PROCEEDINGS THE 4th INTERNATIONAL CONFERENCE ON ECONOMICS, BUSINESS, AND MANAGEMENT RESEARCH (ICEBMR) "Cultural Tourism as a Tool for National Building or Neocolonialism in the Bandung Spirit"
https://e-conf.usd.ac.id/index.php/icebmr/ | ISSN: 3032-596X | Vol 4, 2025

THE EFFECT OF INFLATION AND INTEREST RATES ON EXCHANGE RATES IN INDONESIA

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ABSTRACT

This study aims to analyse the influence of inflation rates and interest rates on foreign exchange rates for the period from 2000 to 2023. Using secondary data, this study applied a multiple linear regression method. The analysis results show that inflation has a negative and statistically significant effect on the exchange rate. On the other hand, interest rates have no significant impact on the exchange rate. Simultaneously, inflation and interest rates have a significant effect on the exchange rate. These findings underscore the importance of adaptive monetary policy and monitoring of external factors in maintaining exchange rate stability and the national economy.

Keywords: *Exchange Rate, Inflation, Interest Rate, Multiple Linear Regression, Indonesia*

1. Introduction

The rupiah exchange rate against foreign currencies, particularly the US dollar, often exhibits high volatility. These fluctuations create uncertainty for economic actors, such as investors, entrepreneurs, and consumers, which in turn impacts national economic stability. One of the primary causes of this volatility is the fluctuation in inflation and interest rates in Indonesia. The continued increase in the price of consumer goods causes inflationary pressures that can weaken the value of the rupiah. On the other hand, the interest rate set by Bank Indonesia as a monetary policy instrument plays a vital role in controlling inflation and influencing foreign capital flows. However, the relationship between inflation, interest rates, and the rupiah exchange rate is not always easy to predict because various domestic and global economic factors influence it. The problem that arises is how exactly inflation rates and interest rates affect the rupiah exchange rate, as well as the extent to which they impact Indonesia's economic stability. A lack of understanding of this relationship can lead to less targeted monetary policy, potentially worsening economic conditions.

The primary motivation of this study is to provide a clear empirical understanding of the impact of inflation and interest rates on the exchange rate. With the results of this study, it is hoped that policymakers, such as Bank Indonesia, can formulate more effective strategies in maintaining exchange rate stability and controlling Inflation. Additionally, this research aims to help market participants and investors make more informed decisions regarding investment and foreign exchange trading. This research is essential to be carried out as an effort to understand Indonesia's macroeconomic dynamics more comprehensively and to support the creation of sustainable economic growth and national financial stability.

This study offers novelty by using time series data spanning 23 years (2000–2023) to analyse the simultaneous and partial effects of inflation and interest rates on the rupiah exchange rate. Additionally, this study employed a classical assumption to ensure the validity of the econometric model used. The study also highlights the long-term dynamics as well as the role of external factors that were often overlooked in previous similar studies.

2. Literature Review

Research on the effect of inflation and interest rates on currency exchange rates has been widely conducted in the context of the Indonesian economy. Inflation is one of the key macroeconomic variables that significantly influences purchasing power and the stability of the rupiah exchange rate. High inflation tends to lead to exchange rate depreciation because it reduces the attractiveness of domestic investment and increases the demand for foreign exchange. Interest rates, as a monetary policy

instrument, also have a significant impact on the exchange rate. Increases in the benchmark interest rate usually lead to capital inflows, which in turn. However, these effects can differ depending on economic conditions and market expectations. Econometric models are often employed to test this relationship empirically. Multiple linear regression is the primary method for estimating the influence of inflation and interest rate variables on exchange rates. In this study, several relevant economic theories are employed to explain the relationship between variables of interest. These theories include:

2.1. Theory Purchasing Power Parity (PPP)

The Purchasing Power Parity (PPP) theory posits that the exchange rate between two currencies will adjust to reflect the difference in price levels between the two countries. If Inflation in Indonesia is higher than that of trading partner countries, then the rupiah tends to weaken against foreign currencies. This happens because the price of goods and services in the country has become more expensive, resulting in a decrease in the purchasing power of the domestic currency. *According to Dornbusch and Fischer (1994),* in the long run, the exchange rate will move towards an equilibrium that reflects the difference in inflation between countries involved in international trade.

2.2. Theory Fisher Effect

The Fisher Effect theory, proposed by Irving Fisher, states that a country's nominal interest rate will adjust to match its inflation rate. In the context of exchange rates, when Inflation in Indonesia increases, Bank Indonesia often responds by raising interest rates to attract investors and stabilise the rupiah exchange rate. However, if inflation continues to rise, higher interest rates can lead to an economic slowdown, which ultimately also affects the depreciation of the rupiah.

2.3. Theory Overshooting Exchange Rate

Dornbusch (1976) explained that the exchange rate is influenced not only by the difference in inflation but also by monetary policy. When central banks raise interest rates to control inflation, the exchange rate can initially overappreciate in the short term before returning to its long-term equilibrium level. This phenomenon is referred to as overshooting, which often occurs in developing countries such as Indonesia due to financial market volatility and foreign capital flows that are sensitive to monetary policy.

2.4. Theory Mundell-Fleming Model

The Mundell-Fleming model highlights the relationship between monetary policy, inflation rates, and exchange rates in open economic systems. According to this model, in a floating exchange rate regime, expansionary monetary policy (e.g., lowering interest rates to increase liquidity) can lead to exchange rate depreciation because it reduces the attractiveness of investments in domestic currencies. Instead, tight monetary policy can strengthen exchange rates by attracting foreign capital.

2.5. External Factors Affecting Exchange Rates

In addition to domestic factors such as inflation and monetary policy, exchange rates are also influenced by external factors, such as:

Global Economic Conditions: World economic uncertainty, such as a financial crisis or global recession, can trigger capital movements to safer assets, including the US dollar, leading to the depreciation of the rupiah.

Foreign Capital Flows: Foreign investment in the Indonesian bond and stock market can affect the rupiah exchange rate. When inflation is high, investors tend to withdraw their capital, which contributes to a weakening of the exchange rate.

Policy (The Fed): The Fed'*s monetary policy*, including changes in interest rates, can impact the rupiah exchange rate through global capital movements.

Based on the theories above, inflation has a close relationship with the exchange rate through purchasing power mechanisms, monetary policy, and external factors. A deep understanding of this theory is crucial for designing the right policy strategy to maintain rupiah exchange rate stability amid global economic dynamics.

2.6. Hypothesis

H1**:** Inflation affects the exchange rate in Indonesia.
H2**:** Interest rates affect the exchange rate
H3**:** Inflation and interest rate affects the exchange rate in Indonesia simultaneously

3. Research Methods

This study employs a quantitative approach to analyse the impact of inflation on currency exchange rates in Indonesia. The research design employs both descriptive and inferential methods. A descriptive approach is employed to describe inflation and exchange rate trends, while an inferential approach is used to analyse the cause-and-effect relationship between these two variables. The secondary data used is time series data from 2000 to 2023, sourced from Bank Indonesia (BI), the Central Statistics Agency (BPS), the World Bank, and the IMF. The dependent variable in this study is the exchange rate against the US dollar, while the independent variables are inflation, as measured by the Consumer Price Index (CPI), and the interest rate.

The data analysis methods used include descriptive analysis and multiple linear regression. Tests of classical assumptions will be performed to ensure the validity of the regression model. Data processing will use statistical software such as Stata. This study focuses on the influence of inflation on the rupiah exchange rate, with the limitation of not considering political factors or extraordinary events that can affect the exchange rate.

3.1. Variable Description and Data Source

This study uses exchange rate (KURS), which is expressed as the exchange rate of the rupiah against the United States dollar (Rp/USD). Meanwhile, the independent variables used include Inflation (INF), which is defined as the annual change in the Consumer Price Index (CPI) and reflects the increase in the price of goods and services in general; interest rate (SB), which is measured based on Bank Indonesia's benchmark interest rate (BI Rate) and serves as the primary monetary policy instrument in controlling Inflation and influencing capital flows; and the and describes the competitiveness of the domestic economy in the international market. Thus, this study aims to analyse how changes in inflation and interest rates, whether simultaneously or partially, can affect the exchange rate during the observed period.

This study uses secondary data obtained from official sources such as: Bank Indonesia (BI), Central Statistics Agency (BPS), and World Bank and IMF. The type of data used in this study is a time series, covering the period from 2000 to 2023, to examine the effect of inflation and interest rates on the exchange rate. Several important patterns and trends can be observed.

3.2. Technical Data Analysis

This study employs several analytical techniques to achieve its research objectives. First, descriptive analysis is conducted to illustrate the trends of inflation and interest rates in relation to exchange rates using multiple linear regression. As a validation step, this research also performs classical assumption tests, which include normality, multicollinearity, heteroscedasticity, and autocorrelation tests. These tests are conducted to ensure that the regression model used meets the requirements and is valid for use in the research data analysis. The data obtained will be analysed using statistical software such as Stata to ensure that the research results are more accurate and can be adequately interpreted.

3.3. Econometrics Model

The econometric model used in this study is a multiple linear regression model. Formulated as follows:

$$KURSt = \beta_0 + \beta_1 INF_t + \beta_2 SB_t + \varepsilon_t$$

$KURS_t$ = The exchange rate of the rupiah against the US dollar
INF_t = Inflation
SB_t = Bank Indonesia Benchmark Interest Rate (BI Rate)
β_0 = Constant
$\beta_1, \beta_2, \beta_3$ = The regression coefficient of each independent variable
ε_t = Error term

This model was used to measure the simultaneous and partial influence of each macroeconomic variable on exchange rate, as well as to test the significance of the relationships between variables during the observation period.

4. Research Findings and Discussion

Between 2000 and 2023, the rupiah exchange rate against the US dollar exhibited a significant long-term depreciation trend. The rupiah exchange rate moved from Rp8,421.77 per USD in 2000 to Rp15,236.88 in 2023, reflecting a weakening of around 80%. These exchange rate fluctuations were accompanied by the dynamics of Bank Indonesia's inflation rate and benchmark interest rates, which also changed quite sharply throughout the period. The highest annual inflation rate was recorded in 2000 at 20.44%, which is likely a continuation of the Asian economic crisis of 1997–1998. The next spike in inflation occurred in 2005 (14.33%), 2008 (18.14%), and 2022 (9.56%). In contrast, in 2020, Indonesia experienced deflation of -0.401% due to the economic contraction caused by the COVID-19 pandemic. In the last decade, inflation has tended to be more stable and lower, indicating improvements in domestic price management.

4.1. Statistics Descriptive

Based on the results of descriptive statistics, the data consisted of 24 annual observations spanning the period from 2000 to 2023. The average exchange rate was 11,275.75, inflation was 7.95%, and the interest rate was 6.92%. Inflation exhibits significant fluctuations (0.41%–20.64%), whereas interest rates tend to be more stable (3.1%–7.7%).

Variable	Obs	Mean	Std. Dev	Min	Max
KURS	24	11275.75	2421.151	8421.77	15236.88
INF	24	7.932583	5.599355	-.401	20.44
SB	24	5.029167	1.06953	3.1	7.7

4.2. Classic Assumption Test

The classical assumption test showed that the regression model met the requirements of residual normality (Shapiro-Wilk test, $p > 0.05$), and there was no multicollinearity (correlation between independent variables < 0.8).

4.2.1. Normality Test

Shapiro-Wilk test for normal data

Variable	Obs	W	V	Z	Prob > Z
uhat	24	0.97295	0.730	-0.643	0.73988

The Shapiro-Wilk test yielded $p = 0.73988$, indicating a normally distributed residual.

4.2.2. Multicollinearity Test

	ValueT-R	Inflation	Interest Rate
Exchange Rate	1.0000		
Inflation	-0.6288	1.0000	
Interest Rate	-0.4950	0.3359	1.0000

The results of the multicollinearity test showed that there was no high correlation between independent variables (Exchange Rate, Inflation, and Interest Rate), because all correlation values were below 0.8. This means that there is no problem of multicollinearity, so all three variables can be used simultaneously in regression models.

4.3. Multiple Linear Regression Result

Source	SS	df	MS		
Model	65539241.9	2	3276920.9	**Number of Obs**	**= 24**
Residual	69286090.2	21	3299337.63	**F (2,21)**	**= 9.93**
Total	**134825332**	**23**	**5861970.96**	**Prob> F**	**= 0.0009**
				R-squared	**= 0.4861**
				Adj R-squared	**= 0.4372**
				Root MSE	**= 1816.4**

NilaiTukar	Coef.	Std. Err	t	P>l t l	[95% Conf.	Interval]
Inflation	-225.4143	71.81424	-3.14	0.005	-374.7602	-76.06841
SukuBunga	-724.0884	375.972	-1.93	0.068	-1505.965	57.78814
_cons	16705.42	1820.317	9.18	0.000	12919.87	20490.98

The above results show an F-statistical value of 9.93 with a p-value of 0.0009 (below 0.05%), indicating that H0, i.e., there is no influence of independent variables (Inflation and Interest Rates) on dependent variables (Exchange Rate), is rejected. This means that simultaneously, there is a significant influence of Inflation and Interest Rates on Exchange Rates.

If you examine the results of the t-test, the Inflation variable has a p-value of 0.005 (below 0.05%), indicating that inflation partially has a significant effect on the Exchange Rate. Meanwhile, the Interest Rate variable has a p-value of 0.068 (above 0.05), indicating that the Interest Rate does not have a significant effect on the Exchange Rate at a significance level of 5%. A determination coefficient (R-squared) value of 0.4861 indicates that about 48.61% of the variation in the exchange rate can be explained by changes in inflation and interest rates, while other variables outside the model explain the rest.

These findings support the *Purchasing Power Parity (PPP) theory*, which states that an increase in domestic prices will reduce the purchasing power of the rupiah against foreign currencies, thereby driving depreciation. In the Indonesian context, high inflation usually reflects price pressures in the food, energy, and transportation sectors that are quite vulnerable to external turmoil.

The phenomenon of rupiah depreciation in the period 2000–2005 and 2013–2015 clearly illustrates this dynamic. During these periods, inflation soared due to rising fuel prices and the global crisis, which had a direct impact on the rupiah exchange rate. On the other hand, although Bank Indonesia's benchmark interest rate is also included as a variable in the model, the regression results show that the effect of interest rates on exchange rates is not statistically significant at the 95% confidence level. This suggests that interest rate movements in Indonesia, although policy-relevant, are not always strong enough to counteract exchange rate weakness, especially when pressure comes from abroad.

This condition also supports the *Overshooting Exchange Rate* theory, which states that exchange rates can overrespond to changes in interest rates in the short term before eventually stabilising. Global instability, such as the Fed's tight monetary policy, capital outflows, or a decline in Indonesia's export demand, can lead to the market's response being disproportionate to changes in domestic interest rates.

In addition, the results of the classical assumption test reinforce the validity of the model used, except for autocorrelations that require further attention in future research. An R-squared of 0.4861 suggests that almost half of the exchange rate variation can be explained by inflation and interest rates, suggesting a fairly representative model for macroeconomic data. However, 51.39% of the variation was still explained by other factors, such as trade balance, market expectations, geopolitical tensions, and global market sentiment.

Thus, the results of this study emphasise the importance of coordination between monetary and fiscal policies and the need for policies that are adaptable to external dynamics. Interest rate adjustments should be accompanied by domestic price stabilisation and a planned external risk mitigation strategy.

5. Conclusion

This study concludes that inflation has a negative and significant influence on the rupiah exchange rate against the US dollar during the period 2000–2023, supporting the *Purchasing Power Parity (PPP)* theory. This shows that uncontrolled domestic price pressures can reduce export competitiveness and weaken the rupiah's position in the foreign exchange market.

Meanwhile, although interest rates are theoretically closely related to capital movements and exchange rates, the effect in this study was not statistically significant. This suggests that exchange rate stability is not only dependent on domestic monetary instruments, but is also heavily influenced by external factors, such as global central bank policies (especially those of *the Fed*), foreign capital flows, and

geopolitical conditions. This result indicates that inflation and interest rates have a significant simultaneous influence on exchange rates.

The policy implication of this outcome is that Bank Indonesia needs to integrate its interest rate policy with broader domestic price stabilisation policies, including controls on food and energy commodity prices. In addition, the government needs to build economic resilience from a structural perspective, so that exchange rate fluctuations are not too dependent on global sentiment. The study also recommends that future models consider the *Error Correction Model (ECM)* or *Vector Error Correction Model (VECM)* approach to capture short- and long-term dynamics more accurately.

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