Economic Analysis of Interest Rates and Exchange Rates

# 1. Theoretical Background

## 1.1 Interest Rates

Interest rates refer to the cost of borrowing money or the return on investment when lending money. Interest rates influence various aspects of the economy, particularly investment, consumption, savings, and international capital flows.

## 1.2 Exchange Rates

Exchange rates are the rates at which one currency can be exchanged for another. They play a crucial role in international trade and capital flows by adjusting the prices of goods and services between countries.

## 1.3 Relationship Between Interest Rates and Exchange Rates

The relationship between interest rates and exchange rates can be explained by several economic theories:

1. Interest Rate Parity (IRP): This theory states that differences in interest rates between two countries will be reflected in the forward exchange rate. The formula is:  
  
(1 + i\_d) = (F / S) \* (1 + i\_f)  
  
where i\_d is the domestic interest rate, i\_f is the foreign interest rate, F is the forward exchange rate, and S is the spot exchange rate.

2. International Fisher Effect (IFE): This theory posits that the difference in interest rates between two countries will reflect the expected change in exchange rates. The formula is:  
  
(E(S\_t) / S\_0) = (1 + i\_d) / (1 + i\_f)  
  
where E(S\_t) is the expected future exchange rate, S\_0 is the current exchange rate, i\_d is the domestic interest rate, and i\_f is the foreign interest rate.

3. Purchasing Power Parity (PPP): PPP theory suggests that exchange rates adjust to reflect differences in price levels between countries. The formula is:  
  
S = P\_d / P\_f  
  
where P\_d is the domestic price level and P\_f is the foreign price level.

# 2. Economic Formulas

## 2.1 Interest Rate Parity (IRP)

Interest Rate Parity (IRP) explains how interest rate differences impact exchange rate movements. If the domestic interest rate is higher than the foreign interest rate, the forward exchange rate must be lower than the spot rate, reflecting an expected depreciation of the foreign currency:  
  
F = S \* (1 + i\_d) / (1 + i\_f)

## 2.2 International Fisher Effect (IFE)

The International Fisher Effect (IFE) suggests that differences in interest rates provide expectations for future exchange rate movements. A currency with a higher interest rate is expected to depreciate over time:  
  
(E(S\_t) / S\_0) = (1 + i\_d) / (1 + i\_f)

## 2.3 Purchasing Power Parity (PPP)

Purchasing Power Parity (PPP) indicates that exchange rates adjust to maintain parity between the price levels of two countries:  
  
S = P\_d / P\_f

# 3. Real-World Examples

## 3.1 Relationship Between U.S. and Japanese Interest Rates and Exchange Rates

For example, consider the interest rate differential between the United States and Japan. If U.S. interest rates are higher than Japanese rates, the Interest Rate Parity theory suggests that the Japanese Yen (¥) will appreciate in the future. This prediction leads to adjustments in exchange rates to eliminate arbitrage opportunities.  
  
Example: In 2016, the Federal Reserve increased the U.S. interest rate while Japan maintained low rates through quantitative easing. As a result, the U.S. Dollar (USD) appreciated against the Japanese Yen, as capital flowed into the U.S. seeking higher returns.

## 3.2 International Fisher Effect Example

Another example is the comparison between Turkey and the Eurozone in the mid-2010s. Turkey's high inflation led to higher interest rates, but the Turkish Lira continued to depreciate. This reflects the market's expectation of a long-term decline in the Lira's value, despite the high interest rates.

## 3.3 Purchasing Power Parity Example

Purchasing Power Parity can be seen in the aftermath of the 1970s oil shocks, when U.S. inflation surged and the value of the Dollar declined. During this period, rising U.S. prices weakened the Dollar's purchasing power, leading to a depreciation in its exchange rate.

# 4. Conclusion

The relationship between interest rates and exchange rates is complex and can be explained by various economic theories and formulas. Changes in interest rates drive capital flows, which directly influence exchange rate movements. Interest Rate Parity, the International Fisher Effect, and Purchasing Power Parity are valuable tools for understanding this relationship, and real-world examples demonstrate how these theories work in practice. Understanding these dynamics is essential for economic policy-making and investment decisions.