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The Impact Of Exchange Rate, Inflation And Interest Rates On Indonesian Mining Product Exports

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ABSTRACT
Exports of mining products generate substantial state revenue through export duties and taxes. This income can be used to finance national development in various fields such as infrastructure, education and health. Apart from that, mining products contribute to strengthening Indonesia's foreign exchange reserves, which in turn helps maintain macroeconomic stability. This research was conducted to analyze factors that could influence the growth of exports of Indonesian mining products. The dependent variable used in this research is the value of mining exports and the dependent variables are the dollar exchange rate, inflation rate and interest rates. The research was conducted in Indonesia with data taken for the period from 2010 to 2023. The data sources used were secondary data obtained from the Indonesian Central Bureau of Statistics and Bank Indonesia. Data analysis uses the help of e-views software by carrying out multiple regression analysis tests. The results of this research prove that inflation and interest rate variables influence exports of Indonesian mining products. The exchange rate has no effect on exports of mining products in Indonesia.

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INTRODUCTION

The important role of exports in driving the country's economy cannot be denied. Apart from generating foreign exchange, exports also trigger economic growth, increase industrial competitiveness and create employment opportunities. Therefore, many countries, including Indonesia, make exports their main focus.

Indonesia, blessed with abundant natural wealth, has abundant mineral and coal reserves. Exports of mining products are an important sector in the Indonesian economy, making a significant contribution to state income, foreign exchange and job creation. Exports of mining products generate substantial state revenue through export duties and taxes. This income can be used to finance national development in various fields such as infrastructure, education and health. Apart from that, mining products contribute to strengthening Indonesia's foreign exchange reserves, which in turn helps stabilize the rupiah exchange rate and maintain macroeconomic stability.

Research conducted by previous researchers has discussed the influence of several factors on independent variables separately, such as (Tarakci et al., 2022) which discusses

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the exchange rate on exports in Turkey and (Kiganda et al., 2017) which discusses inflation on exports in Kenya. The research that discusses exchange rates, inflation and interest rates on exports by (Yuliadi et al., 2024) is different from that discussed by researchers. If it presented data for the period 2015 to 2019, then the researcher uses data for the period 2010 to 2023. Besides that, the export variable used in the research is more specific, namely exports of mining products.

The export graph below shows that the condition of exports of mining products appeared to increase in 2010 and fluctuated until finally decreasing again in 2020. It increased after 2021 to 2022 but then decreased again at the end of 2023 and occurred until the beginning of 2024.

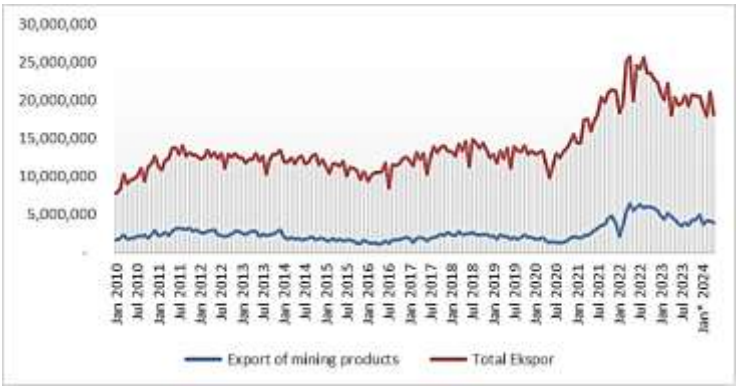

Figure 1. Indonesian Export Value

Indonesia's export volume from 2023 to early 2024 will continue to decline. Exports of Indonesian mining products throughout 2022 were US$65.05 billion, while in 2023 it was US$52.21 billion or has decreased by US$12.84 billion (19.7%). If compared to the period January to April 2023 which amounted to US$19.20 billion, then the initial period of 2024, namely exports of mining products from January to April, amounted to US$16.11 billion or there has been a decrease of US$3.09 billion (16.1%).

There are many factors that cause the value of exports, especially exports of mining products, to grow or decline. It could be in terms of government policy related to export regulations and others. This research aims to find out how much Indonesian mining exports are influenced by the dollar exchange rate, inflation rate and interest rates. So it is hoped that it will help the government adopt more effective economic policies and be able to increase exports which will support Indonesia's economic growth.

The data analysis model chosen by the author is an analysis of factors that influence the export of mining products. These factors include the dollar exchange rate, inflation rate and interest rates. The problem formulation in this research can be determined, namely:

1. Does the dollar exchange rate have a significant effect on exports of mining products?
2. Does the inflation rate have a significant effect on exports of mining products?
3. Do interest rates have a significant effect on exports of mining products?
4. What is the relationship between the variables of the dollar exchange rate, inflation and interest rates and mining exports?

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Export is the activity of selling products abroad based on an agreement between the seller and buyer regarding payment methods, quality, quantity and other requirements. In general, exports are defined as the process of removing goods or commodities from one country to be marketed in other countries. The main purpose of exports is to increase domestic demand, encourage the development of large companies, and maintain social and political stability (Todaro & C, 2004). Exports are another definition of the production of various domestic products, which are then sold to other countries (Mankiw, 2006). Viewed from the expenditure sector, exports are a variable that plays an important role in gross domestic product.

A country involved in international trade is obliged to pay attention to the prevailing exchange rate. The exchange rate is the agreed price in trade transactions between countries. A country's currency exchange rate is classified into two types, namely nominal exchange rate and real exchange rate. The nominal exchange rate shows the comparison of the prices of the currencies of two countries, while the real exchange rate shows the comparison of the prices of goods between the two countries (Mankiw, 2006).

The Mundell-Fleming model examines the relationship between the exchange rate and the volume of international trade in the context of a small open economy with perfect capital mobility and a constant price level. This model shows that depreciation or appreciation of the value of the domestic currency will have an impact on the volume of exports and imports. Currency depreciation, which means the value of the domestic currency is relatively cheaper compared to foreign currency, will result in an increase in export volume (Mankiw, 2009). As mentioned, changes in exchange rates trigger exchange rate risk and have an impact on international trade volume. New theories show that changes in exchange rates can have both positive and negative impacts on trading volumes.

Previous research conducted by (Fuad Anshari et al., 2017) showed that partial exchange rate depreciation had a significant negative effect on the exports of Indonesia, Malaysia and Singapore but had a significant positive effect in the Philippines. Likewise, (Mahendra & Kesumajaya, 2015) (Suprianto, 2018) (Ikenna et al., 2023) (Risma et al., 2019) (Yuliadi et al., 2024) concluded that the exchange rate has a positive effect on exports. Besides that, researchers (Sugiharti et al., 2020) concluded that the exchange rate had a negative effect. Meanwhile, researchers (Reni Novianti Sari, 2017) (Devi & Murtala, 2019) (Kurniasari & Monica, 2019) concluded that the exchange rate has no effect on exports.

Inflation is characterized by an increase in the prices of goods and services in general, which results in a decrease in the ability of money to purchase goods and services. (Mankiw, 2006). The inflation rate calculation uses consumer price index parameters (Samuelson & Nordhaus, 2004), namely:

$$Inflation\ Rate = \frac{CPI\ year\ t\ -\ CPI\ (year\ t-1)}{CPI\ (year\ t-1)}\ x\ 100$$

To find out the inflation rate, we need to calculate the difference between the current year's CPI and the previous year's CPI. Then, the difference is divided by the previous year's CPI and multiplied by 100%. The result is the percentage inflation rate for that period, which can be categorized as light, moderate, heavy, or hyperinflation.

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An increase in the price of goods and services can encourage increased production activities by society, thereby spurring national economic growth. However, it should be noted that inflation can also weaken competitiveness and lead to a decline in exports. Previous research conducted by (Fuad Anshari et al., 2017) stated that inflation had a positive effect on Philippine exports. Likewise, (Ikenna et al., 2023) (Muhammad Ikhsan Harahap, 2023) (Kiganda et al., 2017) concluded that inflation has a positive effect on exports. Besides that, researchers (Tarakci et al., 2022) and (Rosalina & Titik, 2021) concluded that inflation has a negative effect. Meanwhile, researchers (Devi & Murtala, 2019) (Ari Putra & Sutrisna, 2017) (Yuliadi et al., 2024) (Fazhar Sumantria, 2019) concluded that inflation has no effect on exports.

The Keynesian view of interest rates is in contrast to classical theory. Keynes argued that the interest rate does not directly encourage or discourage investment and savings. Instead, it is the level of people's income that is the determining factor. Savings occur when someone has excess funds (Marginal Propensity to Save).

In contrast to the traditional view, Keynes viewed the interest rate as a monetary phenomenon produced by the interaction between the supply and demand for money in the money market. Money has an influence on economic activity (GNP) through its role in determining interest rates. Interest rate fluctuations then impact the desire to invest, which in turn affects GNP. Keynes thought that the economy had not yet reached full employment, so there was still room to increase output without changing wage or price levels. Lowering interest rates can stimulate investment and increase national product. Thus, in the short term, monetary policy in Keynes' theory plays a crucial role in encouraging the growth of national product (Nopirin, 2000).

Previous research conducted by (Risma et al., 2019) concluded that interest rates have a positive effect on exports. Besides that, researchers (Mahendra & Kesumajaya, 2015) (Suprianto, 2018) (Rosalina & Titik, 2021) (Fazhar Sumantria, 2019) and concluded that interest rates have a negative effect. Meanwhile, researchers (Reni Novianti Sari, 2017) (Muhammad Ikhsan Harahap, 2023) (Kurniasari & Monica, 2019) concluded that interest rates have no effect on exports. The conceptual framework in this research is:

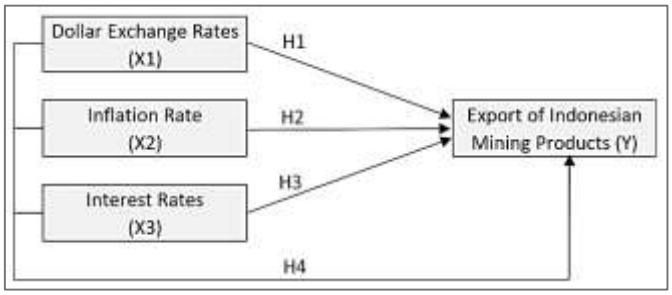

Figure 2. The Conceptual Framework

Hypothesis:

H1: The dollar exchange rate has an effect on exports of mining products,

H2: Inflation has an effect on Exports of Mining Products,

H3: Interest rates influence mining product exports,

H4: Simultaneously all independent variables influence mining product exports.

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METHODS

This type of research is quantitative research using data in the form of numbers measured on a numerical scale and obtained from Bank Indonesia and BPS reports and which is the object of research. Quantitative research methods are research methods that are based on the philosophy of positivism, used to research certain populations or samples, collecting data using research instruments, quantitative or statistical data analysis, with the aim of testing predetermined hypotheses. In this research the author examines the dollar exchange rate, inflation rate and interest rates on Indonesian mining exports. Researchers use quantitative data. Quantitative data is a type of data in research that can be measured, calculated, and can be described using numbers (Babbie, 2008).

The data source used is secondary data in carrying out the analysis. Secondary data is primary data that has been further processed and presented either by the primary data collector or by another party, for example in the form of tables or diagrams (Tampubolon et al., 2023).

Acknowledgment of research limitations; research ethics and subject consent; efforts to ensure the reproducibility of research results; information on references and data sources; statistical outcomes and data visualizations, as well as tables and figures that support research findings. This comprehensive information is crucial for understanding and evaluating the research reported in the journal.

The population in this study is data on the dollar exchange rate, inflation rate and interest rates and exports of Indonesian mining products. All data used in this research is secondary data obtained from Bank Indonesia and BPS reports. The research sample consists of data from 2010 to 2023.

Descriptive statistical testing is carried out to provide an overview or description of data seen from the average value (mean), standard deviation, maximum and minimum variance. The Normality Test aims to test whether in the regression model, the confounding or residual variables have a normal distribution (Ghozali, 2016). To test whether data is normally distributed or not, you can find out by using a graph plot. By looking at the histogram of the residuals there are several bases for decision making, namely:

1. If the data spreads around the diagonal line and follows the direction of the diagonal line or the histogram graph shows a normal distribution pattern, then the regression model meets the assumption of normality.
2. If the data spreads far from the diagonal and does not follow the direction of the diagonal line or the histogram graph does not show a normal distribution pattern, then the regression model does not meet the assumption of normality.

The multicollinearity test aims to test whether in the regression model a correlation is found between the independent variables. A good regression model should have no correlation between independent variables (Ghozali, 2016). Multicollinearity can be done by looking at the variance inflation factor (VIF) value from the analysis results using the e-views application. If the VIF value < 10 then the regression model is free from multicollinearity.

The autocorrelation test aims to test whether in the linear regression model there is a correlation between confounding errors in period t and confounding errors in period t-1. This

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problem arises because the residuals (nuisance errors) are not independent from one observation to another. One way to find out whether there is autocorrelation or not is to use the Durbin-Watson test (DW-test). The Durbin-Watson test is only used for first order autocorrelation.

The heteroscedasticity test aims to test whether in the regression model there is inequality of variance from the residuals of one observation to another (Ghozali, 2016). If the variance from the residual from one observation to another is constant, it is called homoscedasticity and if it is different it is called heteroscedasticity. A good regression model is one that is homoscedastic or does not have heteroscedasticity. One way to detect the presence or absence of heteroscedasticity is to look at the scatterplot graph between the predicted value of the dependent variable and its residual. If in the scatterplot graph there is a certain pattern, such as dots that form a certain regular pattern (wavy, widening then narrowing), then this indicates that heteroscedasticity has occurred. If there is no clear pattern, and the points spread above and below the number 0 on the Y axis, then heteroscedasticity does not occur.

The multiple linear regression model is an equation that describes the relationship between two or more independent variables/predictor (X1, X2,...Xn) and one dependent variable/response (Y). The aim of multiple linear regression analysis is to predict the value of the dependent variable/response (Y) if the values of the independent variables/predictor (X1, X2, ..., Xn) are known. Besides that, it is also to determine the direction of the relationship between the dependent variable and the independent variables (Gujarati, 2003).

The multiple linear regression equation is mathematically expressed by:

$$Y = \alpha + \beta 1\_ExcR + \beta 2\_Inf + \beta 3\_IntR + e$$

Where:

- Y = Non-Oil and Gas Exports (Indonesia)
- α = Constant Coefficient
- $\beta 1, \beta 2, \beta 3$ = regression coefficient of independent variables
- *ExcR* = Dollar rate
- *Inf* = Inflation rate
- *IntR* = Interest rate

To determine the values of the regression coefficients ($\beta 1$, $\beta 2$, ..., βn) and constants (α), the Ordinary Least Squares (OLS) method is used which aims to find the best regression line that can minimize the value of random error (error) in predict the value of Y.

RESULTS AND DISCUSSION

The classical assumption test is a testing stage that must be fulfilled in quantitative research. This is done to obtain good data and in accordance with research requirements. The classic assumption tests in this research are the normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test.

From the results of the normality test with Jarque-Bera, it can be seen that the probability value is 0.899 > 0.05, so it can be stated that the data is normally distributed and further testing can be carried out.

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The multicollinearity test is a test carried out to determine whether the research data found no correlation between the independent variables. Good data is data that is free from symptoms of multicollinearity. Data that is free from symptoms of multicollinearity is that the Variance Inflation Factor (VIF) value must be less than 10.0. From the results of the multicollinearity test which can be seen in Table 3 above, it can be seen that all data in the study are free from symptoms of multicollinearity. This can be proven from the centered VIF value being smaller than 10.0, namely for the exchange rate variable it is 1.25, inflation is 1.589 and the interest rate is 1.503.

Heteroskedasticity occurs when the residual variance is not constant across the range of predictor values. This test tests whether the residual variance varies significantly with the predictor values. From the results of the heteroscedasticity test, the probability value is obtained using the test; white is 0.796 > 0.05, so that the data in the study is free from symptoms of heteroscedasticity.

Next, this test is carried out using the Durbin Watson (DW) test, provided that if the DW number is between (-2) and +2 then there is no autocorrelation. The DW test result is 0.897, which means the data in the study is free from autocorrelation. The F test results show that the probability f-statistic value is 0.00, which means it is smaller than 0.05. This certainly indicates that the independent variables in the research simultaneously influence the dependent variable.

From the results of testing the coefficient of determination in this study and the results can be seen in Table 7, it can be seen that the Adjusted R-squared value in this study is 0.5823 or 58.23%. This means that 58.23% of the dependent variable is influenced by the independent variable, while the remaining 41.77% is explained by other factors not included in this research.

Table 1. Multiple Linear Analysis Test Results *)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
c	16.77270	1.826105	9.184963	0.0000
Dollar_Rate	-0.112120	0.187495	-0.597988	0.5524
Inflation	0.092397	0.021740	4.250000	0.0001
Interest_Rate	-0.232277	0.026191	-8.868454	0.0000

*) Data processed in 2024

Based on the results of multiple linear analysis tests in this research, the following regression equation was obtained:

$$Y = 16.773 - 0.112120\_ExcR + 0.092397\_Inf - 0,232277\_IntR + e$$

From the results of multiple linear analysis tests, information can be obtained that:

a. The significance value for the exchange rate (X1) on Y in this study is 0.5524 > 0.05 with a t-statistic of -0.598 so it can be concluded that there is no influence between the exchange rate level on exports of mining products (Y).

   The results of previous research regarding the exchange rate not affecting exports are in line with research such as that conducted by researchers (Reni Novianti Sari, 2017) (Devi & Murtala, 2019) and (Kurniasari & Monica, 2019).

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b. The significance value for Inf (X2) on Y in this study is 0.0001 < 0.05 with a t-statistic of 4.25 so it can be concluded that there is an influence between inflation on exports of mining products (Y) in a positive direction.
In theory, the inflation rate will increase exports through a depreciating exchange rate. Depreciation of the domestic exchange rate can provide a boost to Indonesia's export sector because it makes Indonesian products more price competitive on the international market.
Research regarding the influence of inflation on exports in a positive direction is in line with research such as that conducted by researchers (Fuad Anshari et al., 2017) (Ikenna et al., 2023) and (Kiganda et al., 2017).

c. The significance value for IntR (X3) on Y in this study is 0.0000 < 0.05 with a t-statistic of -8.868 so it can be concluded that there is an influence between the BI interest rate on exports of mining products (Y) in a negative direction.
An increase in interest rates will reduce the incentive to increase investment so that it will reduce domestic production which can lead to a decrease in the level of exports.
Research regarding the influence of interest rates on exports in a negative direction is in line with research such as that carried out by researchers (Mahendra & Kesumajaya, 2015) (Suprianto, 2018) and (Rosalina & Titik, 2021).

CONCLUSION

From this research, it can be concluded that the first hypothesis is rejected. The second, third and fourth hypotheses in this study were accepted. Which means that partially the exchange rate does not affect imports of Indonesian mining products, but the level of inflation and interest rates influence the level of exports of Indonesian mining products. Then simultaneously, all independent variables influence the level of exports of Indonesian mining products. Considering the importance of exports, the author hopes that other researchers will be able to find other factors or variables that influence exports so that they can be used as new reference sources.

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