

A study of factors affecting Exchange Rate Movements of BRICS Countries

*Trupti Raut

Assistant Professor in Accountancy, Dnyanprassarak Mandal's College and Research Centre, Assagao Bardez -Goa (India)

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Corresponding Author

Email: rauttrupti3[at]gmail.com

ABSTRACT

Accurately predicting the behavior of exchange rate is very difficult as there are diverse internal as well as external factors affecting the exchange rate. This paper studies the factors affecting the exchange rate variability of BRICS nations. Present study focuses on macroeconomic variables that can affect the exchange rate. Variables taken for the study are Gross Domestic Product, Consumer Price Index, Imports, Exports, Money Supply (M2), Interest Rates and Foreign Exchange Reserves. Quarterly data from 2000 to 2016 has been used for the study. Regression analysis is used for studying the factors affecting the exchange rate of BRICS countries. A result of the study shows that consumer price index affects the exchange rate of BRICS nations.

1. Introduction

Currently economic leadership is slowly moving from Great7 nations to BRICS nations. BRICS nations are the emerging economies of the world. This nation represents around 40% of the population of the world and nearly 25% of landmass. Stability in the exchange rate is important as it affects the economic health of nation. This research paper attempts to find out the possible factors that can cause variability in the exchange rate of BRICS countries.

2. Literature Review

- **Shabana Parveen, Abdul Qayyum Khan, Muhammad Ismail (2012)** studied factors affecting Exchange Rate variability in Pakistan. The main variables used to check variability are inflation, growth rate, imports and exports on exchange rate volatility.
- **Muhammad Zain ul Islam, Hassan Razaz (2014)** studied factors affecting foreign exchange markets of Pakistan with the help of correlation and regression analysis and found positive impact of the discount rate and interest rate on the foreign exchange of Pakistan.
- **Kazi Mohammed Kamal Uddin, G. M. Azmal Ali Quosar, Dulal Chandra Nandi(2013)** studied factors affecting the fluctuation in exchange rate of Bangladesh. The study revealed that stock of money and increase in debt service burden results in a real depreciation of currency, while increasing foreign exchange reserve results in a real appreciation of currency.
- **Raja Sher Ali Khan (2014)** studied the factors affecting exchange rate variability in Pakistan and found that inflation affects the exchange rate variability in Pakistan.

- **Anita Mirchandani (2014)** studied macroeconomic determinants of exchange rate volatility in India and found that exchange rates are correlated with many variables such as interest rate, inflation rate & GDP growth rate in either direct or indirect manner.
- **Baasankhuu Baljinnyam, De Hong Lu(2013)** studied influencing factors of the exchange rate between Chinese Yuan (CNY) and Mongolian Tögrög (MNT) for the period 2006-2012 using co-integration and regression analysis and found that inflation and interest rate are the two most influential factors to exchange rate variation, but exports and imports between China and Mongolia had no significant effect on exchange rate.
- **Mariyam Himmath Hassan & Behrooz Gharleghi(2015)** studied the philosophy of the Dornbusch's Sticky price model of Exchange Rate determination for Maldivian economy by using quarterly data obtained for a period of 14 years from 2000 to 2013. The result revealed that the sticky price monetary model is not validated for the case of Maldives.
- **Jerson B. Patosa and Agustina Tan Cruz(2013)** studied factors affecting exchange rate movement in selected asian countries using yearly data from 1977 to 2010, and found that industrial production affects the exchange rate of all the selected Asian countries.
- **Zaheer Abbas, Safiullah Khanand Syed Tahir Hussain Rizvi(2012)** studied exchange rates and macroeconomic fundamentals using quarterly data from year 1984 to 2008 and found that the economic variables are not senseless in determination of exchange rates.

3. Importance of Study

Accurately predicting the behavior of exchange rate of any country is very much difficult as foreign exchange market is volatile and there are enumerable variables affecting the exchange rate of countries. Proper understanding and knowledge of this variables helps to control to some extent the volatility of exchange rate. This study is important as it will help to know the variable which causes the volatility in the exchange rate of BRICS nations.

4. Objective of Study

To study factors affecting exchange rate movements of BRICS countries.

5. Research methodology

✓ Sample Size

Sample of five countries namely Brazil, Russia, India, China and South Africa (BRICS) is selected to examine the factors affecting exchange rate movements.

✓ Period of Study

Quarterly data from first quarter of 2000 to the last quarter of 2016

✓ Tools and techniques

To study the factors affecting exchange rate movements of BRICS countries multiple regression technique is used.

✓ Sources of data

The study uses quarterly time series data of exchange rate, gross domestic product, consumer price index, import, export, money supply (M2), interest rate, and foreign exchange reserves. All the data have been collected from the Bloomberg, Reserve Bank of India (RBI) website.

6. Empirical results

To find out the factors affecting exchange rate movements of BRICS countries for the period of January 2000 to December 2016 the following equation is taken for studying the determinants of exchange rate of this five emerging economies of the world.

$$EXR=f(CPI, INT, GDP, FER, M2, IMP, EXP)$$

Table 6.1 Factors Affecting Exchange Rate Movements of Brazil
Regression Analysis of Brazil

Dependent Variable: Exchange Rate		Method: Least Squares		
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.02	0.02	1.41	0.16
CPI	-0.03	0.00	-13.82	0.00
EXP	0.04	0.11	0.34	0.74
FER	-0.26	0.14	-1.94	0.06
GDP	-0.23	0.28	-0.82	0.42
IMP	-0.14	0.18	-0.80	0.43
INT	0.00	0.01	0.33	0.74
M2	0.66	0.45	1.47	0.15
R-squared	0.86	Mean dependent var		0.03
Adjusted R-squared	0.84	S.D. dependent var		0.20
S.E. of regression	0.08	Akaike info criterion		-2.09
Sum squared resid	0.35	Schwarz criterion		-1.82
Log likelihood	73.92	Hannan-Quinn criter.		-1.99
F-statistic	47.69	Durbin-Watson stat		1.58
Prob(F-statistic)	0.00			

Source: Authors Calculations

The CPI which is taken as proxy of inflation rate has a significant negative impact on the exchange rate of Brazil, which means that one percent increase in CPI of Brazil will decrease the exchange rate of Brazil by 0.03 percent. Decrease in exchange rate is always favorable situation because it will appreciate the domestic currency. Increase in inflation of Brazil will appreciate their currency in terms of US Dollar. Another variable which has a significant positive impact on exchange rate of Brazil is the foreign exchange reserves of Brazil foreign

exchange reserves have also a significant negative impact on exchange rate of Brazil.

The other variables which are included in the model have no significant impact on exchange rate. The adjusted R-squared of the model is 84% which shows that around 84% variations in the exchange rate can be explained by this model. The Durbin-Watson stat is 1.58 which is around two which means that there is no problem of autocorrelation.

Table 6.2 Factors affecting Exchange Rate Movements of Russia
Regression Analysis of Russia

Dependent Variable: Exchange Rate		Method: Least Squares		
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.27	0.37	0.72	0.47
INT	0.22	0.09	2.42	0.0188

CPI	-0.50	0.04	-11.58	0
EXP	-4.55	2.60	-1.75	0.0852
FER	-1.47	3.34	-0.44	0.66
GDP	-0.56	2.45	-0.23	0.82
IMP	-1.07	1.18	-0.91	0.37
M2	12.46	7.49	1.66	0.10
R-squared	0.83	Mean dependent var		0.57
Adjusted R-squared	0.80	S.D. dependent var		3.17
S.E. of regression	1.40	Akaike info criterion		3.64
Sum squared resid	108.54	Schwarz criterion		3.91
Log likelihood	-106.53	Hannan-Quinn criter.		3.74
F-statistic	37.16	Durbin-Watson stat		1.90
Prob(F-statistic)	0.00			

Source: Authors Calculations

The above table shows the regression results of Russia. The exchange rate of Russia is regressed on the seven independent variables. The exchange rate of Russia showed significant negative relationship with its inflation rate. The negative coefficient of CPI indicates that one percent increase in value of CPI will decrease the exchange rate of Russia by 0.49%. The interest rate of Russia showed the significant positive relation with its exchange rate. It means that with every one percent increase in the interest rate of Russia will

depreciate their currency by 0.22. The export of Russia showed a significant negative impact on exchange rate of Russia which means that increase in export of Russia will make their currency strong in terms of us Dollar. The imports, money supply, GDP, FER have no significant impact on exchange rate of Russia. The adjusted R squared of the model is 0.80 which means that 80% variation in the exchange rate of Russia is explained by CPI, interest rate and export. Overall the model is reliable for predicting the behavior of exchange rate of Russia.

Table 6.3: Factors affecting Exchange Rate Movements of India
Regression Analysis of India

Dependent Variable: Exchange Rate		Method: Least Squares		
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.16	0.08	13.87	0.00
CPI	-0.34	0.04	-8.32	0.00
EXP	-3.18	0.93	-3.44	0.00
FER	-7.06	1.74	-4.07	0.00
GDP	-0.96	0.86	-1.12	0.27
IMP	-2.60	0.63	-4.11	0.00
INT	0.02	0.10	0.19	0.85
M2	-10.40	2.48	-4.20	0.00
R-squared	0.90	Mean dependent var		0.35
Adjusted R-squared	0.89	S.D. dependent var		1.63
S.E. of regression	0.54	Akaike info criterion		1.73
Sum squared resid	16.07	Schwarz criterion		2.00
Log likelihood	-46.36	Hannan-Quinn criter.		1.83
F-statistic	72.48	Durbin-Watson stat		2.27
Prob(F-statistic)	0.00			

Source: Authors Calculations

The above table shows the regression equation of India. The dependent variable i.e. Exchange Rate is regressed on seven explanatory variables. The independent variables taken are Consumer price indices, gross domestic product, interest rate, money supply (M2), foreign exchange reserves, imports and exports of India. The CPI, Export, FER, Import and money supply have significant negative impact on the exchange rate of Rupee in terms of US Dollar. Negative coefficient of these variables implies that increase in these variables will appreciate

Indian rupees in terms of US Dollar. The GDP and interest rate and interest rate have no significant relation with the exchange rate of India. The value of adjusted R squared of the model is only 88% which means that nearly 88% variation in exchange rate of India is explained by the independent variables. The Durbin-Watson stat 2.27 shows that there is no auto correlation among the variables. Overall the above model is reliable for predicting the exchange rate behavior in India.

Table 6.4 Factors affecting Exchange Rate Movements of China
Regression Analysis of China

Dependent Variable: Exchange Rate		Method: Least Squares		
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.11	0.01	7.83	0.00
CPI	-0.01	0.00	-2.38	0.02

EXP	-0.02	0.08	-0.21	0.84
FER	-0.10	0.14	-0.73	0.47
GDP	-2.32	0.39	-5.88	0.00
IMP	-0.08	0.09	-0.98	0.33
M2	-1.01	0.35	-2.85	0.01
INT	0.00	0.01	0.42	0.68
R-squared	0.73	Mean dependent var		-0.03
Adjusted R-squared	0.69	S.D. dependent var		0.06
S.E. of regression	0.03	Akaike info criterion		-3.78
Sum squared resid	0.07	Schwarz criterion		-3.51
Log likelihood	127.02	Hannan-Quinn criter.		-3.67
F-statistic	20.82	Durbin-Watson stat		1.42
Prob(F-statistic)	0.00			

Source: Authors Calculations

The above table shows the regression equation of china. The dependent variable of the study is exchange rate of china and independent variables are Consumer price indices, gross domestic product, interest rate, money supply (M2), foreign exchange reserves, imports and exports of China. The adjusted R-squared value of the model is 69% which shows that around 69% variations in exchange rate of China are explained by the

independent variables taken for the study. Around 31% variations in exchange rate China can be explained by other factors which are not taken for the study. The CPI, GDP and money supply of China showed a significant negative relation with the exchange rate. The FER, Export, Import and interest rate of China have no significant impact on exchange rate of China.

**Table 6.5 Factors affecting Exchange Rate Movements of South Africa
Regression Analysis of South Africa**

Dependent Variable: Exchange Rate		Method: Least Squares		
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.24	0.06	3.96	0.00
CPI	-0.04	0.01	-4.34	0.00
EXP	-0.22	0.34	-0.66	0.51
FER	-0.04	0.41	-0.09	0.93
GDP	-6.28	0.73	-8.63	0.00
IMP	-0.19	0.21	-0.87	0.39
INT	0.04	0.03	1.25	0.22
M2	-3.19	3.31	-0.96	0.34
R-squared	0.94	Mean dependent var		0.12
Adjusted R-squared	0.93	S.D. dependent var		0.63
S.E. of regression	0.16	Akaike info criterion		-0.66
Sum squared resid	1.48	Schwarz criterion		-0.39
Log likelihood	28.74	Hannan-Quinn criter.		-0.55
F-statistic	123.27	Durbin-Watson stat		1.69
Prob(F-statistic)	0.00			

Source: Authors Calculations

The above given table shows the regression equation of South Africa. The dependent variable which is the exchange rate of South Africa in terms of US dollar has been regressed on seven independent variables to know the ability of these variables to forecast the behavior of exchange rate. The adjusted R-squared of the above model is 93% which shows that model is good and reliable and can be used for predicting exchange rate behavior of South Africa. The CPI that is consumer price indices showed significant negative relation with the exchange rate. It means that increase in the Inflation will appreciate the currency of South Africa. Same is in the case of GDP of the country. GDP also showed significant negative relation with the exchange rate. Money supply, Foreign Exchange Reserves, Interest Rate, Import, Export have no significant relation with the exchange rate of the country.

7. Findings Conclusion and Suggestions

The major finding of the present study is that CPI which is taken as proxy of inflation affects the Exchange Rate of all the sampled countries. Therefore we can say that Inflation is the main variables which the countries can use to monitor and control their Exchange Rate fluctuations. It is found that there is no long run relationship between Exchange Rate and Foreign exchange reserves of Brazil, Russia and India.

8. Conclusion

It can be concluded from the present study that Consumer Price Indices (Inflation) is the most important macroeconomic factor which causes variability in Exchange Rate of all the BRICS countries. Inflation affects the Exchange Rate of all the

countries. CPI has a significant negative impact on Exchange Rate of all BRICS countries.

9. Suggestions

Under the Flexible Exchange Rate system Exchange Rate of the countries continuously fluctuates. There is lot of volatility in Exchange Rate because of various macroeconomic factors

affecting the exchange rate and because of demand of supply of currency in the international market. Reduction in Exchange Rate fluctuations of the country is very important. Countries should keep continuous watch on their various economic variables to reduce the fluctuation of countries currency in terms of US Dollar. Controlling and monitoring of macroeconomic variables can help the country to achieve stable exchange rate.

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