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# The Effect of Spot Exchange Rates, Estimated Forward Exchange Rates, and Inflation Rates on Future Spot Exchange Rate

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## ABSTRACT

The study investigates the influence of spot exchange rates, estimated forward exchange rates, and inflation rates on future spot exchange rates. The volatility in exchange rates and its impact on future spot exchange rates is a critical concern for international traders and investors. The findings could have practical implications for currency risk management and hedging strategies. The results of this study indicate that the spot exchange rates and inflation rates have a positive effect on the future spot rate, while the estimated forward exchange rate has a negative effect. The result offer valuable insights for policymakers, financial analysts, and businesses involved in international trade. By understanding the impact of spot and estimated forward exchange rates, as well as inflation rates, stakeholders can make more informed decisions regarding currency exposure and risk management. The study contributes to the literature on international financial management and provides a framework for predicting future exchange rate movements in a dynamic global economic environment.

**Keywords:** Spot Exchange Rates; Estimated Forward Exchange Rates; Inflation Rates.

## 1. Introduction

Almost all countries in the world conduct foreign exchange transactions in international trade, so that a country's exchange rate is one of the indicators in the economic system. Foreign currency is a currency used for international financial transactions and has an official exchange rate registered with the central bank (Hady, 2009). Economic actors buy and sell currencies in the foreign exchange market to facilitate international transactions (Madura, 2018). This transaction causes market players to face financial risks called foreign exchange exposure, consisting of translation exposure (financial statement risk), transaction exposure (future transaction value risk), and operating exposure (future cash flow risk).

Foreign exchange market players often use hedging strategies to protect the value of a company from exchange rate fluctuations (Madura, 2018). Hedging decisions are influenced by the degree of exposure and the decision to apply certain techniques to eliminate some or all of the exposure. One important step in managing foreign exchange risk is forecasting or predicting exchange rate

movements. Forecasting is the art and science of predicting future events (Heizer & Render, 2017). However, exchange rate movements cannot always be predicted accurately because they are influenced by unexpected events.

The spot rate is the currency exchange rate that occurs at that time in the spot market, while the forward rate is the exchange rate specified in a forward contract for use in the future (Madura, 2018). The estimated forward exchange rate is calculated from the spot exchange rate plus a forward premium or discount (Hady, 2009). Therefore, the expectation of future spot exchange rates can be determined using the reflection of current forward rates (Chiang, 1988). There is a study showing that the spot and forward market regression equation model can be used to predict future spot for several currencies, such as the Euro, Yen, and Australian Dollar, but is not significant for the US Dollar (Dewi, 2007). Another study found that the spot rate has a significant positive effect and the forward rate estimate has a significant netagive effect on the future spot for the Rupiah against the US Dollar (Anindita, 2017). The difference in these results may be caused by different economic conditions and time.

In addition to spot rates and forward rates, macroeconomic factors such as interest rates, inflation, and economic conditions, as well as non-economic factors such as political situations and security stability, also affect future spot rates. Reported from the Bank Indonesia website, the BI-rate from early 2024 to March 2024 was 6.00%. The decision to maintain the BI-Rate at 6.00% focuses on pro-stability monetary policy, namely to maintain the stability of the Rupiah exchange rate as well as pre-emptive and forward looking steps to ensure inflation remains under control within the target of 2.5±1% in 2024 (Bank Indonesia, 2024). The inflation target of 2.5±1% in 2024 resulted in actual inflation rates in the first quarter of 2024 of 2.57%, 2.75%, and 3.05% (Bank Indonesia, 2024).

Therefore, this study aims to determine the effect of spot exchange rates and estimated forward exchange rate along with inflation rates on future spot exchange rates in second quarter of 2024.

## 2. Literature Review

### *2.1 Hedging Theory*

The theory that states that shareholder value can be increased by reducing foreign exchange exposure by implementing a hedging policy is called Shareholders Value Maximization (Kahneman & Tversky, 1979). Hedging is an action taken to protect a company against exchange rate fluctuations (Madura, 2018). Hedging is also an action to protect a company to avoid or reduce the risk of foreign exchange losses as a result of business transactions (Faisal, 2001). Therefore, hedging is a strategy to protect the company's value against exchange rate fluctuations.

Hedging decisions must be made through analysis of information/data published in general and specifically, namely:

- The first step that can be taken for hedging decisions is to predict the exchange rate that will occur in the future (forecasting). Forecasting based on market efficiency is formed by the demand and supply of currency exchange rates that occur in the market, that can be obtained from the selling rate or buying rate (spot rate) published by the central bank as a reference for other banks.
- Hedging can also be done to avoid financial risks by using derivative instruments such as options, forwards, futures, and swap contracts.

*2.2 Spot Rate*

Spot rate is the exchange rate at which one currency is traded for another currency that occurs at that time in the spot market (Madura, 2018). Spot rate can be said to be the nominal exchange rate of a particular currency against another currency.

2.2.1 Spot Transaction Types

Theoretically, the delivery of spot transactions occurs at that time, but in practice this transaction can be completed within 2 or 3 days (Faisal, 2001). This means that the time of the transaction with delivery in the spot market is not long or is completed immediately (immediately delivery).

The types of transactions in the spot market are as follows:

- Cash, a spot transaction of a currency against another currency with delivery on the same day as the transaction day.
- Tom (tommorow), a spot transaction of a currency against another currency on the transaction day and delivery on the next day.
- Spot, a spot transaction of a currency against another currency on the transaction day and delivery within 48 hours.

*2.3 Estimated Forward Rate*

The forward rate is the exchange rate of a currency specified in a forward contract used to obtain another currency in the future (Madura, 2018). The forward rate is the rate set at the time the transaction is carried out to be completed at maturity. A forward transaction is an agreement between a seller and a buyer, an individual with a bank, or between banks for a certain amount of currency over a certain period of time at a predetermined exchange rate (Sartono, 2003). Forward transactions are carried out by economic actors in the international market who are involved in receiving or paying using foreign currency in the future (Kuncoro, 2001). Forward transactions usually use maturities of 1 week, 1 month, 3 months, or according to the agreement of the forward contract holder.

Estimated forward rate is a calculation used to estimate the forward rate that will be agreed upon. Estimated forward rate is calculated from the spot rate plus a forward premium (the forward rate

value is greater than the spot rate) or a forward discount (the forward rate value is smaller than the spot rate) (Hady, 2009). Estimated forward rate can be described by the following formula.

$$Forward\ Rate = Spot\ Rate + \frac{(Interest\ rate\ Differential \times Spot\ Rate \times Days)}{100 \times 360}$$

*2.5 Inflation*

Inflation is defined as a general increase in prices of goods and services over a period of time (Bank Indonesia, 2024). Inflation is also defined as a condition where there is an increase in the general price level, both for goods, services and production factors (Samuelson, 2003) . So inflation is a continuous increase in product prices over a period of time.

Inflation is calculated by BPS-Statistics Indonesia by collecting price data from various goods and services that represent public consumption spending or commonly known as the Consumer Price Index (CPI). CPI is divided into 11 categories based on the Classification of Individual Consumption by Purpose (COICOP) 2018.

## 3. Research Methodology

*3.1 Desain Penelitian*

The type of research used in this study is causal associative, to analyze the effect of spot and estimated forward exchange rate, and inflation rates as independent variables on future spot exchange rates. The research objects that are targeted to obtain solutions to the problems in this study are spot exchange rates, estimated forward exchange rates, future spots exchange rates, and inflation rates.

This research is a quantitative research where the data collection method used is a statistical dataset provided by the first party (Bank Indonesia and Trading Economics) in the form of historical time series data. Sampling in this study uses a purposive sampling technique.

The sampling criteria used in this study are as follows:

- Historical data of spot exchange rates and inflation rates in the first quarter of 2024.
- Historical data of estimeted forward exchange rates in accordance with historical data of spot rates in the first quarter of 2024.
- Historical data of future spot exchange rates in the second quarter of 2024 which describes 90 days of historical data of spot rates in the first quarter of 2024.

*3.2 Analysis Technique*

The analysis technique used in this study is multiple linear regression analysis in accordance with the type of causal associative research which functions to test the influence of two or more

independent variables on one dependent variable. The data analysis tool used in this quantitative study is Eviews 13 software.

3.2.1 Classical Assumption Test

The tests carried out in the classical assumption test are as follows:

- Autocorrelation
- Normality
- Heteroscedasticity

3.2.2 Regression Analysis

The multiple linear regression model equation that explains the influence of spot exchange rates, estimated forward exchange rate, and inflation rates on future spot exchange rates in this study is as follows:

$$Y_{t+1} = \alpha_{t+1} + \beta_{1,t} X_{1,t} + \beta_{2,t} X_{2,t} + \beta_{3,t} X_{3,t} + \varepsilon_t$$

With:

$Y_{t+1}$ is future spot exchange rates, $\alpha$ is the constant or intercept, $\beta_{1,2,3}$ is $X_{1,2,3}$'s slope or coefficient,

$X_1$ is spot exchange rates, $X_2$ is estimated forward exchange rates, $X_3$ is inflation rates, $\varepsilon$ is the error term, and t is period of time.

3.2.3 Hypothesis Testing

This study uses partial regression hypothesis testing (t-test). The t-test is used to measure how significant the individual independent influence is on the dependent variable if other variables are constant by comparing the probability value of the t-statistic and the level of significance.

The hypothesis in this study are as follows:

$H_1$ : There is a positive effect of the spot exchange rates on the future spot exchange rates.

$H_2$ : There is a positive effect of the estimated forward exchange rates on the future spot exchange rates.

$H_3$ : There is a positive effect of the inflation rates on the future spot exchange rates.

3.2.4 Goodness of Fit

The goodness of fit based on model in this study is:

- Simultaneous regression coefficient test or F test is done by comparing the probability value of F-statistic and the level of significance.
- The coefficient of determination test is done by looking at the Adjusted R-squared value.

## 4. Result

*4.1 Classical Assumption Test Result*

4.1.1 Autocorrelation

Table 1. Autocorrelation Test Result.

| Autocorrelation | Breusch-Godfrey Serial Correlation LM Test | |
|---|---|---|
| | Obs*R-squared | Prob. Chi-Square(2) |
| | 15.13661 | 0.3366 |

According to the results displayed in Table 1, the value of Obs*R-squared is 15.12661 with probability value 0.3366, which is larger than the significance level of 5%, so there is no autocorrelation in the residual values.

4.1.2 Normality

Table 2. Normality Test Result.

| Normality | Jarque-Bera Test | |
|---|---|---|
| | Jarque-Bera | Probability |
| | 1.438447 | 0.487130 |

According to the results displayed in Table 2, the value of Jarque-Bera is 1.438447 with probability value 0.487130, which is larger than the significance level of 5%, so the residual values are normally distributed.

4.1.3 Heteroscedasticity

Table 3. Heteroscedasticity Test Result.

| Heteroscedasticity | Heteroskedasticity Test: White | |
|---|---|---|
| | Obs*R-squared | Prob. Chi-Square(7) |
| | 7.657744 | 0.3637 |

According to the results displayed in Table 3, the value of Obs*R-squared is 7.657744 with probability value 0.3637, which is larger than the significance level of 5%, then the residual variance is constant so there is no heteroscedasticity in the regression model.

*4.2 Regression Analysis Result*

Table 4. Regression Result.

| Variable | Least Squares Method Regression | | |
|---|---|---|---|
| | Coefficient | t-Statistic | Prob |
| Constant | 11328.42 | 3.732994 | 0.0007 |
| Spot Exchange Rates | 0.863259 | 5.977485 | 0.0000 |
| Estimated Forward Exchange Rates | -0.631619 | -4.160528 | 0.0002 |
| Inflation Rate | 44015.54 | 6.220283 | 0.0000 |

According to regression analysis model on sub-chapter 3.2.2, so the equation for multiple linear regression in this study based on result in Table 4 is as follows.
Future spot exchange rates = 11328.42 + 0.863259 Spot exchange rates – 0.631619 Estimated forward exchange rates + 44015.54 Inflation rates + error

*4.3 Hypothesis Testing Result*

The results of the hypothesis test in this study are:

- The probability value of the t-statistic for the spot exchange rates is 0.0000 which is smaller than the significance level of 5%, so the spot exchange rates has a significant effect on the future spot. Then the coefficient value for the spot exchange rates is 0.863259, so the effect is positive. Therefore, Hypothesis $H_1$ is proven.
- The probability value of the t-statistic for the estimated forward exchange rates is 0.0002 which is smaller than the significance level of 5%, so the estimated forward exchange rates has a significant effect on the future spot. Then the coefficient value for the estimated forward exchange rates is -0.631619, so the effect is negative. Therefore, Hypothesis $H_2$ is not proven.
- The probability value of the t-statistic for the inflation rates is 0.0000 which is smaller than the significance level of 5%, so the inflation rates has a significant effect on the future spot. Then the coefficient value for the inflation rates is 44015.54, so the effect is positive. Therefore, Hypothesis $H_3$ is proven.

*4.4 Goodness of Fit Result*

4.4.1 Simultaneous Regression Coefficient

Table 5. Simultaneous Regression Coefficient.

| Simultaneous Regression Coefficient | Least Squares Method Regression | |
|---|---|---|
| | F-statistic | Prob(F-statistic) |
| | 31.66167 | 0.000000 |

According to the results displayed in Table 5, the value of F-statistic is 31.66167 with probability value 0.000000, which is larger than the significance level of 5%, so the independent variables in the research (spot exchange rate, estimated exchange rate, and inflation rates) simultaneously influence the dependent variables (future spot exchange rate).

4.4.2 Coefficient of Determination

Table 6. Coefficient of Determination Result.

| Coefficient of Determination | Least Squares Method Regression | |
|---|---|---|
| | R-squared | Adjusted R-squared |
| | 0.736403 | 0.713145 |

According to the results displayed in Table 6, the value of Adjusted R-squared is 0.713145 so the ability of the independent variables (spot exchange rate, estimated exchange rate, and inflation rates) to describe the variation of the dependent variables (future spot exchange rate) is 71.3145%.

## 5. Discussion

This study explores the implications of the analysis results showing that the Adjusted R-squared value is 0.713145, indicating that the independent variables (spot exchange rates, estimated forward exchange rates, and inflation rates) are able to explain 71.3145% of the variation of the

dependent variable (future spot exchange rates). This result shows that the three independent variables have a strong relationship with the future spot exchange rates.

This study found that the spot exchange rates and inflation rates have a positive effect on the future spot exchange rates, while the estimated forward exchange rates has a negative effect. This finding is in line with several previous studies showing that the spot exchange rates, estimated forward exchange rates, and inflation rates play an important role in predicting the future spot exchange rates. However, the results showing a negative effect of the estimated forward exchange rates on the future spot exchange rates are interesting, as this may indicate that the market may not always be efficient in predicting the future spot exchange rates.

Further discussion includes how these results can be used by stakeholders, including international traders and investors, to develop more effective risk management and hedging strategies. This research also provides an understanding of how economic conditions and macroeconomic factors, such as monetary policy and inflation rates, can affect foreign exchange rates.

## 6. Conclusion

This study concludes that spot exchange rates, estimated forward exchange rates, and inflation rates have a significant effect on future spot exchange rates. These findings make an important contribution to the international financial management literature and provide a framework for predicting future foreign exchange rate movements in a dynamic global economic environment.

These conclusions emphasize the importance of understanding the relationship between the studied variables and future spot exchange rates to make more informed decisions in the context of international trade and investment. This study also suggests that stakeholders can use the findings to improve their risk management strategies and prepare for foreign exchange rate volatility.

Overall, this study adds to the understanding of the factors that influence foreign exchange rates and provides new thinking on how foreign exchange markets operate and how they can be predicted. This study also offer suggestions for future research, such as exploring additional macroeconomic and non-economic factors that may affect exchange rate movements, or examining the predictive power of the model in different economic conditions or over longer time frames. This could help to refine the model and improve its predictive accuracy for currency markets.

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