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ANALYSIS OF MACROECONOMIC DETERMINANTS OF EXCHANGE RATE VOLATILITY IN INDIA

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Abstract:-

Exchange rate is known as the one of the crucial element for the development of the economy, it is seen that volatility has significant influence on the international trade. In this paper analyzed that impact of inflation rate and money supply on the volatility of exchange rate of India. We collected the monthly data to estimate the short and long run relationship between these variables. For this purpose, we have applied the Johansen Cointegration, VECM, GCT and IRF for analysis the response of different shocks on the variables. This paper is showing that high money supply and interest rate increase the inflation rate, which leads to increase the volatility in exchange rate on India.

JEL Classification: *E31, E43, E52, E58, F31*

Keywords: - *Volatility, international trade, VECM, Granger causality, IRF.*

INTRODUCTION:

The basic purpose of monetary policy is to make the policies for the control of inflation rate and enhance the employment rate. For r the achievement of such policies monetary authorities are being used the monetary variables for the achievement of their goals .In the global network age ,it is seen that interest rate has main role in prevent the capital inflows[1].Across the world no any country can ignore the impact of exchange rate on the development of economy. In the free economy market real exchange rate has the decisive role [2].Due to this reason exchange rate is known as the economic indicator which is manipulated by the government [3].

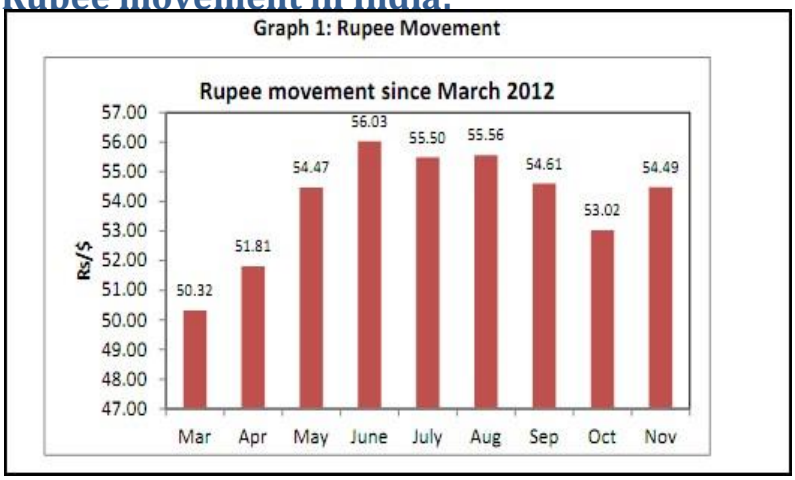
For the stability of domestic currency, most of the countries make policies about the stability of exchange rate. Unexpected monetary shocks are due to reason of excessively fluctuation. Most of the times the management of monetary authorities become pointless for everyone even speculators attack has also impact on the currency position .policy makers are doing efforts to control the price stability. Reliability of exchange rate is known as the one of the key factor which has impact on the stability of price [4].. In India, the purpose of monetary policy is to establish the both domestic and external value of the currency .therefore; here we are Appling to estimate the causes of instability of exchange rate in India. Unexpected monetary shocks may be reason of Excessively huge fluctuation in exchange rate .In the condition of when speculators attack in all the types currency ,the management of exchange rate become very costly[5].policy makers have main role to formulate the policies against the changing position of exchange rate. In India the purpose of monetary policy to achieve the not stable prices but also has crucial role to maintain the external values of currency. Reliability of exchange rate is known as the key factor to promote the growth of the economy .Therefore it would be requesting to government of India to analysis the reason of changes in the exchange rate[6].According to fisher international effect theory that exchange rate can be calculated from the nominal exchange rate.

Background:

After the failure of Bretton wood system, most of the world economist adopted the floating the fixed rate in the place of fixed exchange rate .the objective of our paper is to analysis the impact of impact of exchange rate policy on the all the countries of international business All the economist have considered that exchange rate responsibility is dependent on the monetary authorizes .In 1970s ,most of the policies were changed due to nationalized all the institutions.In that time the all the policies were revised and India was adopted the float exchange rate due to decrease the values of currency .there was signed an agreement is known as the(EFF),which agreement was based regarding the devaluation of currency and financial sector reforms. In 1990s, problem is that India was facing the series of adjustments. At that time, India was come at the lowest ranking in GDP due to its devaluation of currency .Although ,it was viewed that exchange rate instability had worst impact due to exchange rate instability .Optimal Currency Are hypothesis was developed after the volatility of exchange rate[11].Later on, it is shown that there is relationship between money growth rate and inflation .Most of the studies have proven that domestic exchange rate has influenced on the growth of the economy .Hence ,most of the studies have proved that oscillation in exchange rate can be effected on the growth of the economy.

Rupee movement in India:

Graph 1: Rupee Movement



Objective:

1) In 1970s, all the policies were changed, this changes were also occur in India.
2) The purpose of this study is to analysis the exchange rate volatility on the inflation level in India.
3) To analyze the relationship between exchange rate, money supply and impact of inflation on the growth of the economy.
4) In this paper analyze that there is short run relationship or long run relationship between the variables.
5) In this paper, also exploring that with the help of monetary policy volatility can be controlled.

This paper has five main sections, the first portion is introduction, in which explain the background of the study .while, the second section explains the literature view and third portion explains the methodology and at the end conclusion and policy guidelines are being furnished.

Literature review:

Abeysinghe, T., Yeok L. T., analyzed that across the world, major reasons of volatility in the exchange rate are known as the best topic for discussion for every macroeconomists .however, most of the studies have proved that this area is not more explored in India .All the developing and under developing country are being showed the structural form in the chronological order Most of the studies about ASEAN proved that there is no positive relationship between money growth rate and exchange rate .But in Thailand there is no association between exchange rate and economy of the country .Moreever,most of the studies have statistically proved that there is Association between real exchange rate and exchange rate. On the one side, it is also proved that inflation has not influenced on the industries and growth of the economy [1].

Aizenman and Goldberg ,*The prime aim of this study to find out the impact of exchange rate on the performance of stock exchange on Kenya This paper, is trying to explore that exchange rate has always impact on the development of economy .this is helpful to boost growth of the economy This is the best tool to control the inflation rate .Inflation rate and exchange rate are both are such a tool that helpful to determine the performance of stock exchanges. They had take the data of 35 stock exchange of keyna.For they applied the multi regression model. The results were showing that discount rate, exchange rate had positive association with the stock market, while inflation rate had negative impact on the stock market of Kenya .This study suggested that there should be stock exchange management strategize for the exchange rate awareness purpose [2]*.

Aizenman, J., IN this paper, they are exploring that exchange rate has influences on the export of the country .Export is one of the major indicator for the development of the economic .A country is alarming position in the condition of lack of exports .In this paper, they had taken the 13 products of exports .this study is based on the estimated method .For this purpose, they had applied the ARDL model .their results were proving that exchange rate is affected on the exports product .The most affected subsides are petroleum, grapes meat etc this study is suggested that Government should focus on the instability of the exchange rate[3].

Akhtar, A. M. and Hilton, R. S,In this paper, they had analyzed the effects of exchange rate on the international trade .For this purpose they were collected the data from 1998-2008 and applied the VAR mode l.Numerous empirical studies had been done about such types of issues .This study is showing that these is positive association between exchange rate and international trade of Nigeria .It is widely believed that that increase in the exchange rate will inhibit the growth of foreign trade [4].

Arize, A. C,In this paper, they had analyzed that exchange rate has the crucial role for the economic development of the economic. Exchange rate has main role for the import and export of the country. The prime objective of this paper is to analysis the impact of exchange rate on the import-export, inflation rate on the economy of the Malaysia s stock exchange, they had collected the data from 19992009 and applied the VECM, granger caulity, cointegartion test and stability test .In this paper, they had also generated the impulse response function .However, the results are showing that these are association between macroeconomic variables and stock market of Malaysia [5].

Azid, T., Jamil, M., In this paper, they had analyzed that impact of real exchange rate on the export of tawian,for this purpose they had taken the data from 1998 to 2008 and applied the VAR model. They analyzed that if the exchange rate reduce 6 % then there will be increase the real exchange rate. These effects were seen significant magnified in the long run [6].

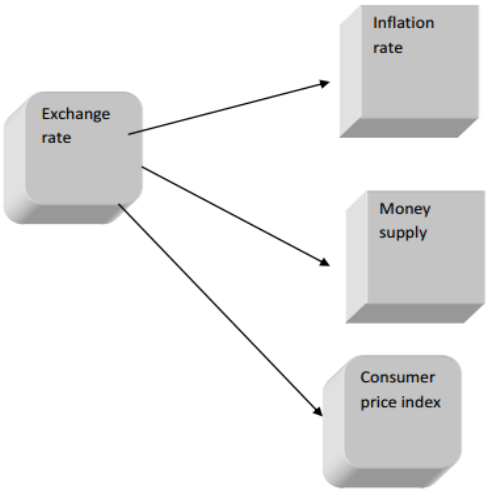
De Grauwe, P ,In this paper ,they had analyzed the impact of exchange rate on the import, for this purpose they had to take the data from 1998 to 2008 and propose the GARCH model and the results were showing that there is significant strong relationship between exchange rate and import of the country .In this study they suggested that government should focus on the real exchange rate for the progress of the country [7]. Esquival G., Larrain F. B ,In this paper, they had viewed the impact of exchange rate on the stock exchange of Bombay, in this study they had taken the exchange rate dependent variable and inflation, interest rate and GDP as the independent variables and applied the multi regression equation model, they were collected the data from 1999 to 2012, their results had revealed that there is highly correlation between these variables. In this paper, they suggested that government should sustain the exchange rate for the better performance of the stock exchange [8].

Glauco D. V., Abbot, A., In this paper ,they have developed a theory about exchange rate movement under the condition of mobility of capital .For this paper ,they were utilized the data from 1998 to 2008 and applied the GARCH model .Their results are showing that exchange rate has huge impact on the capital mobility .To the extent that volatility of exchange rate has also influence on the interest rate .it is seen that 1 % increase in exchange rate will lead to increase 1% change in interest rate[9]. Kemal, M. A., *In this paper,they analyzed the both impact of exchange rate volatility on the domestic and foreign currency .for this purpose ,they had collected the data from 1990 to 2009 an d applied the EGRACH model and least square method .Their results are showing that there is significant negative association between foreign currency and exchange rate .they suggested that there is need to stability in the volatility of the exchange rate[10]*.

Date:
We have collected the monthly data , which is based on the 109 observations .All the variables data can be transferred to log form for the purpose of reduce variance .In this way coefficient can be interpreted elasticity.

Mathematically:
$$LnERt = 0_1 + IRt + 2LnCPt + 3LnMSt$$

We have applied the views for the better results .There have been applied three main models, Johansson co integration, vector error correction model and error correction model for checking the long run as well short run association .To analyze the other variables effect on stock exchange volatility , we have applied the granger causality and impulse response.



Results and discussion:
Table no 1:

Table 1: Augmented Dickey-Fuller Test Statistics At Level						
	Test critical values					

Null Hypothesis	1% level	5% level	10% level	t-Statistic	Prob.*	Decision
LER has a unit root	-3.4938	-2.8893	-2.5817	1.1554	0.9978	Reject
IR has a unit root	-3.4926	-2.8887	-2.5814	-2.3298	0.1647	Reject
LCP has a unit root	-3.4932	-2.8888	-2.5816	2.7448	1	Reject
LM2 has a unit root	-3.5008	-2.8923	-2.5833	-1.6321	0.4625	Reject
At First Difference						
D(LER) has a unit root	-3.4938	-2.8893	-2.5817	-6.9008	0	Does not reject
D(IR) has a unit root	-3.4932	-2.8888	-2.5816	-11.9749	0	Does not reject
D(LCP) has a unit root	-3.4932	-2.8888	-2.5816	-6.6558	0	Does not reject
D(LM2) has a unit root	-3.5015	-2.8926	-2.5835	-1.4737	0	Does not reject
*MacKinnon (1996) one-sided p-values.						

Table no 2:

Table 2: Unit Root Test for Residual At Level						
		Test critical values				

Null Hypothesis	1% level	5% level	10% level	t-Statistic	Prob.*	Decision
Residual has a u	-3.4932	-2.8888	-2.5816	-10.5225	0	Does not reject

Table no 3:

Table 3: Ramsey RESET Test			
F-statistic	Prob. F(1,103)	Log likelihood ratio	Prob. Chi-Square(1)
45.45317	0	39.47839	0

Table no 4;

Table 4: VAR Lag Order Selection Criteria						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	130.1223	NA	8.49E-08	-2.627545	-2.520697	-2.584355
1	769.0268	1211.258	1.96E-13	-15.60474	-15.07048*	-15.38879*
2	782.7039	24.78934	2.07E-13	-15.55634	-14.59471	-15.16763
3	805.6928	39.75169	1.79E-13	-15.70194	-14.31292	-15.14048
4	824.3247	30.66511	1.71E-13	-15.75677	-13.94036	-15.02255
5	841.4683	26.78687	1.69E-13	-15.78058	-13.53679	-14.87362
6	856.6085	22.39489	1.76E-13	-15.76269	-13.09149	-14.68296
7	880.7329	33.67366	1.53e-13*	-15.93194	-12.83336	-14.67944
8	894.5651	18.15474	1.66E-13	-15.88678	-12.36078	-14.46152
9	905.0697	12.91195	1.96E-13	-15.77229	-11.81892	-14.17428
10	928.8724	27.27388	1.78E-13	-15.93485	-11.55409	-14.16407
11	946.2155	18.42704	1.89E-13	-15.96283	-11.15468	-14.01928
12	974.5558	27.75004*	1.62E-13	-16.21992*	-10.98438	-14.10363
* indicates lag order selected by the criterion						

Table no 5:

Table 5: Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.464644	95.22097	47.85614	0
At most 1	0.165448	28.98988	29.79708	0.0618
At most 2	0.085742	9.818801	15.49472	0.2948
At most 3	0.002985	0.316811	3.841467	0.5736
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05				

:

Table no 6:

Table 6: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.464644	66.23108	27.58435	0
At most 1	0.165448	19.17108	21.13163	0.0921
At most 2	0.085742	9.501991	14.26461	0.2468
At most 3	0.002985	0.316811	3.841467	0.5736
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Table 7.

a) Cointegrating Eq:	CointEq1			
LER(-1)	2			
IR(-1)	0.004007			
0.00144				
2.79447]				
LCP(-1)	-1.428248			
0.07367				
-19.3888]				
LM2(-1)	0.543885			
0.03268				
16.6396]				
C	-5.615791			
b) Error Correction:	D(LER)	D(IR)	D(LCP)	D(L)
CointEq1	-0.385649			
0.04 363				
8.84036]				
D(LER(-1))	-0.045827			
* 0.07971				
0.58 500]				
D(IR(-1))	0.000679			
0.00 078				
0.87 833]				
D(LCP(-1))	-0.071557			
0.18 113				
0.39 508]				
D(LM2(-1))	0.050608			
0.09 192				
0.55 061]				
C	0.004282			
0.00213				
2.03280]				
-2.349975	-0.026722	-0.006725		
-5.52848	-0.02505	-0.05005		
[-0.42508]	[-1.06718]	[-0.13438]		
25.61804	0.023618	-0.156277		
-10.1003	-0.04575	-0.09144		
[2.53639]	0.51628]	[-1.70935]		
-0.208065	0.000478	0.000358		
-0.09784	-0.00045	-0.00088		

[-2.12684]	[1.080199]	[0.40258]		
13.97607	0.366983	-0.001324		
-22.9538	-0.10397	-0.20778		
[0.60889]	[3.53011]	[-0.00638]		
-4.797984	0.074251	-0.172003		
-11.6478	-0.05276	-0.10544		
[-0.41182]	[1.40758]	[-1.63151]		
-0.093808	0.003208	0.014728		
-0.26823	-0.00131	-0.00343		
[-0.44974]	[2.73 a [6.06686]			
Standard errors in ( ) & t-statistics in [ ]				

Table no 8:

Table 8: Granger Causality Tests			
Null Hypothesis:	F-Statistic Prob.	Decision	
IR does not Granger Cause LER			
LER does not Granger Cause IR			
LCP does not Granger Cause LER			
LER does not Granger Cause LCP			
LM2 does not Granger Cause LER			
LER does not Granger Cause LM2			
5.0834	0.0264* Reject		
2.1961	0.1415	Does not Reject	
5.1974	0.0248* Reject		
6.6138	0.0116* Reject		
0.9766	0.3255	Does not Reject	
0.2236	0.6374	Does not Reject	

LCP does not Granger Cause IR	4.8857	0.0294* Reje	
IR does not Granger Cause LCP	3.3734	0.0692	Does not Reject
LM2 does not Granger Cause IR	2.5508	0.1134	Does not Reject
IR does not Granger Cause LM2	0.0028	0.9574	Does not Reject
LM2 does not Granger Cause LCP			
LCP does not Granger Cause LM2			
3.8135	0.0536	Does not Reject	
0.2251	0.6364	Does not Reject	
* at 5% significant level			

The method of stationary known as the pre –requisite for testing the ECM and co integration .In this research , we used the time series data which are integrated at any level .Then we estimates the OLS which is spurious when the series are not stationary .

Stationary test:
Our first step if stability test, it describes about the all the order of the variables. For the checking of stationary, we used the unit root .we applied stationary to see the we can apply OLS r not .If the series are stationary, then we can apply OLS if series are not stationary then cannot apply OLS .In table no 1, we have presented the ADF test and our results are showing that p value is more then 0.05, therefore we rejected null hypothesis .it is proved that series is integrated at I(0).

Residual Analysis:
Our result of table no 2 are showing that residual is stationary .these results are proving that model is not found spurious and there is long run association between exchange rate volatility and all other variables.
Stability Test:
Stability of data can be check with the help of Ramey and also CUSUM and CUSUM square .In the table no 3 Ramsey's RESET represents the nonlinearity of series .The value of f statistics is significant. The results of CUSUM and CUSUM square are not stable.

Lag length criteria for co integration and unrestricted VAR:
SICT has been used for the purpose of lag length. For the VAR model lag one is more.VAR model can be stable if all the roots of modulus less than 1.If vary is not stable then SE is not pragmatic. For analysis the long run or short run analysis we used Johansen Co integration and VECM.

VECM:
VECM is estimated in the main two steps.firsly, for estimating the Johannes procedure the co integration has used. While in the next step we calculated the accurate results of error correction term with the help of VAR model. In the table no 7 the results of co integrating and error correction are presenting in the equation no 7.
The results of coefficeitnare showing that there is long run relationship between the variables, while VECM is showing that the deviations procedure. All the variables have been taken the long from .all the variables have one co integration vector. During the period of 2003 to 2009, it is seen that all the variables are significant influenced on the exchange rate. It is understood that changes in inflation and interest rate will be changed in the exchange rate. Our results are trying to expose that there is negative relationship between money supply and interest rate and significant 1 %.if one unit will increase in interest rate and money supply will increase with the increase in 1 unit of exchange rate.

The results of error correction lie between 0 and 1 and negative sign indicates the convergence and way to evaluates the low and fast speed of adjustment towards the equilibrium .our results are showing that there are negative sign and these are in the range of 0 and 1.this is showing that convergence towards the equilibrium. The crucial role of error term is for the correction of disequilibrium position. Error correction is the best way for the correction of disequilibrium position and in this sway, we can come back the variables towards the equilibrium position .This thing is showing that both interest rate and exchange rate are showing the high level of volatility.

All the results of tract test are showing that the value of p is significant for the rank or r=0, here null hypothesis is rejected. Other the other side the rank=1 so here null hypothesis is not rejected. In the table no 6 the results of cointegartion are showing the maximum value of eigenvalue. The results of table no 5 and 6 are showing that there are present of

cointegation equation. It revelas that there is long run relationship between the exchange rate and all the monetary variables. Here, VECM model has main role that there is numerical relationship between variables or not. It can also be proved by the Johannes cointegation that there is short association or there is long run association between the variables. Most of the techniques have proved that VAR is not good for this purpose. Therefore, VECM is known as the better option for this technique.

LER +0.00402R-1.4283LCP+0.5439LM2-5.61578= 0 which can be written as:

LER = -0.00402R +1.4283LCP - 0.5439LM2+5.6157 = 0

Granger causality:

Here X is known as the granger cause of Y.Y is the variables, which is used for prediction. With the help of value of X, we can predict easily the value of Y. In such situation instantaneous causation can be crereated.In instantaneous causation Y can better predict with the help of X.If there is no impact of Xt and YT then such situation, we can reject the hypothesis. Here the results of cointegtaion are showing that there is exist both short and long run association. In the table no 8 the results are presenting the granger causality. These results are showing that inflation causes the exchange rate at 5 %.It is proving that past information was right with the help of previous value of inflation, exchange rate can be predicted. There is bidirectional causality is running between the variables. The results have shown that past value of interest rate has also impact on the exchange rate. Most of the studies have proved that interest rate granger has impact on the volatility of the exchange rate. Our result are showing that inflation granger is the cause of exchange rate voloatlity. On the basic of the our results, it have proved that there are both short and long run relationship between the variables .there is positive association between inflation and exchange rate while, there is negative relationship between interest rate. Our results are not showing properly relationship between exchange rate and money supply. According to economic theory increase in interest rate will increase the prices of subsides and it will increase inflation rate. At the end, it is shown that increase in money will effect on the exchange rate.

Conclusion:

Our empirical results are showing that inflation has positive relationship ,on the other side interest rate and money supply have the negative association with exchange rate .According to different economic theories ,there is direct relationship between interest rate and investment, if 1% interest rate will increase then investment will also increase in 1 %.there is also association between interest rate and inflation .our study is also showing that money supply has association between exchange rate vitality. Due to exchange rate volatility money supply may be effected .Money supply can be increased by the increasing of economic size of Pakistan .there is inverse relationship between money and price level, in this condition enhancement in exchange rate volatility can be restraint.

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