) as much as 91.7%, while the other 9.3% can be accounted by other elements that are not included in the model, these factors could be money supply, GDP growth rate, etc, foreign direct investments, etc that have not been included in the research model. The standard error of the estimation is as low as

0.037 or 3.7%, which means that this result is acceptable for the findings of the research.

Another coefficient of determination test was run for a second time, adding COVID-19 as the moderating variable to see if the relationship of all the variables can be more significant when COVID-19 new infection cases are within the equation. The result of the coefficient of determination test when moderated by COVID-19 is summarized in Table 9 as shown below:

Table 9: Coefficient of Determination Test with COVID-19 as Moderating Variable

Dependent Variable	Adjusted R Square	Std. Error of The Estimate
IDX Composite Index	0.934	0.033

Secondary data processed, 2022

The coefficient of determination in Table 9 is the result of the test when moderated by COVID-19. As shown in Table 9, The adjusted R-square as shown in the table presents a value of 0.934 after adding COVID-19 as a moderating variable, with an increase of 0.017 or 1.7% when compared to the previous test without adding COVID-19 as the moderating variable. All while the standard error of the estimation also decreased to 0.033 or 3.3%. This result goes to show that all the independent

CONCLUSION

This research intended to examine the impact of exchange rates, inflation rates, interest rates, oil prices, and gold prices on the composite stock market index in Indonesia, as well as prove that COVID-19 can affect the relationship of the variables by either weakening or strengthening them. The study concludes that all the independent variables, except the price of gold, were found to have a significant impact on the IDX Composite Index. In other words, the IDX Composite Stock Index was found to be significantly influenced by exchange rates, inflation rates, interest rates, and oil prices – whether it be simultaneously or singularly, as proven by the test results above. More specifically, the influence of exchange rates, interest rates, and oil prices on the stock market was found to be significantly negative, while the impact of inflation rates on the stock market was found to be significantly positive.

On the other hand, the outcome of adding COVID-19 as a moderating variable was only found to be significant in weakening the relationship between inflation rates and gold price towards the stock market index, and strengthening the relationship between interest rates toward the stock market

variables as a whole in this study, including exchange rates, interest rates, inflation rates, oil price, and gold price, are 1.7% more significant toward IDX Composite Index as the dependent variable when being moderated by COVID-19 new infection cases. This insinuates that overall, COVID-19 does affect the impact of all the independent variables on the IDX Composite Index as the dependent variable.

index. As for exchange rates and the price of oil, COVID-19 was found to be insignificant as a moderating variable.

The limitations in this study included the inability to include a more diverse pool of variables, as well as the short research period which cannot account for long-term outcome of the research in question. Hence, Future studies are recommended to include more macroeconomic elements to the pool of independent variables, such as adding the GDP growth rate, money supply, and/or foreign direct investments to perfect the research. Furthermore, more extensive data samples can be collected for the following studies, adding on more research days to achieve better clarity in the findings of the research.

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