The Impact of Interest Rate in determining Exchange Rate: Revisiting Interest Rate Parity Theory

P.R.M.R.Perera
Lecturer (Temporary)
Department of Accountancy, Faculty of Commerce & Management Studies, University of Kelaniya, Sri Lanka.
T.P: 071 9182838
malinthar_2013@kln.ac.lk

N.L.C.Silva
Lecturer (Temporary)
Department of Accountancy, Faculty of Commerce & Management Studies, University of Kelaniya, Sri Lanka.
T.P: 071 6202765
silvanl_2013@kln.ac.lk

N.K.L.Silva
Lecturer (Temporary)
Department of Accountancy, Faculty of Commerce & Management Studies, University of Kelaniya, Sri Lanka.
T.P: 071 7093451
silvank_2013@kln.ac.lk
The Impact of Interest Rate in determining Exchange Rate: 
Revisiting Interest Rate Parity Theory  

P.R.M.R.Perera¹, N.L.C.Silva², N.K.L.Silva³  

Department of Accountancy, Faculty of Commerce & Management Studies, 
University of Kelaniya, Sri Lanka.  

Abstract  

Objective of this study is to examine the relationship between Interest rate and the Exchange rate and to find the effect of changes in Interest rate on Exchange rate volatilities. Exchange rate is sensitive to number of factors, where Interest rate is identified as a major factor (Ozun & Cifter , 2010). Central Bank of Sri Lanka provides quantitative evidence for the study, where Sri Lanka Inter-Bank Offer Rate (SLIBOR) constitutes the independent variable and US Dollar to Sri Lankan Rupee exchange rate represents dependent variable. Sample spreads through 4 years and contains daily data. Data set is proven to be normally distributed. Correlation and Linear Regression Model is used to ascertain relationships. Results of the study are consistent with Interest Rate Parity theory that discloses a strong positive relationship between Interest rate and Exchange rate. This study extends the literature on international financing and provides valuable information to decision makers in small open economies and to the academia. 

Key Words: Interest Rate, Exchange Rate, Central Bank of Sri Lanka, Exchange Rate Parity.
Introduction

Interest rate is an important macroeconomic variable that causes Exchange rates to change. The Central Bank of a country uses interest rate in manipulating Exchange rate (Central Bank of Sri Lanka, 2006). Many researchers appeared to test the causality of Interest rate and Exchange rate to prove Interest Rate Parity theory, which is identified as a commonly used technique in forecasting exchange rates (Zhang & Dou, 2010).

Interest Rate Parity theory states that no investor could exploit the interest rate differentials in countries to make arbitrage profits, as the countries with high interest rates tend to have a depreciating currency (Wu & Chen, 1998). Thus the theory explains a positive relationship between Interest rates and Exchange rate in a country.

In this research, the relationship between interest rate and exchange rate is tested in order to prove the theory that will make a contribution to the knowledge of economists, investors and academics.

Literature Review

An empirical test of the relationship between Interest rate and exchange rate with a new wavelet network model using time series data, proved a positive relationship in Turkish financial markets (Ozun & Cifter, 2010). Lee & Boon, (2007) found that the Exchange rate and variability of Exchange rate is a considerable concern for various parties, as it has a significant impact on the economy, especially in the international currency markets. A study conducted to identify the effect of interest rate and inflation on exchange rate in Nigerian context, established a conflicting result where a negative relationship exists between interest rate and exchange rate (Thaddeus & Nnneka, 2014).
Belke, Geisslreither, & Gros, (2004) examined the interrelation between exchange rate volatility and interest rate volatility and found a statistical co-movement of exchange rate and interest rate volatilities. Cho & West, (2003) formulated a model using data from Korea, Philippines, and Thailand, to forecast the effect of interest rate shocks to either appreciate or depreciate exchange rates. Further, they found that an increase in interest rates caused exchange rate appreciation in Korea and the Philippines, however to depreciation in Thailand.

Zhang & Dou, (2010) argued that the interest rate parity theory does not effectively work currently compared to past economies, given that the the major currency markets are relatively more efficient, for interest rate parity to match. At the same time recessions and government interventions have weakened the behaviour of interest rate parity. Behavior of foreign exchange markets usually depend on the interest rate parity theory. Further, investors are ready to take the risk of exchange rate volatilities as long as there are forward contracts (Aliber, 1973).

Methods

Data collection and Sample

The study is based on quantitative approach and secondary data are collected from the Central Bank of Sri Lanka. Based on literature, Sri Lanka Inter Bank Offer Rate (SLIBOR) is selected as the independent variable, for which daily data collected for a period of 4 years from 2010 to 2014. For the same period, daily USD to LKR exchange rate data collected from the Central Bank of Sri Lanka (Ozun & Cifter , 2010). Shapiro-Wilk test proves the data set is normally distributed and data contains no outliers.
Hypotheses

Many studies formed the relationship between Interest rate and Exchange rate (Cho & West, 2003). Further studies established a positive respond of Exchange rate to a change in Interest rate.

Based on previous findings in literature, researcher is encouraged to develop following hypotheses,

$H_1$. There is a relationship between Interest rate and Exchange rate (Ozun & Cifter, 2010).

$H_2$. There is a relationship between changes in Interest rate and Exchange rate volatilities. (Belke, Geisslreither, & Gros, 2004)

Model Specifications

Following linear regression model is used by many researchers in finding relationships between two variables (Alam & Uddin, 2009). Same model is deployed in this study to explain the causality between Interest rate and Exchange rate,

$$Y_{1it} = u_{0i} + u_{1i} X_{1it} + u_{it}$$

(1)

Where,

$Y_{1it}$ is USD to LKR Exchange rate.

$X_{1it}$ is Interest rate (Sri Lanka Inter Bank Offer Rate)

Effect of changes in Interest rate on changes in Exchange rate is found regressing percentage changes of variables. Changes in the variables are calculated using following model.
\[ Y_2 = 100 \times \left[ \frac{Y_1(t) - Y_1(t-1)}{Y_1(t-1)} \right] \]  

(2)

Where,

\( Y_2 \) = Percentage change in the variable at period \( t \),
\( Y_1(t) \) = Value of the variable at period \( t \),
\( Y_1(t-1) \) = Value of the variable at period \( t-1 \).

The regression model reflects the effect of Interest rate on Exchange rate and the Effect of Interest rate percentage changes on percentage changes in Exchange rate.

Findings and Discussion

Relationship between Interest Rate and Exchange Rate

Pearson Correlation identifies a relationship between Interest rate and Exchange rate, which results a correlation coefficient of +0.741. This indicates a positive and a strong correlation between the variables.

<table>
<thead>
<tr>
<th>Correlations</th>
<th>SLIBOR</th>
<th>US$ Exchange Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLIBOR</td>
<td>Pearson Correlation</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td><img src="https://via.placeholder.com/150" alt="image" /></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>967</td>
</tr>
<tr>
<td>US$ Exchange Rate</td>
<td>Pearson Correlation</td>
<td><img src="https://via.placeholder.com/150" alt="image" /></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>967</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
Coefficient of determination ($R^2$) is 0.550, where 55% of exchange rate is determined by interest rate, and the rest 45% of the exchange rate is determined by all other factors.

### Model Summary\(^b\)

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.741(^a)</td>
<td>.550</td>
<td>.549</td>
<td>6.4561097</td>
</tr>
</tbody>
</table>

\(a\). Predictors: (Constant), SLIBOR  
\(b\). Dependent Variable: US$ Exchange Rate

Probability value of T-test for SLIBOR is 0.000 (Lower than 0.05) at 95% confidence level, where the explanatory power of interest rate is high.

### Coefficients\(^a\)

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>95.0% Confidence Interval for B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>87.759</td>
<td>1.060</td>
</tr>
<tr>
<td></td>
<td>SLIBOR</td>
<td>3.223</td>
<td>.094</td>
</tr>
</tbody>
</table>

\(a\). Dependent Variable: US$ Exchange Rate

**Relationship between change in Interest Rate and change in Exchange Rate**

Pearson correlation provides a coefficient of +0.040 that is a positive but weak correlation between changes in interest rate and exchange rate. This outcome makes it difficult for decision makers to predict potential exchange rate movements.
Correlations

<table>
<thead>
<tr>
<th></th>
<th>SLIBOR change</th>
<th>US$ Exchange rate change</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLIBOR change</td>
<td>Pearson Correlation</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.040</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>967</td>
</tr>
<tr>
<td>US$ Exchange rate change</td>
<td>Pearson Correlation</td>
<td>.040</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.217</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>967</td>
</tr>
</tbody>
</table>

The coefficient of determination is 0.002, which indicates only 0.2% of the exchange rate changes could be explained by interest rate changes. Thus other factors that are not considered in this study constitute 99.8% of the exchange rate.

Model Summary\(^b\)

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.040(^a)</td>
<td>.002</td>
<td>.001</td>
<td>0.29467%</td>
</tr>
</tbody>
</table>

\(^a\) Predictors: (Constant), SLIBOR change  
\(^b\) Dependent Variable: US$ Exchange rate change

Probability value of T-test for SLIBOR illustrates a weak explanatory power of interest rate, which is higher than 0.05 at 95% confidence level.

Coefficients\(^a\)

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>95.0% Confidence Interval for B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
</tr>
<tr>
<td>(Constant)</td>
<td>.015</td>
<td>.009</td>
<td></td>
</tr>
<tr>
<td>SLIBOR change</td>
<td>.016</td>
<td>.013</td>
<td>.040</td>
</tr>
</tbody>
</table>

\(^a\) Dependent Variable: US$ Exchange rate change
Conclusion

This study aimed at find the impact of interest rate on exchange rate which is expanded to two main objectives. Discussion focused on the set two objectives, provides information for following conclusions.

Providing similar results to the previous studies, this study reveals a positive relationship between interest rate and USD to LKR exchange rate in Sri Lanka. Further, the correlation discloses that the relationship is strong. Coefficient of determination strengthens the relationship and decisive power of Interest rate, where 55% of Exchange rate is determined by Interest rate. Changes in interest rate positively affect the USD to LKR Exchange rate changes. However a weak relationship exists between percentage changes.

This study is subject to limitations, where researched could use more data for an extended period of time in order to test the long term relationships between variables. Moreover there could be other variables that affect Exchange rate, which are not considered in this simple regression model. Further there could be uncaptured variations in data due to unusual events. As future research directions, it’s recommended to test the collective impact of more than one macroeconomic variables on Exchange rate.
References


