



A STUDY ON MACRO ECONOMIC INDICATORS AND THEIR IMPACT ON EXCHANGE RATES

Vidyavathi B., *Kulkarni Keerti & Ainapur Pooja

DVHIMSR, Dharwad, Karnataka-580004, India

*Corresponding authors' Email: deshpande.kitu.keerti@gmail.com

ABSTRACT

Exchange rates play a vital role in a country's level of trade, which is critical to most every free market economy in the world. Interest rates, inflation, GDP, current account deficit, External debt, FDI and their relationship with the exchange rates are one of the most important determinants of a country's relative level of economic health. For this reason, exchange rates are among the most watched analyzed and governmentally manipulated economic measures. On the other side, exchange rates matter on a smaller scale as well as larger scale from the economy's conditions and perspectives. The present study focuses on the analysis of various macro-economic variables and their inter-relationship with the major determinant, exchange rates. The study is an attempt to closely examine and evaluate the leading factors that influence the fluctuations in exchange rates and explains the reasons behind their volatility. It also analyses some of the major forces behind exchange rate movements and how it impacts one country's currency.

KEYWORDS: Exchange rates, Inflation, GDP, Interest rates, current account deficit, External Debt, FDI

INTRODUCTION

Foreign Exchange rate is one of the most important means through which a country's relative level of economic health is determined. A country's foreign exchange rate provides a window to its economic stability, which is why it is constantly watched and analyzed. If one has to think of sending or receiving money from overseas, he/she needs to keep a keen eye on the currency exchange rates. And that's how an economy of any country as well has to observe the changes too closely. Exchange rates are basically the rates at which

one country's currency may be converted into another. It tends to fluctuate constantly with the changing market forces of supply and demand of currencies from one country to another. For these reasons; studying macro-economic variables and their impact on exchange rates are of utmost significance, which also helps to understand what, how and when these variables determine the exchange rates. This study is one such attempt to enable the understanding of economic factors influencing the exchange rates



Determinants of Exchange Rates

Numerous factors determine exchange rates, and all are related to the trading relationship between two countries. Remember, exchange rates are relative, and are expressed as a comparison of the currencies of two countries. The following are some of the principal determinants of the exchange rate between two countries. Note that these factors are in no particular order; like many aspects of economics, the relative importance of these factors is subject to much debate.

DIFFERENTIALS IN INFLATION

As a general rule, a country with a consistently lower inflation rate exhibits a rising currency value, as its purchasing power increases relative to other currencies. During the last half of the 20th century, the countries with low inflation included Japan, Germany and Switzerland, while the U.S. and Canada achieved low inflation only later. Those countries with higher inflation typically see depreciation in their currency in relation to the currencies of their trading partners. This is also usually accompanied by higher interest rates.

DIFFERENTIALS IN INTEREST RATES

Interest rates, inflation and exchange rates are all highly correlated. By manipulating interest rates, central banks exert influence over both inflation and exchange rates, and changing interest rates impact inflation and currency values. Higher interest rates offer lenders in an economy a higher return relative to other countries. Therefore, higher interest rates attract foreign capital and cause the exchange rate to rise. The impact of higher interest rates is mitigated, however, if inflation in the country is much higher than in others, or if additional factors serve to drive the currency down. The opposite relationship exists for decreasing interest rates - that is, lower interest rates tend to decrease exchange rates.

CURRENT-ACCOUNT DEFICITS

The current account is the balance of trade between a country and its trading partners, reflecting all payments between countries for goods, services, interest and dividends. A deficit in the current account shows the country is spending more on foreign trade than it is earning, and that it is borrowing capital from foreign sources to make up the deficit. In other words, the country requires more foreign currency than it receives through sales of exports, and it supplies more of its own currency than foreigners demand for its products. The excess demand for foreign currency lowers the country's exchange rate until domestic goods and services are cheap enough for foreigners, and foreign assets are too expensive to generate sales for domestic interests.

PUBLIC DEBT

Countries will engage in large-scale deficit financing to pay for public sector projects and governmental funding. While such activity stimulates the domestic economy, nations with large public deficits and debts are less attractive to foreign investors. The reason is that a large debt encourages inflation, and if inflation is high, the debt will be serviced and ultimately paid off with cheaper real dollars in the future.

In the worst case scenario, a government may print money to pay part of a large debt, but increasing the money supply inevitably causes inflation. Moreover, if a government is not able to service its deficit through domestic means (selling domestic bonds, increasing the money supply), then it must increase the supply of securities for sale to foreigners, thereby lowering their prices. Finally, a large debt may prove worrisome to foreigners if they believe the country risks defaulting on its obligations. Foreigners will be less willing to own securities denominated in that currency if the risk of default is great. For this reason, the country's debt rating (as determined by Moody's or Standard & Poor's, for example) is a crucial determinant of its exchange rate.

TERMS OF TRADE

A ratio comparing export prices to import prices, the terms of trade is related to current accounts and the balance of payments. If the price of a country's exports rises by a greater rate than that of its imports, its terms of trade have favorably improved. Increasing terms of trade shows greater demand for the country's exports. This, in turn, results in rising revenues from exports, which provides increased demand for the country's currency (and an increase in the currency's value). If the price of exports rises by a smaller rate than that of its imports, the currency's value will decrease in relation to its trading partners.

POLITICAL STABILITY AND ECONOMIC PERFORMANCE

Foreign investors inevitably seek out stable countries with strong economic performance in which to invest their capital. A country with such positive attributes will draw investment funds away from other countries perceived to have more political and economic risk. Political turmoil, for example, can cause a loss of confidence in a currency and a movement of capital to the currencies of more stable countries.

A declining exchange rate obviously decreases the purchasing power of income and capital gains derived from any returns. Moreover, the exchange rate influences other income factors such as interest rates, inflation and even capital gains from domestic securities. While exchange rates are determined by numerous complex factors that often leave even the most experienced economists flummoxed, investors should still have some understanding of how currency values and exchange rates play an important role in the rate of return on their investments.

NEED AND BACKGROUND OF THE STUDY

Macro-economic factors affect exchange rate of any country as all factors are interrelated and interlinked with economy which in turn affect exchange rate. Exchange rate volatility is directly associated with economy's macroeconomic indicators like Inflation, interest rates, FDI, GDP and Current account deficit. Some factors have negative relationship while some have positive relationship with exchange rates. Exchange rate plays a predominant role as foreign trade, foreign investment depend on exchange rate of the country. Country's economic growth is also relied on the exchange rate

of that country. For any international investments, exchange rate factor is the major consideration to invest. High exchange rate volatility affects international investment decisions and with less volatility ceases investments by foreign institutional investors. Therefore, exchange rate is a driving force to attract the international investments and to increase the country's economic growth rate. Exchange rate volatility is caused by many macro economic factors which tend to be an important component to understand the significance of exchange rates.

OBJECTIVES OF THE STUDY

- To understand the interrelationship between factors like inflation, and interest rates with Exchange Rate for the period of 2006-2016 using correlation analysis.
- To understand the interrelationship between factors like current account deficit, and FDI with exchange rate for the period of 2006-2016 using correlation analysis
- To understand the interrelationship between factors like, External debt and GDP with Exchange rate for the period of 2006-2016 using correlation analysis.
- To evaluate the different situations of economic factors causing appreciation and depreciation of currency.

LIMITATIONS OF THE STUDY

- Due to time constraint only 6 macroeconomic factors are taken for study.
- Only 10 years data has been taken to study the relationship between macroeconomic factors and exchange rate.

SCOPE OF THE STUDY

The study of exchange rates is of vital importance from the economy's growth perspective. Substantial variables are

responsible for the determination which causes impacts on exchange rates. The scope of the present research covers the most crucial macro-economic indicators which influence the exchange rates either positively or negatively. There are indeed, many other variables which can cause fluctuating exchange rates. But for the present exertion, variables which have a larger impact have been covered applying correlation analysis as the research tool. It throws the light on explaining as to how closely these variables influence the very dependent variable Exchange rates.

RESEARCH DESIGN

- This research has been carried out in order to investigate the impact of various macroeconomic variables on the volatility of foreign exchange rate. The research is based on secondary data, to compile the report with some variables ten years annual data for the period of 2006 to 2016 are collected. The relationship between Exchange rate and Macro-economic variables such as, interest rate, Inflation rate, Foreign Direct Investment, GDP , External debt etc. have been analyzed with the help of statistical tools.
- **Sample unit:** The Exchange rate, Inflation, Interest rate, External debt, GDP, FDI and Current account deficit are the factors considered for the study.
- **Sample size:** The sample includes yearly Macroeconomic indicators for the period of 10 years i.e.2006 to 2016.
- **Data collection type**
The entire study involves data collected using secondary sources. For this various literatures, books, journals, magazines, web links were used. The yearly data was confined to the year 2006 to 2016.

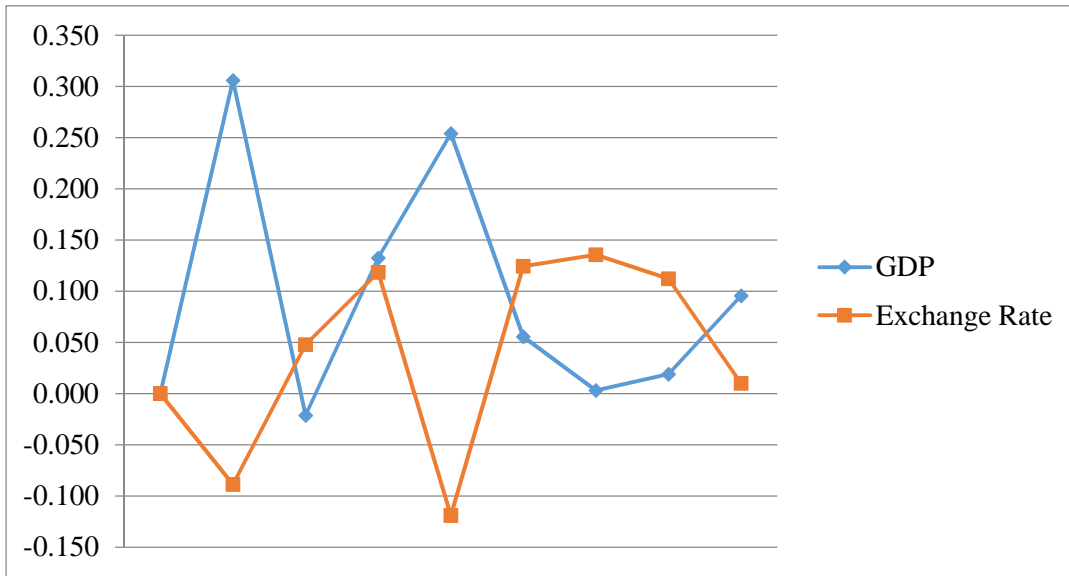
Data Analysis and Interpretation

Table showing the details of GDP Vs Exchange rate

Years	GDP	Returns	Exchange Rate	Returns
2006	951.34	-	45.29	-
2007	1242.43	30.598%	41.27	-8.876%
2008	1215.99	-2.128%	43.24	4.773%
2009	1377.26	13.262%	48.36	11.841%
2010	1727.11	25.402%	42.6	-11.911%
2011	1823.2	5.564%	47.9	12.441%
2012	1828.9	0.313%	54.4	13.570%
2013	1863.9	1.914%	60.5	11.213%
2014	2041.9	9.550%	61.1	0.992%
2015	2075.8	1.660%	66.67	9.116%

$$r = \frac{N \sum xy - \sum x \sum y}{\sqrt{[(N \sum x^2 - (\sum x)^2)(N \sum y^2 - (\sum y)^2)]}}$$

Variable X= GDP Variable Y= Exchange rate r = -0.819



Interpretation

From the above graph it can be depicted that GDP and Exchange rates are inversely correlated because of its negative correlation i.e, -0.819 which indicates that when one variable increases, the other variable decreases and the same can be seen in the above graph during the year 2007 and 2010. In 2007 when GDP increased from 951.34 to 1242.43, in the

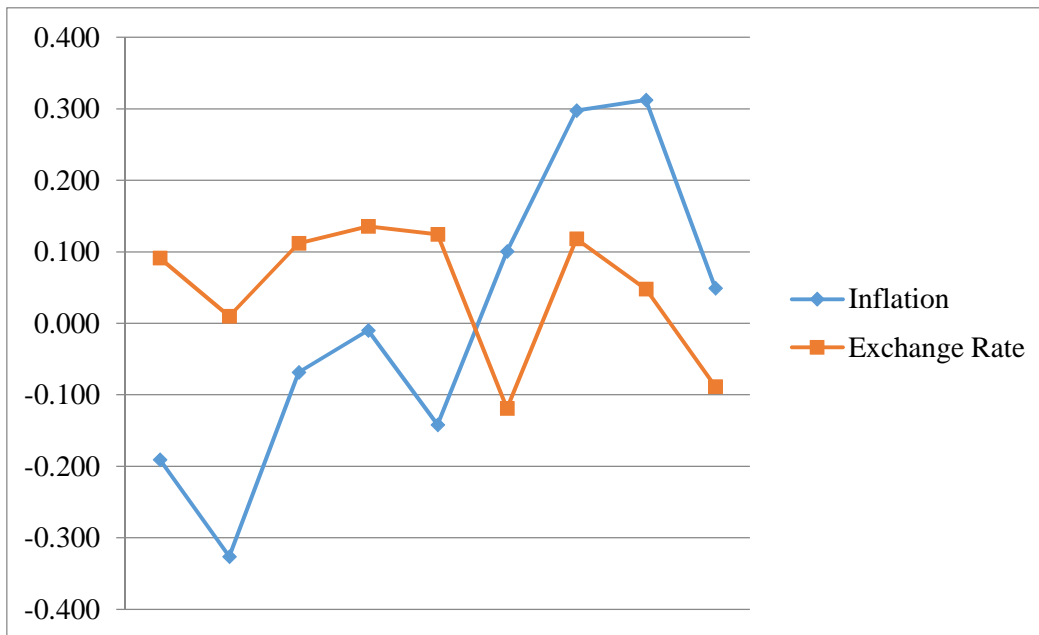
same line exchange rate appreciated from Rs 45.29 to Rs 41.27. During 2010, GDP increased from 1377.26 to 1727.11 and exchange rate appreciated (decreased) from Rs 48.36 to Rs 42.6. After 2010, inspite of GDP growth rate, exchange rate depreciated from Rs 42.6 to Rs 66.67 because of other factors like inflation, interest rates etc influencing Exchange rate.

Table showing the details of Inflation Vs Exchange rate

Years	Inflation (CPI)	Returns	Exchange Rate	Returns
2006	6.1	-	45.29	-
2007	6.4	4.918%	41.27	-8.876%
2008	8.4	31.250%	43.24	4.773%
2009	10.9	29.762%	48.36	11.841%
2010	12	10.092%	42.6	-11.911%
2011	10.3	-14.167%	47.9	12.441%
2012	10.2	-0.971%	54.4	13.570%
2013	9.5	-6.863%	60.5	11.213%
2014	6.4	-32.632%	61.1	0.992%
2015	5.18	-19.063%	66.67	9.116%

$$r = \frac{N \sum xy - \sum x \sum y}{\sqrt{[(N \sum x^2 - (\sum x)^2)(N \sum y^2 - (\sum y)^2)]}}$$

Variable X= Inflation Variable Y= Exchange rate r = -0.089



Interpretation

Inflation has negative correlation with exchange rate of an Indian currency since the value of correlation (r) is -0.089. During 2007 & 2010, inflation rates decreased and in the same

line exchange rates appreciated. After 2010, though the inflation rates decreased but still the exchange rates depreciated year on year.

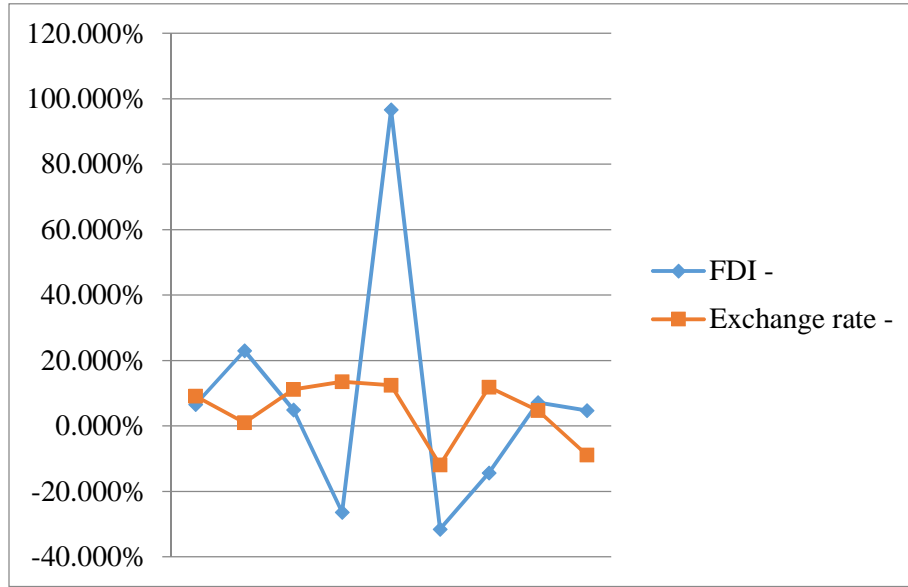
Table showing the details of FDI Vs Exchange rate

Years	FDI (Current US\$)	Returns	Exchange Rate	Returns
2006	36	-	45.29	-
2007	37.7	4.722%	41.27	-8.876%
2008	40.4	7.162%	43.24	4.773%
2009	34.6	-14.356%	48.36	11.841%
2010	23.7	-31.503%	42.6	-11.911%
2011	46.6	96.624%	47.9	12.441%
2012	34.3	-26.395%	54.4	13.570%
2013	36	4.956%	60.5	11.213%
2014	44.3	23.056%	61.1	0.992%
2015	47.2	6.546%	66.67	9.116%

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$$r = \frac{N \sum xy - \sum x \sum y}{\sqrt{[(N \sum x^2 - (\sum x)^2)(N \sum y^2 - (\sum y)^2)]}}$$

Variable X= FDI ; Variable Y= Exchange rate ; r = 0.292



Interpretation

FDI increases when there is an increase in the value of currency for foreign countries against their home currency. In the above analysis, FDI and Exchange rate has positive correlation of 0.292 which indicates that when FDI increases

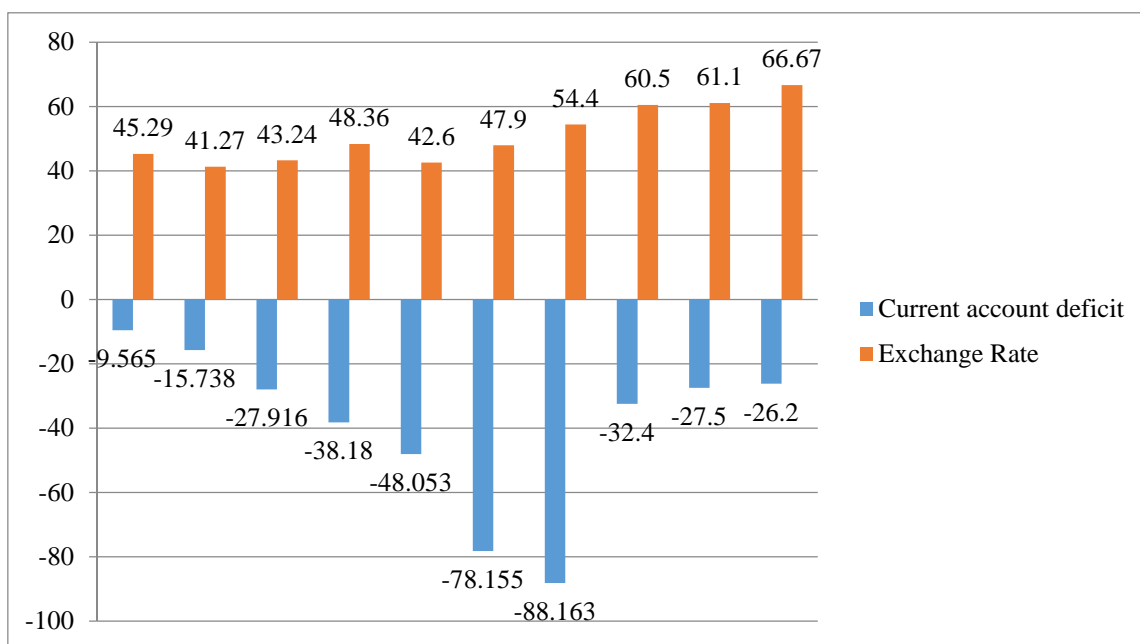
the value of currency for foreign countries increases and vice-versa i.e., when there is a positive relationship between FDI & exchange rate which means that as FDI increases rupee depreciates & as FDI decreases rupee appreciates for home countries.

Table Showing details of Current account deficit Vs Exchange rate

Years	Current account deficit	Returns	Exchange Rate	Returns
2006-2007	-9.565	-	45.29	-
2007-2008	-15.738	64.537%	41.27	-8.876%
2008-2009	-27.916	77.380%	43.24	4.773%
2009-2010	-38.18	36.767%	48.36	11.841%
2010-2011	-48.053	25.859%	42.6	-11.911%
2011-2012	-78.155	62.643%	47.9	12.441%
2012-2013	-88.163	12.805%	54.4	13.570%
2013-2014	-32.4	-63.250%	60.5	11.213%
2014-2015	-27.5	-15.123%	61.1	0.992%
2015-2016	-26.2	-4.727%	66.67	9.116%

$$r = \frac{N \sum xy - \sum x \sum y}{\sqrt{[(N \sum x^2 - (\sum x)^2)(N \sum y^2 - (\sum y)^2)]}}$$

Variable X= Current account deficit Variable Y= Exchange rate r = -0.243



Interpretation

Above Graph shows the details of the relationship between Current account deficit and exchange Rate. From the above analysis current account deficit and exchange rate has negative correlation which indicates that when current account deficit increases, the value of currency depreciates

(decrease in value of home currency) and when current account deficit decreases, the value of home currency appreciates. After 2010, inspite of decrease in the current account deficit the exchange rate of an Indian currency against dollars has depreciated due to certain economic factors which influence the exchange rates.

TABLE Showing the details of Lending rates Vs Exchange rate

Years	Lending Interest Rates	Returns	Exchange Rate	Returns
2006	11.2	-	45.29	-
2007	13	16.071%	41.27	-8.876%
2008	13.3	2.308%	43.24	4.773%
2009	12.2	-8.271%	48.36	11.841%
2010	10.2	-16.393%	42.6	-11.911%
2011	10.2	0.000%	47.9	12.441%
2012	10.6	3.922%	54.4	13.570%
2013	10.3	-2.830%	60.5	11.213%
2014	10.3	0.000%	61.1	0.992%
2015	9.7	-5.825%	66.67	9.116%

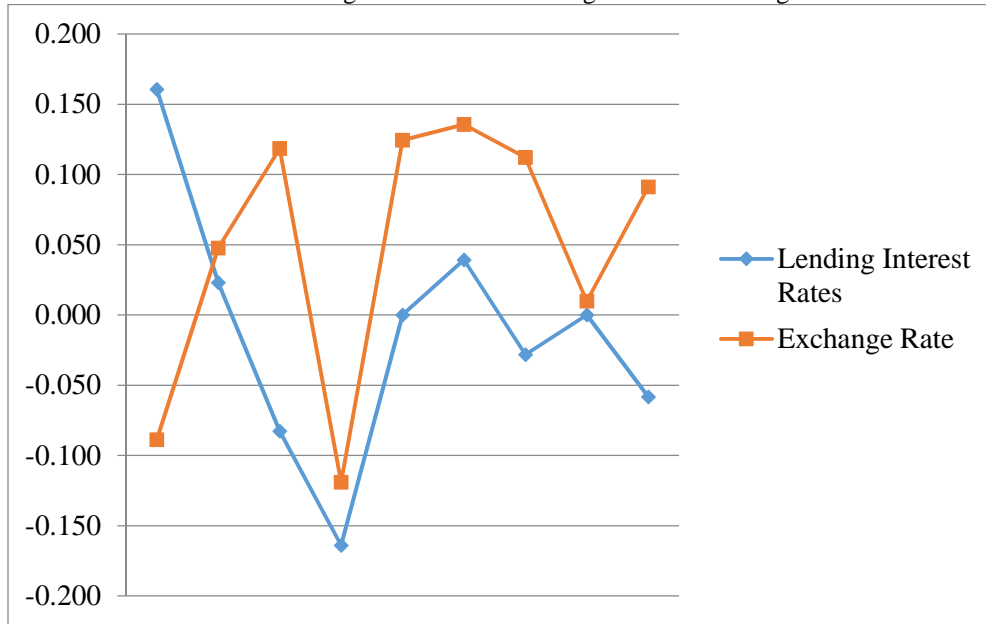
$$r = \frac{N \sum xy - \sum x \sum y}{\sqrt{[(N \sum x^2 - (\sum x)^2)(N \sum y^2 - (\sum y)^2)]}}$$

Variable X= Lending rate

Variable Y= Exchange rate

r = -0.019

GRAPH Showing the details of Lending rates Vs Exchange rate



Interpretation

Interest rates or Lending rates have negative correlation with exchange rate of an Indian currency, since the value of correlation (r) is -0.01915. Higher interest rates attract the foreign investment hence the demand for a country's currency will be more and that will increase the value of the currency and vice-versa. Generally, higher interest rates increase the

value of a given country's currency. The higher interest rates that can be earned tend to attract foreign investment, increasing the demand for the value of the home country's currency. Conversely, lower interest rates tend to be unattractive for foreign investment and decrease the currencies relatively.

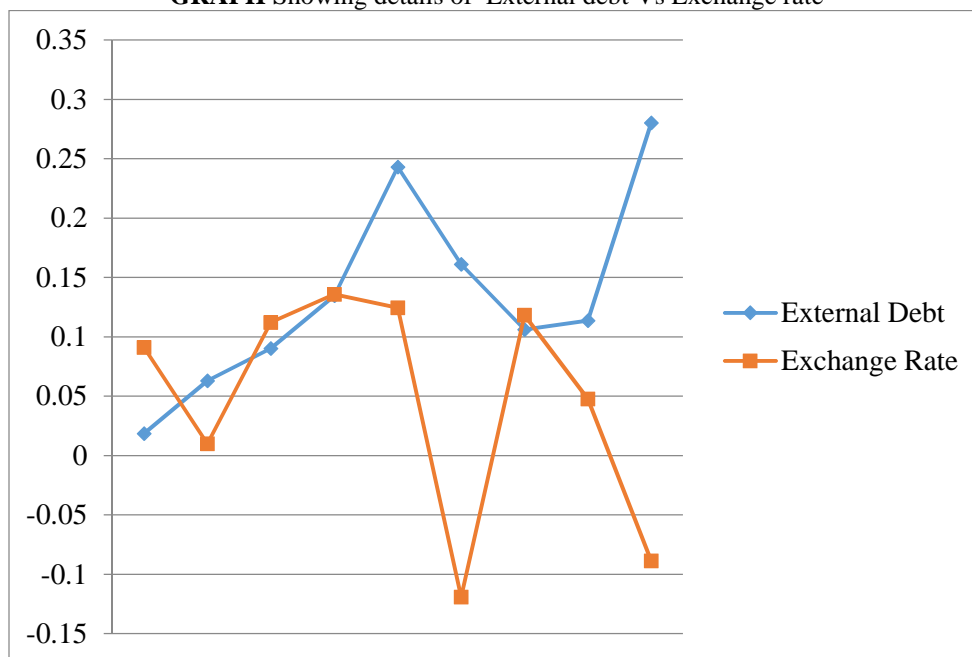
Table Showing details of External debt Vs Exchange rate

Years	External debt (current US\$)	Returns	Exchange Rate	Returns
2006	158.5	-	45.29	-
2007	202.93	28.032%	41.27	-8.876%
2008	225.99	11.364%	43.24	4.773%
2009	249.99	10.620%	48.36	11.841%
2010	290.28	16.117%	42.6	-11.911%
2011	360.8	24.294%	47.9	12.441%
2012	409.4	13.470%	54.4	13.570%
2013	446.3	9.013%	60.5	11.213%
2014	474.4	6.296%	61.1	0.992%
2015	483.2	1.855%	66.67	9.116%

$$r = \frac{N \sum xy - \sum x \sum y}{\sqrt{[(N \sum x^2 - (\sum x)^2)(N \sum y^2 - (\sum y)^2)]}}$$

Variable X= External debt; Variable Y= Exchange rate ; r = -0.365

GRAPH Showing details of External debt Vs Exchange rate



Interpretation

External debt (or foreign debt) is the total debt a country owes to foreign creditors. It can be seen that External debt &

exchange rate is having negative correlation of -0.365 which means that, as external debt increases, the value of rupee depreciates & as External debt decreases rupee appreciates.

CORRELATION MATRIX

	<i>Exchange Rate (Dependent Variable)</i>	<i>GDP</i>	<i>Inflation</i>	<i>FDI</i>	<i>Current Account Deficit</i>	<i>Lending interest rates</i>	<i>External debt</i>
<i>Exchange Rate (Dependent Variable)</i>	1						
<i>GDP</i>	-0.81958	1					
<i>Inflation</i>	-0.08953	0.140249	1				
<i>FDI</i>	0.292775	-0.22115	-0.42969	1			
<i>Current Account Deficit</i>	-0.2434	0.276507	0.539502	0.220428	1		
<i>Lending interest rates</i>	-0.01914	0.063104	-0.08519	0.243525	0.304937	1	
<i>External debt</i>	-0.36576	0.578489	0.196681	0.316742	0.62271	0.483865	1

RESULTS OF CORRELATION ANALYSIS

The results of the above table show that, five of the six independent variables under study show a negative relationship with the dependent variable exchange rate.

For example, there is a high degree of negative correlation between Gross Domestic Product and Exchange Rate which is -0.819. It indicates an inverse relationship i.e., higher the GDP growth leads to a decrease in the exchange rate or increase in the value of domestic currency. Like GDP other indicators like Inflation, current account deficit, lending interest rates and external debt have an inverse relationship with exchange rate. On the contrary, FDI and Exchange rate

have positive correlation of 0.297 which indicates that when FDI increases the value of currency for foreign countries increases and vice -versa i.e., when there is a positive relationship between FDI & exchange rate which means that as FDI increases rupee depreciates & as FDI decreases, rupee appreciates for home countries.

CONCLUSION

The relationship between exchange rate and the related macro-economic factors causing variability in the value of the exchange rate carries a higher degree of significance for any economy. The research study has been carried out to analyze

the macro-economic factors that affect the value of Indian currency (Rupee) and their inter-relationship with the exchange rates.

In the present study Correlation Test has been carried out to find the degree of association between the macro economic factors like Inflation, GDP, Current account deficit, Interest rates, external debt, FDI with Exchange rate.

It is found that there is a high negative correlation between GDP and exchange rate, Inflation and Exchange rate, Interest rate and Exchange rate, External debt and Exchange rate, Current account deficit and a weak positive correlation between FDI and Exchange rate in the last ten years.

To conclude, after 2010 currency started depreciating year on year as the year 2011-12, especially the second half, was characterized by increased current account deficit (CAD), decreased equity inflows, depletion of foreign exchange reserves, rising external debt and deteriorating international investment position. Inflation and Lending rates.

Indian Rupee has shown high volatility over the years. There are various probable reasons associated with it. Huge Trade and Current Account Deficit - India imports more goods (in value terms) than it exports, which results in a huge imbalance in trade, or what is called a trade deficit. This was around \$185 billion in March 2012. Local Capital Inflows - IT sector and NRIs generate a lot of dollars. India has become attractive destinations which can owe foreign capital. In 2011-12, India received foreign direct investment of more than \$30bn, in addition to a net inflow of \$18bn from foreign institutional investors in stocks and bonds. But uncertainty about India's commitment to economic reforms, retrospective taxes, and policy paralysis within the government have forced foreign investors to either postpone their investment decisions, or take money out of Indian stock markets. Whatever the case maybe, the main point is that Capital Inflow it is not enough to make up for the trade deficit.

There are many factors which influence exchange rate of a country for example, recent China's devaluation has affected almost all countries exchange rate as most of the countries transactions are linked with US currency, therefore inflation,

lending rates, FDI, Current account deficit and other factors influence the exchange rate.

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