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ORIGINAL ARTICLE

Impact of Exchange Rate Volatility on Foreign Direct Investment in Bric Countries

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ABSTRACT

BRIC countries stand out the large potential consumer market which attracts large capital due to general characteristics of large-scale population. BRIC countries are listed as emerging countries as a whole these countries do not have an economic union that can stand their trade and integration collectively. The BRIC are both the fastest growing and largest emerging markets economies. They account for almost three billion people, or just under half of the total population of the world. In recent times, the BRIC have also contributed to the majority of world's GDP growth. The objective of research is to find out that does exchange rate and FDI related in BRIC countries? This research work is being designed in such a way that it helps to understand the relationship between foreign exchange rate and FDI in BRIC. It will be a quantitative research based on secondary data. We will use statistical tools for research results. Statistical Tools will be correlation analysis, linear regression analysis and graphical analysis of different variables. This sample consists of data from 1981 to 2014 on yearly bases. Summarizing the results it could be written as the FDI increases with increase in exchange rates of currency. Changing exchange rate is one factors to change the FDI in BRIC, there could be research on other factors that has causal relationship with foreign direct investment in BRIC. There is positive correlation between FDI and Exchange rate variables for India where as there is no positive correlation between FDI and Exchange rate variables for Brazil, Russia & China.Analyzing these casual variables of these four countries (Brazil, Russia, China and India), by using the all these three analytical techniques. All these techniques support the results in same way.

Key words: *Exchange Rate Volatility, Foreign Direct Investment, BRIC*

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INTRODUCTION

BRIC countries stand out the large potential consumer market which attracts large capital due to general characteristics of large-scale population. BRIC countries are listed as emerging countries as a whole these countries do not have an economic union that can stand their trade and integration collectively.

Brazil, Russia, India and China have emerged as major destination for Foreign Direct Investment (FDI) inflows, resulting in BRIC a strong constructive term which was prominently coined by the 'Goldman Sachs Investment Bank' (Wilson and Purushothaman, 2003) to represent Brazil, Russia, India, and China as an economic Block. Global competition for FDI had given the bargaining power to Multinational Corporations (MNCs) and their allies (BorosTorstila, 1999).

Why BRIC are important:

According to various economists' projections, it is only a matter of time before China becomes the biggest economy in the world - sometime between 2030 and 2050 seems the consensus. In fact, Goldman Sachs believes that by 2050 these will be the most important economies, relegating the US to fifth place. By 2020, all of the BRIC should be in the top 10 largest economies of the world. They believe that China can dominate in manufactured goods, India in services, and Russia and Brazil in raw material supplies.

OBJECTIVES OF RESEARCH

The object of the research got accurate answers of research questions mentioned below in specific contexts of BRICs.

- Does exchange rate and FDI related in BRICs countries?
- If exchange rate declines what will be the impact on FDI?
- Does exchange rate affects the economy of a country negative or positive in BRICs countries?

LITERATURE REVIEW

Leadership of the world economy is gradually has shifted from G7 (United Kingdom, the United States, France, Italy, Japan, Germany) to BRIC as Brazil Russia, India and China. (Wilson and Purushothaman, 2003).

In fact, China has passed through the Japan in 2010 being the second largest economy (Dawson and Dean, 2011).

BRICS are characterized by the phenomenal economic growth from 5% to two digit (World Bank indicator, 2011).

Sule (2011) estimated that BRICS represent 30 percent of the world's economic growth, 25% of the global land mass, 40% of the world's population and they have combined GDP in 8.7 trillion dollars. In 2008 trade combined $ 4.4 trillion between BRICS.

First economic consumption of BRICS has been affected by the recent financial crisis, and has been punished by the low final demand (Yamakawa et al., 2009).

BRICS has become dominant in international trade. Exports have been increased to 38% for each annual rate in Brazil, India 28%, China 25% and Russia 18% has grown (Vardi, 2011).

BRICS has contributed to 60% of the trade between the low-income countries (Sule 2011). As the majority of this trade is done in US dollars, BRICS today has the world's foreign exchange reserves accumulated to dollar reserves to hold 40%.

Bouoiyour and Ray (2005) organized by using the mismatch between the standard deviation of the real effective exchange rate and FDI, results captured that exchange rate volatility does not affect the foreign direct investment in Morocco during the years of 1960-2000.

Aizenman (1992) studied foreign direct investment dynamics to organize the effect of exchange rate regime. Correlation between the volatility of investment and exchange rate are destined to be a negative depending on the nature of the exchange rate regime.

RESEARCH DESIGN

This research work is being designed in such a way that it helps to understand the relationship between foreign exchange rate and FDI in BRIC. It will be a quantitative research based on secondary data. I have used statistical tools for research results. Statistical Tools will be correlation analysis, linear regression analysis and graphical analysis of different variables. The study area of this research work is whole BRIC.

SAMPLE OF RESEARCH

The sample of the research will consist of FDI and exchange rates of USD (United States Dollar) compare to BRL (Brazilian real), RUB (Russian ruble), INR (Indian rupee) and CNY

(Chinese yuan). Data will be taken for last 34 years to study the relationship between FDI and exchange rates. The exchange rate data will be taken by last 34 years of US dollars, compare to Brazilian real, Russian ruble, Indian rupee, and Chinese yuan with comparatively to the currencies of BRICs countries. This research includes four independent variables currencies and one dependent variable. The independent variable currencies are US dollar comparative to Local Currencies of BRIC and dependent variable is FDI. This sample consists of data from 1981 to 2014 on yearly bases as Hsing (2004); Zietz and Pemberton (1990) determined the macroeconomic variables and developed the model. Soenen and Hanniger (1988) used for the period of 1980-1986 on effective exchange rates and FDI. This study adopted the methods of these writers.

SECONDARY SOURCE OF DATA

This paper uses the secondary source of data from Word bank and Forex Web Pages. Research data has been collected from Govt. source websites and currency values has been collected from Forex web pages. On the other hand, there is nothing regarding the data collection that has been collected from survey technique or questionnaire. The whole research is based on the secondary source of data. Arzu (2008) used secondary source of data to analyze the relationship between exchange rates and FDI in BRIC.

PERIOD OF THE STUDY

The period of study is 34 years of both dependent and independent variables. The data of FDI will be collected for 34 years and exchange rates data will also be collected for 34 years. This data will be from 1981 to 2014

RESEARCH TOOLS & TECHNIQUE

The research technique will help to understand the relationship between foreign exchange rate and FDI in BRICs. It will be a quantitative research based on secondary data. I have used statistical tools for research results. Statistical tools will be correlation analysis and linear regression analysis.

CORRELATION ANALYSIS

Correlation coefficients can range from -1.00 to +1.00. The value of -1.00 represents a perfect negative correlation while a value of +1.00 represents a perfect positive correlation. A value of 0.00 means that there is no relationship between the variables being tested.

Conversely, a negative value of implies that all data points lie on a line for which Y decreases as X increases.

REGRESSION

A statistical measure that attempts to determine the strength of the relationship between one dependent variable (usually denoted by Y) and a series of other changing variables (known as independent variables),

The general form of linear regression is:

$Y = a + bX + u$

Where:

Y= the variable that we are trying to predict

X= the variable that we are using to predict Y

a= the intercept

b= the slope

u= the regression residual.

Ho: there is NO positive correlation between FDI and Exchange rate variables

H1: there is positive correlation between FDI and Exchange rate variables

α = 5%

Decision Criteria = Reject Ho, if P value is less than α. Or "Accept" Ho, if P value is greater than α.

DATA ANALYSIS

To provide the prospective results, different writers have discussed the relationship of exchange rates and FDI. Different international and Pakistani writers used different research tools and techniques to study the relationship and interdependency of different dependent and independent variables

Chowdhury and Wheeler (2008) documented an encouraging effect of exchange rate uncertainty upon FDI, and the impact takes place with a lag. Furceri and Borelli (2008) Nyarko, et al (2011) observed little significant in the existence of an effect of exchange rates on FDI inflows in Ghana.

The most recent study written by Chaudhary, et al (2012) showed mixed results. They proved the effect of exchange rate uncertainty upon FDI in almost half of the sample countries in selected Asian economies such as Pakistan, India, Bangladesh, Indonesia, Singapore and Thailand.

For instance, Campa (1993) found that the volatility in exchange rate negatively affects FDI for the US, and Benassy-Quere, et al (2001) also proved the existence of a negative association between the two variables in developing countries.Kiyota and Urata (2004) observed in Japan that the depreciation of the Yen enhanced FDI while the increase in exchange rate uncertainty discouraged FDI at both aggregated and disaggregated industry levels. Chen, et al (2006) also found an inverse relationship of exchange rate uncertainty to the outflow of FDI of companies. From a different perspective, Schnabl (2008); Tokunbo and Lloyd (2009) empirically investigated the impact of exchange rate volatility on inward FDI of Nigeria

Goldberg and Kolstad (1994) enlightened by quarterly data that volatility of exchange rate acts as a catalyst for MNE's in internationalizing their production facilities. The optimally located country productive capacity increases with the increase in volatility without decrease in domestic investment in US, Canada, Japan and UK.

Becker and Hall (2003) found that R&D foreign direct investment tends to readjust from Europe to UK because of Euro-Dollar exchange rate volatility by exploiting GMM. GARCH is used to capture volatility. Long-term interest rates, output fluctuations are among other significant variables.

EXPLANATION OF VARIABLE

Simply two types of variables have been used, one variable is dependent and one is independent but there variables need to test in different three equations for BRICs countries. Dependent variable is FDI in all these three countries and exchange rate is independent variable as change in exchange rate will measure to change FDI.

To explore the knowledge to find out the impact of exchange rate on the FDI is the basic purpose of this study. From the year 1981 to 2014 a purely secondary source of data has been used as the exchange rates within USD and FDI in BRICs countries.

CORRELATION ANALYSIS RESULTS

Correlation analysis results for Brazil:

Analyzing the correlation results, it seem that there is positive correlation among the variable, but the results shows a moderate positive correlation, depending upon this resultant figure of 0.59 between FDI and exchange rates. Analyzing this value we can say that there is positive relationship but not to the extent of strong positive.

Correlations

		Foreign Direct Investment	Exchange Rate
Pearson Correlation	Foreign Direct Investment	1.000	.596
	Exchange Rate	.596	1.000
Sig. (1-tailed)	Foreign Direct Investment	.	.000
	Exchange Rate	.000	.
N	Foreign Direct Investment	34	34
	Exchange Rate	34	34

Correlation Analysis Results For Russia:

Correlations

		Foreign Direct Investment	Exchange Rate
Pearson Correlation	Foreign Direct Investment	1.000	.645
	Exchange Rate	.645	1.000
Sig. (1-tailed)	Foreign Direct Investment	.	.000
	Exchange Rate	.000	.
N	Foreign Direct Investment	34	34
	Exchange Rate	34	34

Analyzing the correlation results, it seem that there is positive correlation among the variable, but the results shows a moderate positive correlation, depending upon this resultant figure of 0.64 between FDI and exchange rates. Analyzing this value we can say that there is positive relationship but not to the extent of strong positive.

Correlation analysis results for India:

Correlations

		Foreign Direct Investment	Exchange Rate
Pearson Correlation	Foreign Direct Investment	1.000	.661
	Exchange Rate	.661	1.000
Sig. (1-tailed)	Foreign Direct Investment	.	.000
	Exchange Rate	.000	.
N	Foreign Direct Investment	34	34
	Exchange Rate	34	34

Analyzing the correlation results, it seem that there is positive correlation among the variable, but the results shows a strong positive correlation, depending upon this resultant figure of 0.66 between FDI and exchange rates. Analyzing this value we can say that there is positive relationship but not to the extent of high positive

Correlation analysis results for China:

Correlations

		Foreign Direct Investment	Exchange Rate
Pearson Correlation	Foreign Direct Investment	1.000	.319
	Exchange Rate	.319	1.000
Sig. (1-tailed)	Foreign Direct Investment	.	.033
	Exchange Rate	.033	.
N	Foreign Direct Investment	34	34
	Exchange Rate	34	34

Analyzing the correlation results, it seem that there is positive correlation among the variable, but the results shows a weak positive correlation, depending upon this resultant figure of 0.31 between FDI and exchange rates. Analyzing this value we can say that there is positive relationship but not to the extent of moderate positive.

REGRESSION ANALYSIS RESULTS

Regression analysis for Brazil:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.596286995
R Square	0.355558181
Adjusted R Square	0.335419374
Standard Error	21769588291
Observations	34

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	8.36715E+21	8.36715E+21	17.655375	0.000198003
Residual	32	1.51653E+22	4.73915E+20		
Total	33	2.35324E+22			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*
Intercept	4939991012	5581611480	0.885047451	0.3827333	-6429379522
Exchange Rate	14801236398	3522569135	4.201829923	0.000198	7625997872

Multiple R: It tells the percentage of the response variable variation that is explained by a linear model. Here59% shows model fit to your data.
R square: This is r2, the Coefficient of Determination. It tells you how many points fall on the regression line. Here 35% of the variation of y-values (Foreign direct investment of Brazil) around the mean is explained by the x-values (Exchange rates in Brazil). In other words, 35% of the values fit the model.
Adjusted R square: The adjusted R-squared adjust for the number of terms in a model. You'll want to use this instead of R square if you have more than one x variable.
Standard Error of the regression: An estimate of the standard deviation of the error . The standard error of the regression is the precision that the regression coefficient is measured; if the coefficient is large compared to the standard error, then the coefficient is probably different from 0.
P value explains the validity of model applied. If the P value is more than 5%, it means that regression model is not fit to the data and this rejects the null hypothesis and accepts the alternative hypothesis. But here P value is of intercept is approximately 38% that mean model is rejected. Regression results of least square model are rejected due to P value near to 38% of intercept. Explanation of the data is perfect analyzing the F significance value approximately to zero tells that the results are not by chance, in other words there is zero probability of 'by chance' results. Results shows that there is weak relationship between variable

Regression analysis for Russia:

SUMMARY OUTPUT

Regression Statistics

Multiple R	0.645027089
R Square	0.416059946
Adjusted R Square	0.397811819
Standard Error	17688400404
Observations	34

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	7.1337E+21	7.134E+21	22.80014559	3.81799E-05
Residual	32	1.00121E+22	3.129E+20		
Total	33	1.71458E+22			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*
Intercept	87758692.96	4363787586	0.0201107	0.984079964	-8800985745
Exchange Rate	1011970088	211933136.5	4.7749498	3.81799E-05	580276415.3

Multiple R: It tells the percentage of the response variable variation that is explained by a linear model. Here64% shows model fit to your data.
R square: This is r2, the Coefficient of Determination. It tells you how many points fall on the regression line. As here 41% means that 41% of the variation of y-values (Foreign direct investment of Russia) around the mean is explained by the x-values (Exchange rates in Russia). In other words, 41% of the values fit the model.
Adjusted R square: The adjusted R-squared adjust for the number of terms in a model. You'll want to use this instead of R square if you have more than one x variable.
Standard Error of the regression: An estimate of the standard deviation of the error . The standard error of the regression is the precision that the regression coefficient is measured; if the coefficient is large compared to the standard error, then the coefficient is probably different from 0.
P value explains the validity of model applied. If the P value is more than 5%, it means that regression model is not fit to the data and this accepts the null hypothesis and rejects the alternative hypothesis. But here P value is of intercept is 0.98. Regression results of least square model are acceptable due to P value near to zero of intercept. Explanation of the data is perfect analyzing the F significance value approximately to zero tells that the results are not by chance, in other words there is zero probability of 'by chance' results. Results shows that there is weak relationship between variable

Regression analysis for India:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.660586409
R Square	0.436374404
Adjusted R Square	0.418761104
Standard Error	10235346545
Observations	34

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2.59552E+21	2.5955E+21	24.7752781	2.12158E-05

Residual	32	3.35239E+21	1.0476E+20	
Total	33	5.94791E+21		

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*
Intercept	-9297987889	4160516192	-2.2348159	0.03253812	-17772682046
Exchange Rate	556008898.9	111704964.1	4.97747708	2.1216E-05	328473333

Multiple R: Multiple R: It tells the percentage of the response variable variation that is explained by a linear model. Here64% shows model fit to your data
R square: This is r2, the Coefficient of Determination. It tells you how many points fall on the regression line. As here 43% means that 43% of the variation of y-values (Foreign direct investment of India) around the mean is explained by the x-values (Exchange rates in India). In other words, 43% of the values fit the model.
Adjusted R square: The adjusted R-squared adjust for the number of terms in a model. You'll want to use this instead of R square if you have more than one x variable.
Standard Error of the regression: An estimate of the standard deviation of the error . The standard error of the regression is the precision that the regression coefficient is measured; if the coefficient is large compared to the standard error, then the coefficient is probably different from 0.
P value explains the validity of model applied. If the P value is more than 5%, it means that regression model is not fit to the data and this accepts the null hypothesis and rejects the alternative hypothesis. But here P value is of intercept is approximately zero that mean model is acceptable. Regression results of least square model are acceptable due to P value near to zero of intercept. Explanation of the data is perfect analyzing the F significance value approximately to zero tells that the results are not by chance, in other words there is zero probability of 'by chance' results. Results show that there is significant relationship between variable.

Regression analysis for China:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.319608071
R Square	0.102149319
Adjusted R Square	0.074091486
Standard Error	90236005791
Observations	34

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2.96443E+22	2.9644E+22	3.6406702	0.065391067
Residual	32	2.60561E+23	8.1425E+21		
Total	33	2.90205E+23			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*
Intercept	-4630403511	44982031360	-0.102939	0.91865382	-96255803045
Exchange Rate	13179443801	6907269688	1.90805404	0.06539107	-890204137.9

Multiple R: It tells the percentage of the response variable variation that is explained by a linear model. Here 31% shows model fit to your data.

R square: This is r2, the Coefficient of Determination. It tells you how many points fall on the regression line. As here 10% means that 10% of the variation of y-values (Foreign direct investment of India) around the mean is explained by the x-values (Exchange rates in India).
Adjusted R square: The adjusted R-squared adjust for the number of terms in a model. You'll want to use this instead of R square if you have more than one x variable.
Standard Error of the regression: An estimate of the standard deviation of the error . The standard error of the regression is the precision that the regression coefficient is measured; if the coefficient is large compared to the standard error, then the coefficient is probably different from 0.
P value explains the validity of model applied. If the P value is more than 5%, it means that regression model is not fit to the data and this rejects the null hypothesis and accepts the alternative hypothesis. But here P value is of intercept is approximately zero that mean model is acceptable.. Explanation of the data is perfect analyzing the F significance value approximately to zero tells that the results are not by chance, in other words there is zero probability of 'by chance' results. Results show that there is weak relationship between variables.

TESTING OF HYPOTHESIS

For Brazil:
Depending on P value here we accept null hypothesis (there is no positive correlation between FDI and Exchange rate variables) as p value is more than 5%
For Russia:
Depending on P value here we accept null hypothesis (there is no positive correlation between FDI and Exchange rate variables) as p value is more than 5%
For India:
Depending on P value here we accept alternative hypothesis (there is positive correlation between FDI and Exchange rate variables) as p value is less than 5%
For China:
Depending on P value here we accept null hypothesis (there is no positive correlation between FDI and Exchange rate variables) as p value is more than 5%

CONCLUSION

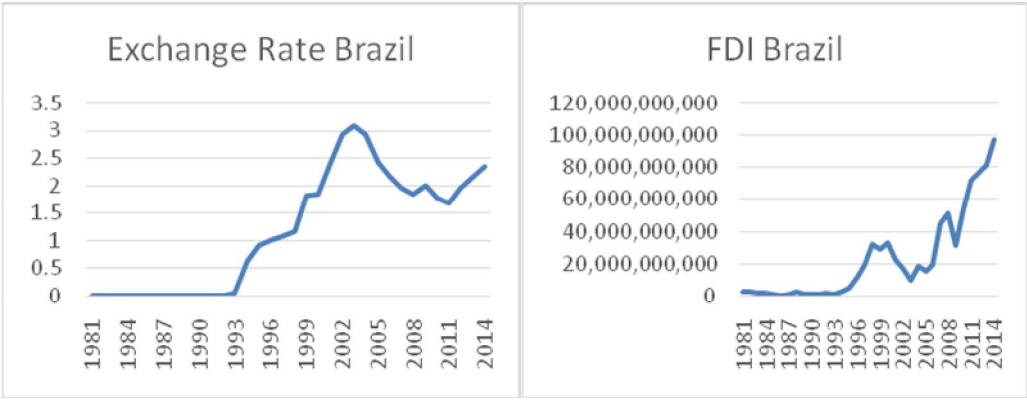
Analyzing these casual variables of these four countries (Brazil, Russia, China and India),depending on p values of regression analysis, results in correlation analysis and graphical explanation of movement in both variables, there is no clash of interest in results by using the all these three analytical techniques. All these techniques support the results in same way. So results could be explained as, For Brazil, depending on P value, correlation and regression here we accept null hypothesis as p value is more than 5%, correlation is 0.5962.For Russia: depending on P value, correlation and regression here we accept null hypothesis as p value is more than 5% and correlations is about 0.6450. For India: Depending on P value, correlation and regression here we accept alternative hypothesis as p value is less than 5% and correlation is 0.6605. For China: Depending on P value, correlation and regression here we accept null hypothesis as p value is more than 5% and correlation is 0.3196.Summarizing the results it could be written as a result this paper shows that the FDI increases with increase in exchange rates of currency. Relationship is positive for BRIC but its strong positive for Brazil, Russia & India whereas it's week positive for China as per the results in correlation coefficient. Changing exchange rate is one factors to change the FDI in BRIC, there could be research on other factors that has causal relationship with foreign direct investment in BRICs.

RECOMMENDATION

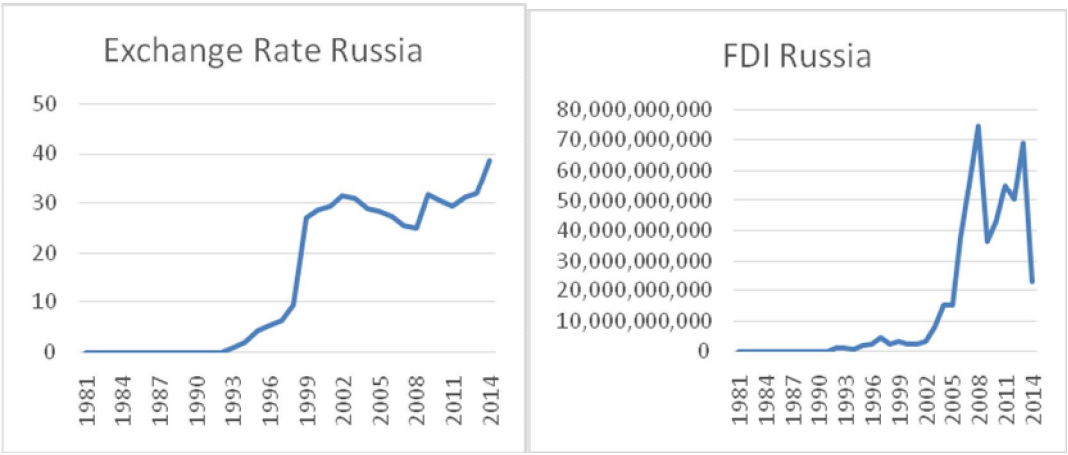
1. The FDI increases with increase in exchange rates of currency, same on the other hand it is economically bad impression for a country when its exchange rates are not under control and its worst condition for a country when the value of its currency decrease or exchange rates in particularly country increase with the passage of time.
2. It is also recommended that further research could be conducted on factors that affect the price movements of different currencies in these countries.
3. Changing exchange rate is one factors to change the FDI in BRIC, there could be research on other factors that has causal relationship with foreign direct investment in BRIC.
4. There should be research on the factors that can decrease the exchange rate within the country.
5. Factors that increase the foreign direct investment could be studied in BRIC as there should be more cumulative research on these countries.
6. In BRIC countries it would be race wining if these maintain their exchange rates in the country because it would be achievement for stabilized economic conditions.

APPENDIX

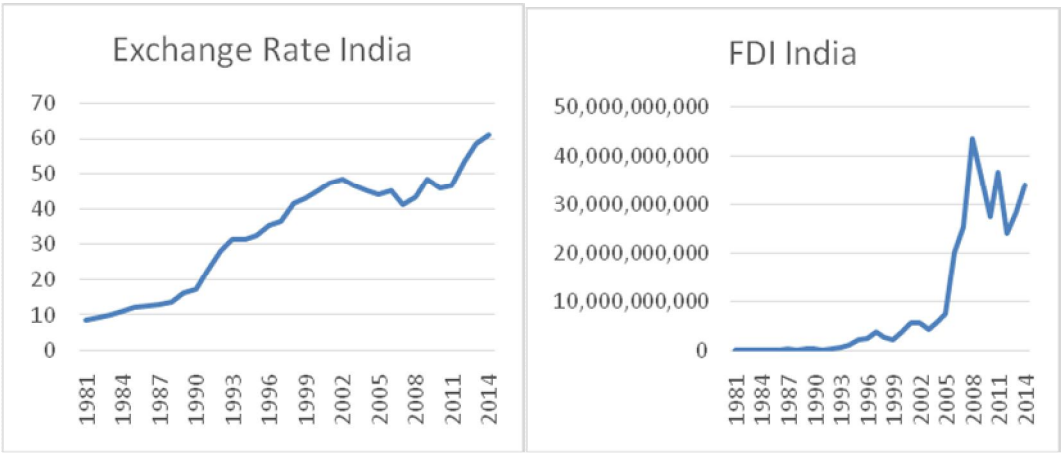
Graphical Presentation for Brazil:



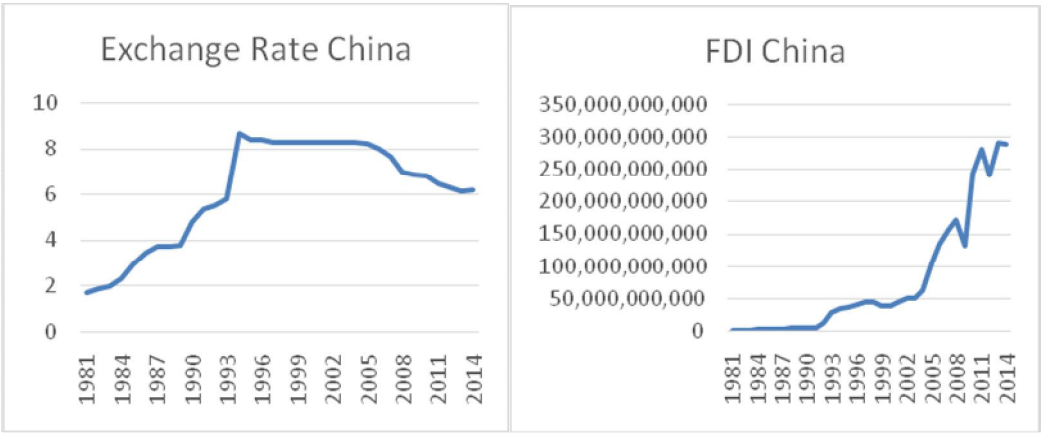
Graphical Presentation for Russia:



Graphical Presentation for India:



Graphical Presentation for China:



Graphical explanation of results:

To demonstrate trends in data and make comparison between different groups, graphs and charts are the best way. To most efficient and effective presentation different types of findings different types of graphs are required. This thesis has a portion of explanation of data and results that consists of graphical presentation. Line graphs are mostly used for time series data as this data consist on time period over the thirty three years, so graphical presentation of data consist over the thirty three years of time series. Line graphs are most effective in presentation with at least five or more data points of data as compare to bar graphs. It is less effective when time period is relatively few, here this research have not too much short time period it is enough to best present the data in line graphs. If the lines are not well separated it become very confusing to understand the results of graph. Normally the y-axis means vertical position has frequencies of what is being measured in analysis and it is conventional that x-axis means horizontal line contains the categories of time such as months, weeks of the day, depending on the data, here years are used.

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