“ANALYSIS OF THE INFLUENCE OF INFLATION, INTEREST RATE, EXCHANGE RATE, AND ECONOMIC GROWTH ON THE PROFITABILITY OF THE BANKING SECTOR IN INDONESIA”

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ABSTRACT

This study aims to analyze how much inflation, interest rates (IR), exchange rates (ER), and economic growth (GDP growth) influence profitability in Indonesia’s banking sector. In addition, it also examined whether there is a short-term equilibrium relationship and a long-term equilibrium relationship between these macroeconomic factors on profitability. The type of research is explanatory research with a quantitative approach. The data analysis technique is descriptive analysis with multiple linear regression using the Ordinary Least Square (OLS) method on secondary and annual time series data. The estimation results that the partial long-term equilibrium relationship between ER and IR is proven to have a significant effect on profitability, while GDP growth and inflation do not affect profitability. However, simultaneously the four independent variables, which is a test model, have a significant effect on profitability (dependent variable). The correlation between independent variables and the dependent variable is very large, 91.78%, while the rest is explained by variations of other variables that are not included in this research model. Results of the Short-term equilibrium relationship using the Error Correction Method (ECM) test show us that all independent variables from this research model are not significant, it can be seen from the probability of all independent variables are more than 5%. This means that the results of the co-integration test and ECM show that all independent variables do not have a short-run equilibrium relationship with the dependent variable. These results are expected to be additional information for policy and decisions making in Indonesia’s banking sector.

Keywords: GDP, inflation, exchange rate, interest rate, ROE

I. INTRODUCTION

In today's modern era, banks have an important role in economic growth in Indonesia. Everyone feels the direct benefit of the existence of banks in Indonesia, both in the upper, middle, and lower classes. This is because banks in Indonesia offer a variety of useful and innovative service products. Starting from ordinary products such as money storage services, money transfers, safe lending of money to special service products, such as large-scale money lending among entrepreneurs, investment, etc.

All these things are done by the bank not only to help the Indonesian state in economic growth but also to gain profits in its business. By Hasibuan's (2005:2) definition of a bank as a financial institution, usually in the form of a company that collects funds from people who have a surplus of funds and distributes them back to people who lack funds, as well as providing services, other bank services for-profit and social motives to improve the standard of living of many people.

The progress and development of banking in Indonesia cannot be separated from external factors that influence it. These external factors are macroeconomic factors. Several macroeconomic factors influence the development of banking, including inflation, interest rates, exchange rates, and people's incomes. Inflation is a condition where the prices of goods in general experience a continuous increase or a decrease in the value of domestic money. The interest rate is a certain percentage calculated from the principal loan that must be paid by the debtor or borrowers of funds within a certain period and is received by the creditor in this case the bank as a fee. The exchange rate according to Dominic Salvatore (1996) is the price of a currency against other currencies or the comparison between

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the price of one country's currency with the price of another country's currency. Community income referred to here is national income, namely the income of the people of a country as a whole or produced by a country within a certain period which can be seen from the economic growth of a country. These macro factors are external factors that will affect the situation and development of the banking sector, especially regarding the profitability of banking in Indonesia. Community income referred to national income, which is the income of the people of a country as a whole or produced by a country within a certain period which can be seen from the economic growth of a country. These macro factors are external factors that will affect the situation and development of the banking sector, especially regarding the profitability of banking in Indonesia.

When interest rates are low, the effect is that more people borrow money. As a result, consumption increases because there is more money in circulation, the economy begins to grow, and the after-effect is rising inflation. The opposite effect also applies, if interest rates are high, there will be fewer money borrowers. The result is that more people hold back on spending, they choose to save money, consumption levels fall and inflation falls. Inflation as another factor has an influence on bank development, which is a high increase in inflation will cause a decline in people's purchasing and this has an impact on companies that will reduce production and investment resulting in a decrease or sluggishness in lending to banks by companies (debtors). Another factor is the exchange rate factor, which is very influential on foreign exchange trading, if there is a depreciation of the domestic currency value against foreign currency, people will sell or release their foreign currency. On the other hand, if there is an appreciation of the domestic currency against foreign currency, people will buy foreign currency. Another factor is per capita income (GDP per Capita) where income per capita very influential on people's savings in banks, namely the development of savings is influenced by an increase in people's per capita income. This is in accordance with Keynes's opinion which states that the consumption function is based on behavior, namely if there is an increase in income, the increase is not used entirely to increase consumption but is also used for saving from the remaining income.

<table>
<thead>
<tr>
<th>Year</th>
<th>Inflation (%)</th>
<th>Interest rate (%)</th>
<th>IDR/USD</th>
<th>Economic growth (%)</th>
<th>ROA (%)</th>
<th>ROE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>3.35%</td>
<td>7.50</td>
<td>13,795</td>
<td>4.88</td>
<td>4.19%</td>
<td>29.89%</td>
</tr>
<tr>
<td>2016</td>
<td>3.02%</td>
<td>4.75</td>
<td>13,436</td>
<td>5.02</td>
<td>3.84%</td>
<td>23.08%</td>
</tr>
<tr>
<td>2017</td>
<td>3.61%</td>
<td>4.25</td>
<td>13,548</td>
<td>5.07</td>
<td>3.69%</td>
<td>20.03%</td>
</tr>
<tr>
<td>2018</td>
<td>3.13%</td>
<td>6.00</td>
<td>14,481</td>
<td>5.17</td>
<td>3.68%</td>
<td>20.49%</td>
</tr>
<tr>
<td>2019</td>
<td>2.72%</td>
<td>5.00</td>
<td>13,901</td>
<td>5.02</td>
<td>3.50%</td>
<td>19.41%</td>
</tr>
<tr>
<td>2020</td>
<td>1.68%</td>
<td>4.25</td>
<td>14,121</td>
<td>-2.19</td>
<td>2.41%</td>
<td>12.62%</td>
</tr>
<tr>
<td>Average</td>
<td>2.92%</td>
<td>5.29</td>
<td>13,880</td>
<td>3.83</td>
<td>3.55%</td>
<td>20.92%</td>
</tr>
</tbody>
</table>

Source: BPS

The table above displays data on inflation, interest rates, exchange rates, economic growth which are external factors to profitability data (ROA & ROE) as an illustration of the development of the data to be studied. Where there have been fluctuations in profitability data and the factors that influence it during the last five years from 2015 to 2020.

From 2015 to 2016 there was a decrease in inflation (-0.33%) and interest rates (-0.25%) while economic growth increased (0.05%) and there was a strengthening of the rupiah against the USD but there has been a significant decrease in the profitability of companies that measured by ROA (-0.35%) and ROE (-6.81%).

From 2016 to 2017 there was a decrease in interest rates (-0.5%) and the weakening of the rupiah against the USD while economic growth (0.05%) and inflation (0.59%) increased but there has been a decline in company profitability as measured by ROA (-0.15%) and ROE (-3.05%).

From 2017 to 2018 there was a decrease in inflation (-0.48%) and the weakening of the rupiah against the USD while there was an increase in economic growth (0.1%) and interest rates (1.75%) but there has been a decline in the company's profitability as measured by ROA (-0.01%) but increased ROE (0.46%).
From 2018 to 2019 there has been a decrease in inflation (-0.41%), interest rates (-1%) and economic growth (-0.15%) while the value of the rupiah against the USD has strengthened but there has been a decline in company profitability as measured by ROA (-0.18%) and ROE (-1.08%).

Meanwhile, from 2019 to 2020, there has been a decrease in all factors, namely inflation (-1.04%), interest rates (-0.75%) and economic growth (-2.19%) and the weakening of the value of the rupiah against the USD as well as company profitability measured by ROA (-1.09%) and ROE (-6.79%) has decreased.


**Research purposes**

Based on the discussion and data above, the authors focus on researching macroeconomic factors that influence the development of banks as companies and their impact on the profitability of the bank itself. The profitability of a company according to G. Sugiyarlo and P. Winarni (2005:118) shows the comparison between profit and assets or capital that generates the profit. In other words, profitability is the ability of a company to achieve profit. So, the purpose of this study is to analyze how much inflation, interest rates (BI Rate), exchange rates, and economic growth that are macroeconomic factors or external factors influence the profitability of the banking sector both in the short term (short term equilibrium relationship) and long term (long term equilibrium relationship). So hopefully the results of this research are expected to be considered for interested parties, namely conventional banks, especially for decision making in determining company policies and become a source of information for other parties who will carry out the same research.

**II. LITERATURE REVIEW**

Agus Sartono (2010:122) states that the notion of profitability is the company's ability to earn profits in relation to sales, total assets, and own capital. Profitability is an important factor in business because to be able to carry on its life, a company must make a profit. After making a profit, the company can survive and develop itself, one of which is by getting capital from outside. The creditors as outside investors and company owners can read the profits earned by the company in the company's financial statements made by the company's management.

Financial statements are information that describes a company's condition, which then will become information that describes the performance of a company (Fahmi, 2016:22). Complete financial statements usually include a balance sheet, income statement, statement of changes in financial position (which can be presented in a variety of ways, such as, for example, as a cash flow statement), notes and other reports as explanatory material that are an integral part of the financial statements. Thus, financial statements are basically an accounting process result that can be used as tools for assessing company performance and communicating financial performance data or company activities to interested parties.

Performance appraisal for a company can be measured from financial performance and management's success in managing a business entity. The object of research to be studied is banking services from one of the largest banks in Indonesia, Bank Rakyat Indonesia, Tbk (BRI) in terms of external factors (macroeconomics) that affect the soundness of the bank through profitability. Based on Bank Indonesia Circular Letter No.6/23/DPNP dated May 31, 2004, concerning the Rating System for Commercial Banks, there are six indicators used to assess bank performance, namely capital, asset quality, management, profitability, liquidity, and sensitivity to market risk. Apart from that, to measure the performance and level of the financial soundness of a business entity can be seen from the financial reports issued by the business entity.
Financial Statement Analysis

Financial performance is the result or achievement that has been achieved by the company's management in carrying out its function, namely managing company assets effectively for a certain period (Rudianto, 2013: 189). The company's financial performance is a description of the financial condition of a company which is analyzed with financial analysis tools such as financial ratios so that it can be known about the good or bad financial condition of a company that reflects work performance in a certain period.

Analysis of financial statements in a company is also very useful to determine the viability of the company. Financial statement analysis is an analysis of analytical tools and techniques for general purpose financial statements and related data to produce estimates and conclusions that are useful in business analysis (Subramanyam, 2014: 3). So, financial statement analysis is a study of the elements of financial statements that will be converted into smaller units of information so that financial conditions, business prospects, and management effectiveness can be known. This information is very useful for management to make the right decisions for the survival of the company.

Budi Raharjo in the book "Finance and Accounting" (2007; Hassan & Meyer, 2020; Nel, 2020; Muhammad & Mukminan, 2020) classified a company's financial ratios into five, they are liquidity ratio, activity ratio, solvency ratio, profitability ratio, and investment ratio. In this study, what will be discussed is the profitability ratio that according to Kasmir (2016: 196), "Profitability Ratio is the ratio used to assess the company's ability to seek profit".

Profitability Ratio

A consistent level of profitability will be a benchmark for how the company is able to survive in its business by obtaining an adequate profit (return) when compared to the risk. So that the higher the profit earned, the less likely the company will experience financial distress. A profitability ratio is a profitability measured by using Return on Assets (ROA) and Return on Equity (ROE). The profitability ratio in this study is the profitability measured by using Return on Equity (ROE).

According to Hanafi and Halim (2016: 82), "ROE ratio measures the company's ability to generate profits based on certain share capital. This ratio is a measure of profitability from a shareholder's point of view.” ROE is calculated using the formula:

\[ \text{ROE} = \left( \frac{\text{Net profit}}{\text{Current liabilities}} \right) \times 100\% \]

Interest Rate

Interest rate is the remuneration provided by banks based on conventional principles to customers who buy or sell their products or its usually defined as the price to be paid to customers (who have deposits or creditors) and the price to be paid by customers to the bank (customers who have loans or debtors) (Kasmir, 2003: 121 in Ritayani Iyan et al).

The interest rate is expressed as a percentage of the principal per unit of time. The amount of the interest rate varies according to the ability of the debtor to provide a rate of return to the creditor. The interest rate can be one of the guidelines for investors in making investment decisions in the capital market. As an alternative investment vehicle, the capital market offers a return at a certain level of risk.

By comparing the level of profit and risk in the capital market with the interest rate offered by the financial sector, investors can decide which form of investment is able to generate optimal returns. The financial sector interest rate commonly used as a guide for investors is also known as the risk-free interest rate, which includes the central bank interest rate and the deposit rate. In Indonesia, the interest rate of the central bank is proxied at the interest rate for Bank Indonesia Certificates or SBIs (Husnan, 2003:21).

According to the classical theory, a high-interest rate will lead to a high volume of people's savings. In addition, a high-interest rate will also cause the company's cost of capital to soar, so that it will experience competition in investment, meaning that investors tend to choose to invest in the money market or savings compared to the capital market. On the other hand, a low-interest rate, either the loan interest rate or the deposit interest rate, will have the effect of decreasing people's desire to save while companies can take credit to increase capital or invest with low interest (Nopirin, 2007: 70).
Inflation

Inflation is a tendency of increasing the price of goods, especially the price of basic necessities in general and occurs continuously simultaneously in a number of regions. The definition of inflation (Dornbusch, 2004; 32) is the rate of change in prices and the price level is the accumulation of previous inflations so that the measurement of inflation itself can be used from the Consumer Price Index (CPI). Changes in CPI from time to time indicate the price movements of the packages of goods and services consumed by the public. The Consumer Price Index can be written in the following equation:

\[ \pi = \frac{P_t - P_{t-1}}{P_{t-1}} \]

Where \( P_{t-1} \) is the last year's price level and \( P_t \) is the current year's price level. So from the above equation we can determine the current price is:

\[ P_t = P_{t-1} + \pi P_{t-1} \]

The inflation rate above is a percentage of the price increase. The effect of inflation on the domestic situation will affect the stability of prices, which in turn will create economic instability itself, so that it will cause a sluggish domestic economy.

According to Irham Fahmi, 2006:79, inflation is a condition that described changes in the price level in an economy and according to Samuelson and Nordhaus (2004:381-382) inflation occurs when general price level rises. Inflation level is the percentage change in the price level. Meanwhile, according to Rudiger, Stanley, and Richard (2008:39) “Inflation is the rate of change in prices, and the price level is the accumulation of previous inflations”. The determination of the inflation rate is carried out by Bank Indonesia in accordance with Law number 23 of 1999 concerning Bank Indonesia.

Exchange Rate

The exchange rate can be interpreted as the price of a country's currency (domestic currency) which is converted in the form of foreign currency. Stable growth of the value of the currency indicates that the country has a relatively good or stable economic condition.

The exchange rate between the domestic currency against other foreign currencies will fluctuate, especially in the exchange rate system which is fully controlled by the currency market mechanism (free-floating exchange rate or flexible exchange rates). There are two kinds of changes in exchange rates, namely:

- Nominal depreciation (depreciation), is a decrease in the price of the domestic currency against other foreign currencies.
- Nominal appreciation (appreciation), is an increase in the price of the domestic currency against other foreign currencies.

The two changes in the exchange rate above, both appreciation and depreciation, occurred because of the tug-of-war between the forces of demand and supply in the market (a market mechanism). The changes in the exchange rate mentioned above, it will affect the financial performance of the banking sector.

Economic Growth

Economic growth is the economic growth of a country seen from the Gross Domestic Product (GDP). GDP is the value of all products (goods and services) produced by a country within one year, and is a product (output) produced not only by domestic citizens but also by foreign nationals or foreign companies operating or have a business in that country. To be able to produce products, especially goods, companies need capital to invest. The required investment can come from the banking sector.
Framework of Research

The company's financial performance is a description of the company's financial condition which is analyzed with financial analysis tools such as financial ratios, so that it can be known about the good or bad financial condition of a company that reflects work performance in a certain period.

In conducting a financial analysis must understand the various methods to measure a company's financial performance. The method used in this research is the calculation method, namely the profitability ratio used to assess the company's financial performance. The object of this research is the banking sector company. In addition, by collecting various data related to the company and processing these data by applying it with predetermined calculation methods. From these processes, it is hoped that the feasibility of a company's financial statements can be known.

The Framework of Research in research is as follows:

![Figure 2.1: Framework of Research](image)

Based on the description of the literature review above, the research hypothesis to be carried out in this study is as follows:

**Partial Test:**

H1: Exchange Rate (IDR/USD) has a significant effect on ROE

H2: Economic Growth has a significant effect on ROE

H3: Interest Rate has a significant effect on ROE

H4: Inflation has a significant effect on ROE

**Simultaneous Test (Model Test):**

H5: exchange rate, economic growth, inflation and interest rate effect simultaneously (simultaneously) on ROE.

### III. RESEARCH METHOD

In this research, quantitative data is used to determine how to find, collect, process, and analyze data from the Indonesia Stock Exchange, where Commercial Banks are the object. In addition, the research was conducted using the Ordinary Least Square (OLS) method. The data used in this study uses a longterm relationship secondary data and time series data annually from 2001 to 2019 (19 years).

Research method used to carry out several stages of statistical testing so that the results can be BLUE (Best, Linear, Unbiased and Estimator). The first stage to be carried out is to estimate the research model in the form of multiple regression as follows:

\[
Profit_t = \beta_0 + \beta_1 Inf_1 + \beta_2 IR_2 + \beta_3 ER_2 + \beta_4 GDP\_Growth_3 + u_i \quad 1
\]

\(Profit_t\) : Bank Sector Profitability

\(Inf_1\) : inflation
1. **IR**<sub>2</sub>: Interest Rate

2. **ER**<sub>3</sub>: Exchange Rate

3. **GDP**<sub>4</sub>: GDP Growth

4. **Ut**: White-noise process (disturbances or error terms)

The research model above is to find out whether each independent variable in the research model is significant to the dependent variable which is the object of research, the statistical test carried out in this case is using the 't-test' which is a partial test. The second stage is another statistical test that will be carried out is the model selection criteria, namely the goodness of fit test with the correlation test (R-square), AIC test and Fisher's test (F-test) is a model test used in the study, which underlies the regression model in the form of heteroscedasticity test, mutlinearity test and autocorrelation test. Normality test will also be carried out in this study so that all data to be used are normal. The third stage is after the statistical test above has been carried out, a stationarity test will be carried out on the data used in the study. This stationarity test is intended so that the time series data used in the study remains stable in the long term at the level of variance if it fluctuates, there is no difference in the range of data fluctuations in the event of spurious regression, this is necessary to identify long-term and short-term relationships between variables.

The fourth stage is to carry out Cointegration test used to explain the long-term equilibrium relationship between the research variables used, namely the independent variable (inflation, interest rate, exchange rate and GDP Growth) to the dependent variable (profitability) in the form of the same trend direction from the non-stationary variable data used in the model, so that the spurious regression phenomenon does not occur. The characteristics of spurious regression according to Wing Wahyu Winarso, 2009 are characterized by: having a high coefficient of determinant (R2), a high simultaneous test value (F-test), having a partial value (t) which is not significant or many that are not significant so that the test cannot be used. hypothesis and has a low Durbin Watson (d-value).

**Cointegration method** that used is the root unit time series with the Engle-Granger (EG) test or the Augmented Engle-Granger (AEG) test. The unit root test was carried out using the Augmented Dikey Fuller – ADF Unit Root Test with the following hypotheses:

- **H0**: there is a unit word
- **H1**: there is no unit root

If these variables have been cointegrated, we can see that there is a stable relationship in the long term in accordance with the objectives of this study.

The fifth stage is the error correction method-ECM that is used to analyze multivariate time series data which is not stationary but cointegration occurs between the variables used in the research model. The ECM method is used to balance the short-term economic relationship of variables that already have a long-term economic balance/relationship. Thus, ECM in this study will be used to see how much influence the exchange rate and GDP growth have on the performance of the Composite stock both in the short term and in the long term relationship. The Engle-Granger ECM model can be defined as follows (Saputra, Mariani Jaya et al):

\[
\Delta Y_t = \alpha_0 + \alpha_1 \Delta X_t + \alpha_2 EC_t + \varepsilon_t
\]

With \( EC_t = Y_{t-1} - \beta_0 - \beta_1 X_{t-1} \Delta X_t = X_t - X_{t-1} \)

\( \alpha_1 \) = short run coefficient,
\( \beta_1 = \) long run coefficient, and 
\( \alpha_2 = \) unbalance correction coefficient.

**IV. RESEARCH ANALYSIS AND RESULTS**

Before carrying out the first stage to be carried out, that is research model estimation, first a normalization test will be carried out on all operational variables used in this study. The results of the normalization test performed by the Jarque-Bera method using the E-VIEWS software are as follows:

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>Result</th>
<th>Jarque-Bera</th>
<th>Prob. Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ROE</td>
<td>Normal</td>
<td>0.860579</td>
<td>0.650321</td>
</tr>
<tr>
<td>2</td>
<td>Interest Rate</td>
<td>Normal</td>
<td>0.613874</td>
<td>0.735697</td>
</tr>
<tr>
<td>3</td>
<td>inflation</td>
<td>Normal</td>
<td>1.609035</td>
<td>0.447304</td>
</tr>
<tr>
<td>4</td>
<td>GDP</td>
<td>Normal</td>
<td>1.469087</td>
<td>0.479724</td>
</tr>
<tr>
<td>5</td>
<td>Exchange Rate</td>
<td>Normal</td>
<td>1.678459</td>
<td>0.432043</td>
</tr>
</tbody>
</table>

Source: Output Eviews 10.0 (processed)

It can be seen from the above output where the Jarque-Bera result is greater than Prob. and Prob. greater than alpha (\( \alpha \)). This shows accept H0 which means that the data is a normal distribution.

The first stage to be carried out in this research is to estimate the research model in the form of multiple regression as follows:

\[
ROE_t = \beta_0 + \beta_1Inf_1 + \beta_2IR_2 + \beta_3ER_2 + \beta_4GDP\_Growth_3 + u_i
\]

The estimation results from the research model above using e-views are as follows:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>7.64201</td>
<td>2.577119</td>
<td>2.96533</td>
<td>0.0413</td>
</tr>
<tr>
<td>GDP</td>
<td>-0.276105</td>
<td>0.75449</td>
<td>-0.365949</td>
<td>0.7329</td>
</tr>
<tr>
<td>Inflation (Inf)</td>
<td>0.004836</td>
<td>0.099129</td>
<td>0.048786</td>
<td>0.9634</td>
</tr>
<tr>
<td>Exch_rate (ER)</td>
<td>-1.588125</td>
<td>0.499732</td>
<td>-3.177954</td>
<td>0.0336</td>
</tr>
<tr>
<td>Interest_rate (IR)</td>
<td>0.644144</td>
<td>0.188864</td>
<td>3.410626</td>
<td>0.027</td>
</tr>
</tbody>
</table>

Source: Output Eviews 10.0 (processed)

\[
ROE = 7.68112323869 - 0.284722558448*GDP + 0.00563372514246*INF - 1.59601549997*ER + 0.642818224463*IR............. 4.1
\]

The estimation results in equation 4.1 above show that there is an inverse (negative) relationship between GDP Growth and the Exchange Rate on profitability, meaning that if GDP Growth decreases, there will be an increase in profitability of 0.276105 and vice versa if there is an increase in GDP growth, there will be a decrease in profitability by 0.276105. Likewise with the Exchange Rate, if the rupiah depreciates against the USD, the profitability on the other hand will increase by 1.588125, and vice versa if the rupiah appreciates against the USD, the profitability will otherwise experience a decrease of 1.588125.

However, this is not the case with inflation and interest rates, there is a direct (positive) relationship to profitability, meaning that if the rate of inflation decreases by 1%, there will also be a decrease in profitability by 0.004836 and vice versa if there is an increase in inflation by 1%, there will also be an increase in profitability of 0.004836. Likewise with the interest rate, if the interest rate increases by 1%, there will also be an increase in profitability of
0.644144 and vice versa if there is a decrease in interest rate by 1%, there will also be a decrease in profitability of 0.644144.

If we look at the estimation results above, we can see that the partial test (t-test) of each of the four independent variables (GDP Growth, Inflation, Exchange Rate and Interest Rate) on profitability shows that the exchange rate and interest rate have a significant effect on profitability. This profitability is proven by looking at the probability results of the two independent variables above, each of which is 0.0336 and 0.027 these results are below 0.05 (5%). However, the other two independent variables, namely GDP Growth and Inflation, the results show no significant effect on profitability, this is evidenced by the probability results of 0.7329 and 0.9634 respectively, these results are above 0.05 (5%).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-squared</td>
<td>0.958914</td>
<td>-3.44862</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.917827</td>
<td>-3.33905</td>
</tr>
<tr>
<td>SE of regression</td>
<td>0.03713</td>
<td>-3.68507</td>
</tr>
<tr>
<td>Sum squared resid</td>
<td>0.005514</td>
<td>1.600853</td>
</tr>
<tr>
<td>Likelihood logs</td>
<td>20.51879</td>
<td></td>
</tr>
<tr>
<td>F-statistics</td>
<td>23.33903</td>
<td></td>
</tr>
<tr>
<td>Prob(F-statistic)</td>
<td>0.004926</td>
<td></td>
</tr>
</tbody>
</table>

Source: Output Eviews 10.0 (processed)

However, the four independent variables (GDP Growth, Inflation, Exchange Rate, and Interest Rate) together (simultaneously) which is a test model have a significant effect on profitability (dependent variable). This can be proven from the results of the F-test of 23.33903 and the above probability (Prob) result is adalah 0.004926 This result must be below 0.05.

In addition, if we look at the model's feasibility test, this test can be seen from the results of the Adjusted R-squared which is a measure of Goodness of Fit, which is 0.917827 it means that in the long term the variation in profitability (dependent variable) can be explained by variations in GDP Growth, Inflation, exchange rate and interest rate which is 91.78 percent, while the rest is explained by variations of other variables not included in this research model. In addition, the results of the Akaike Info Criterion (AIC) test are -3.44862, and the result of the Durbin-Watson test is 1.600853 this shows that the linear model in this study is feasible to be used in research (goodness fit research model).

The normality test was carried out on the results of the research model using the Jarque-Bera test with the result of 0.856646 (below 4) and the probability value of 0.651601 the result must be greater than 5%. This shows that the above research model used is normally distributed.

**Assumption Classic Test**

So that the analysis carried out on the research model used is BLUE (Best, Linear, Unbiased and Estimator) then the classical assumption test will first be carried out, to find out whether in the research model there are problems with classical assumptions.

**4.2.1 Correlation LM test Result**

*Auto-correlation test* performed using Breusch-Godfrey (BG). Based on the BG test, the following results were obtained:

<table>
<thead>
<tr>
<th></th>
<th>F-statistics</th>
<th>Prob. F(2.29)</th>
<th>0.8386</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obs*R-squared</td>
<td>1.452236</td>
<td>Prob. Chi-Square(2)</td>
<td>0.4838</td>
</tr>
</tbody>
</table>

Source: Output Eviews 10.0 (processed)
The Auto-correlation test results in table 4.4 above show that the Obs*R-squared result is 1.452236 and the Chi-Square Probability is 0.4838 which must be greater than 5 percent, it can be concluded that there is no autocorrelation from the research model.

**Heteroscedasticity Test Results**

From the results of heteroscedasticity test which was carried out using Breusch-Pegan Godfrey (BPG the following results were obtained:

Table 4.5 : Heteroskedasticity Test: Breusch-Pagan-Godfrey

<table>
<thead>
<tr>
<th></th>
<th>Obs*R-squared</th>
<th>Prob. Chi-Square(8)</th>
<th>Chi-Square Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaled explained SS</td>
<td>0.323770</td>
<td>0.1536</td>
<td>0.9882</td>
</tr>
</tbody>
</table>

Source: Output Eviews 10.0 (processed)

The results of the heteroscedasticity test in table 4.5 above obtained the results of Obs*R-squared of 6.682730 and the Probability of Chi-Square of 0.1536 the results must be greater than 5 percent, it can be concluded that there is no heteroscedasticity from the research model.

**Multicollinear test results**

From the results, it can be seen that the VIF value is less than 10, so it can be concluded that in the regression model there is no multicollinearity and the regression model is feasible to use.

Table 4.6 : Multicolinear test: VIF

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>INF</td>
<td>-0.452</td>
<td>-108</td>
<td>1.402</td>
<td>0.220</td>
<td>416</td>
</tr>
<tr>
<td>IR</td>
<td>3.153</td>
<td>0.442</td>
<td>5.752</td>
<td>0.002</td>
<td>417</td>
</tr>
<tr>
<td>ER</td>
<td>-3.695</td>
<td>-0.726</td>
<td>-12.709</td>
<td>0.000</td>
<td>753</td>
</tr>
<tr>
<td>GDP</td>
<td>761</td>
<td>0.235</td>
<td>3.235</td>
<td>0.023</td>
<td>662</td>
</tr>
</tbody>
</table>

a. Dependent Variable: ROE – Source: IBM SPSS Statistic 24

Short-Term Relationship Analysis Research Model

**4.3.1 Stationary Test**

To see and prove whether there has been a short term equilibrium relationship from this research model, a stationary test will first be carried out. This test was carried out using the unit root test with Augmented-Dickey-Fuller (ADF) with the following results:

Table 4.7: Augmented Dickey-Fuller test statistics (Stationary Test)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Stationarity Level</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level</td>
<td>First Difference</td>
<td>Second Difference</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ADF</td>
<td>Prob.</td>
<td>ADF</td>
<td>Prob.</td>
<td>ADF</td>
<td>Prob.</td>
</tr>
<tr>
<td>ROE</td>
<td>-0.869319</td>
<td>0.7408</td>
<td>-3.065896</td>
<td>0.0424</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Exchange Rate</td>
<td>-0.450606</td>
<td>0.8891</td>
<td>-6.878913</td>
<td>0.0000</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>GDP</td>
<td>-3.601811</td>
<td>0.0394</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>inflation</td>
<td>-1.254271</td>
<td>0.5934</td>
<td>-4.673823</td>
<td>0.0153</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Interest Rate</td>
<td>-1.527787</td>
<td>0.4700</td>
<td>-2.566479</td>
<td>0.1460</td>
<td>-4.065343</td>
<td>0.02553</td>
</tr>
</tbody>
</table>

Source: Output Eviews 10.0 (processed)
From the results of the Stationary Test in table 4.7 above, it shows that all research data are not stationary, this indicates that the data has a unit root problem and spurious regression can be ascertained. In order for the research data to be analyzed for short-term relationships, non-stationary data will be increased to first difference or second difference. After that, it will be continued with the co-integration test.

**Cointegration Test (Engle-Granger Test)**

The results of the co-integration test that have been carried out are as follows:

\[
D(ROE,3) = 0.0117878298506 - 1.59191088468 \times D(GDP,2) - 0.134190430187 \times D(INF,2) - 0.471672748457 \times D(ER,2) + 0.418845581938 \times D(IR,3) \quad \ldots \ldots \ldots 4.2
\]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.011788</td>
<td>0.008619</td>
<td>1.367666</td>
<td>0.4019</td>
</tr>
<tr>
<td>D(GDP,2)</td>
<td>-1.591911</td>
<td>0.322581</td>
<td>-4.934914</td>
<td>0.1273</td>
</tr>
<tr>
<td>D(INF,2)</td>
<td>-0.13419</td>
<td>0.029166</td>
<td>-4.600864</td>
<td>0.1363</td>
</tr>
<tr>
<td>D(ER,2)</td>
<td>-0.471673</td>
<td>0.254103</td>
<td>-1.856226</td>
<td>0.3146</td>
</tr>
<tr>
<td>D(IR,3)</td>
<td>0.418846</td>
<td>0.043806</td>
<td>9.561443</td>
<td>0.0663</td>
</tr>
</tbody>
</table>

Source: Output Eviews 10.0 (processed)

From the results of the co-integration test, it is found that all independent variables (GDP, inflation, exchange rate and interest rate) have no effect on profitability (dependent variable) in the short term (short term equilibrium relationship). This can be seen in each t-statistic and Prob. in table 4.8 above where all independent variables are not significant (above 0.05).

The above is also supported by an F-statistic of 40.84362 Prob (F-statistic) of 0.116760 which is greater than 5%, meaning that the independent variables together have no significant effect on profitability in the short term (short term equilibrium relationship).

**Error Correction Method (ECM)**

The ECM test is used to see whether there has been a short-run equilibrium relationship between the exchange rate, GDP, inflation and interest rate on profitability. The ECM estimation results are obtained as follows:

\[
D(ROE) = -0.0236456962045 + 0.022468266327 \times D(GDP) - 0.0423875197036 \times D(INF) - 0.561839195643 \times D(ER) + 0.370594759494 \times D(IR) - 0.627468579644 \times ECT(-1) \quad \ldots \ldots \ldots 4.3
\]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-0.023646</td>
<td>0.00363</td>
<td>-6.514779</td>
<td>0.0228</td>
</tr>
<tr>
<td>D(GDP)</td>
<td>0.022468</td>
<td>0.102142</td>
<td>0.219971</td>
<td>0.8463</td>
</tr>
<tr>
<td>D(INF)</td>
<td>-0.042388</td>
<td>0.015576</td>
<td>-2.72142</td>
<td>0.1127</td>
</tr>
<tr>
<td>D(ER)</td>
<td>-0.561839</td>
<td>0.091786</td>
<td>-6.1212</td>
<td>0.0257</td>
</tr>
<tr>
<td>D(IR)</td>
<td>0.370595</td>
<td>0.029891</td>
<td>12.39822</td>
<td>0.0064</td>
</tr>
<tr>
<td>ECT(-1)</td>
<td>-0.627469</td>
<td>0.114896</td>
<td>-5.461204</td>
<td>0.0319</td>
</tr>
</tbody>
</table>

Source: Output Eviews 10.0 (processed)
Table 4.9 above explains that all independent variables from the research model are not significant, it can be seen from the probability (Prob.) of all independent variables greater than 0.05 (5%). This means that the results of the co-integration test and the error-correction method show that all independent variables (GDP, inflation, exchange rate and interest rate) do not occur in a short-run equilibrium relationship to the dependent variable (profitability). All independent variables in equation 4.3 above are inversely proportional to profitability except GDP and interest rate are directly proportional (positive). The ECT (error correction) coefficient value is -0.627469 (value must be negative). This shows the difference or correction between profitability (ROE) and the balance value is 62.75 percent which will be adjusted within one year.

V. CONCLUSIONS

From the results of data processing that has been carried out on the data model used in this study and after carrying out several stages of data processing with statistical tests ranging from model estimation, classical assumption test, stationary test on all research data both independent and dependent variables with root test unit, followed by cointegration test and error correction model (ECM) test, the results obtained which we can conclude that:

In a long-term equilibrium relationship where the Exchange Rate is proven to have an effect on the profitability (ROE) of Bank BRI for the period 2011-2020. If the rupiah depreciates against the USD, profitability will increase. And vice versa, if the rupiah appreciates against the USD, on the contrary, it will decrease. Interest rates are proven to have an effect on Bank BRI's profitability (ROE) for the 2011-2020 period. This means that if interest rates increase, there will also be an increase in profitability. Conversely, if there is a decrease in interest rates, there will also be an increase in profitability. Inflation has proven to have an effect on Bank BRI's profitability (ROE) for the 2011-2020 period. This means that if there is a decrease in inflation, it will have an impact on Bank BRI's profitability. Vice versa, if an increase in inflation and interest rates has an impact on Bank BRI's profitability. The inflation rate during the study period was at the normal distribution rate. Economic growth has proven to have an effect on Bank BRI's profitability (ROE) for the 2011-2020 period. If economic growth declines, on the contrary, there will be an increase in profitability. Conversely, if there is an increase in economic growth, there will be a decrease in profitability. However, the model test of the four independent variables (GDP Growth, Inflation, Exchange Rate, and Interest Rate) together (simultaneously) has a significant effect on profitability (dependent variable). The results of the co-integration test and the error-correction method show that all independent variables do not have a short-run equilibrium relationship with the dependent variable.

REFERENCES