

MBA Project report

by Misha Kalra

Submission date: 28-May-2019 04:48PM (UTC+0530)

Submission ID: 1136878995

File name: iiii.pdf (736.14K)

Word count: 3549

Character count: 30855

CHAPTER 1: INTRODUCTION

The twin economic goals that every country needs to accomplish are exchange rate stability and stock market growth. This is on the grounds that the financial position of every economy be it developed or developing can be evaluated from its exchange rate stability. Hassan et al. believed that a very strong exchange rate is a sign for a strong and viable economy. While on the contrast side, a very weak currency is a reflection of a very vulnerable and feeble economy. Prices level, firms' profits and even the entire activity in an economy are negatively affected by the real economic shocks caused by Exchange rate instability. Essentially, stock market assumes a very critical role in economic development of every country. With the goal to realize inclusive growth, Stock market serves as a transmission system upon which savings are mobilized as well as adequately distributed across the various economic sectors. In addition to the aforesaid, stock market executes the following functions: it boosts investors' trust in both financial institutions and even the whole financial system; it demonstrates robustness and viability of the productive sectors; and it facilitates capital allocation, investment and provides firms with an easy avenue to have access to satisfactory and required capital.

Today, The world is turning into a international village due to trade liberalization and globalization making Exchange rate and stock market price interrelated directly or indirectly. For example, foreign investors are caught up investing their capital in the stock markets world over. In this procedure, international investment is booming quickly and capital is moving over everywhere throughout the world. The advantages of these investors are being controlled by foreign exchange rate. Also, instability in the exchange rate may realize uncertainty or otherwise in these investors. In this way, exchange rate is the significant determinant of stock market fluctuations

Developing markets have as of late been of great significance to the worldwide investment community. The market capitalization, instability, and returns have expanded significantly in these markets. While developing markets are more unstable than developed markets, they tend to be in general moderately uncorrelated with each other and with developed markets

Numerous worldwide investors opt to diversify their funds across these markets to decrease portfolio uncertainty. Sadly, financial crisis portrayed by substantial fluctuations in stock and foreign exchange markets has been a typical occurrence as of late in rising nations. This acknowledgement guided researchers to explore the connection between stock market performance and the exchange rate. Ajayi and Mougoue (1996) and Makurjee and Naka (1995) discovered that exchange rate is cointegrated with the stock market price in eight industrial nations. Koutoulas and Kryzanowski (1996) gave proof that financial exchange unpredictability reacts fundamentally to exchange rate instability in Canada. Kearney (1998) brought out same outcomes for Ireland. Fang (2000) discovered a negative depreciation impact in the stock return process in Taiwan over the Asian crisis.

The association between exchange rate and stock prices have been exposed to broad research. Various hypotheses bolster the presence of a causal connection between stock prices and exchange rates. The present literature builds up two routes of connections between exchange rate and stock prices-

- The first one is the goods market route (e.g., Dornbusch & Fischer, 1980) which states that changes in exchange rates influence the competitiveness of global firms and subsequently their profits and stock prices. Depreciation in the local currency makes exporting goods cheaper and may lead to an increase in foreign demand and sales. Then again, as the local currency increases in value, external demand of an exporting firm's products lessens so the company's profit will fall and so will its stock price. The contrary case holds for importers. Furthermore, exchange rate fluctuations influence the estimations of a company's exceptional payables and receivables denominated in foreign currencies. As indicated by this contention, we anticipate a causal effect from exchange rates to stock prices.
- The second connection is the asset market route or portfolio balance approach. This hypothesis advances that stock price fluctuations can affect exchange rate movements. In the view of the portfolio balance approach, exchange rates are dictated by market system. Economic growth prospects will lead to an expected increase.

would help to attract capital from foreign investors and therefore results an expansion in the demand for the country's currency and the other way around. Subsequently, increasing (falling) stock prices are connected to an increase (decrease) in the local currency. Then again, fluctuations in stock prices may force exchange rates since investors' affluence and money demand may rely upon the performance of the stock market. In spite of the fact that the theoretical literature proposes causal relations between stock prices and exchange rates, experimental proof is fairly weak. The writing about the connection between securities exchanges and exchange rate, for the most part, for industrialized nations has discovered blended proof of the effect of exchange rate on stock returns. For emerging nations, there are a couple of studies that have investigated the impact of exchange rate fluctuations on stock returns. In our analyses, we study dynamic connections between exchange rates and stock prices in emerging market economies. These economies are fundamentally extraordinary regarding size, phase of improvement, development, and development of money related markets. Capital market liberalization and capital control are also some of the differencing factors. This study is influenced by several reasons-

1. First, earlier examinations principally centered around industrialized nations, with less consideration given to non-modern economies, especially developing countries. The recently industrialized countries incorporated into our investigation pursue trade drove route to activate their economic growth.
2. Second, in contrast to the created nations, most emerging nations do not embrace a freely floating exchange rate framework and have increasingly capital restrictions. A portion of the economies incorporated into our research follow freely floating exchange rate arrangement. Some have capital restrictions, which may debilitate dynamic connections between foreign exchange and equity markets.
3. Besides, the absence of a critical outcome from investigating well-developed countries may be because of the fact that these nations' firms can decrease exchange rate uncertainty by hedging because these countries offer more hedging instruments s they are more readily available. Therefore, studying the developing market economies empowers us to check the effect of the extent of financial market liberalization and exchange rate mechanism on the associations between the foreign exchange rates and equity markets. Using higher frequency data instead of low frequency data is therefore better to quantify associations between exchange rates and stock prices.

1.1 Background on BRICS

BRICS, an acronym for international association of five major developing economies: Brazil, Russia, India, China and South Africa, was formulated by Jim O'Neill in 2001. The coordination among Brazil, Russia, Republic of India and China (BRIC) began informally in 2006 with a in operation meeting of the foreign ministers of the four countries, on the margins of the UN General Assembly. In 2007, Brazil took over the organization of the meeting. On this occasion, it absolutely was detected that the interest in holding a more in-

depth dialogue concerned the organization of a particular meeting of foreign ministers. These nations represent an expressive share of the world's population and production. They are reckoned to be key players in international consumption and demand; and establish a balance between developing and developed nations owing to their accelerated development. These BRICS countries are enriched with natural resources which have given rise to their prospects of becoming international suppliers.

Increasing complexities of the financial world have made it imperative for policy makers, market players, practitioners and researchers to recognize the strategic and dynamic interactions between ⁷ stock market and foreign exchange market. These markets are the most susceptible elements of the financial system and are treated as barometers for gauging the economic health of the economy. It is essential to understand that one of the major reasons of financial crisis in the developing nations can be attributed to change in valuation of the respective currencies and the following problems in balance of payments (BoP). The currencies of the BRICS nations may get appreciated due to the flow of capital in their equity markets, which may further affect their balance of payments. The negative impact posed by a strong currency on the BoP leading to panic among investors and loss of their confidence can be one of the major reasons of crisis in developing markets. Thus, developing economies must monitor the effect of inflow of capital on their exchange rates and implement policies for mitigating the negative effect. Structural ¹¹ changes at micro and macro level have given a boost to investigations on the relationship between exchange rates of currency and stock market prices. Dornbusch and Fischer (1980) describe the flow-oriented model approach which states that international competitiveness and balance of trade is affected by movements in currency which further impacts stock prices. In contrast, Dornbusch (1976) suggests portfolio balance approach which states that diversification of risk by portfolio holders requires effective allocation of currencies. Change in economic conditions of a nation has direct impact on demand and supply of foreign and domestic bonds which influences the

exchange rate between foreign and domestic country. There is lack of consensus between these two approaches. Thus, this study examines the causal relationship between exchange rates and stock index prices in case of developing economies such as India, Brazil, China, Russia and South Africa.

1.2 Why Developing Countries only?

The problem of whether or not stock prices and exchange rates are connected or not has received great consideration because of the East Asian crisis. All through this catastrophe the economies impacted saw turbulence in each currency and stock markets. Suppose that stock prices and exchange rates are associated and in addition the accomplishment drives from exchange rates to stock prices, then at that point crisis in the stock markets is prevented by controlling the exchange rates. Furthermore, emerging nations will utilize such a connection to attract/bring in foreign portfolio investment in their own territories. Likewise, Authorities will aim at domestic economic policies to stabilise the securities market if the feat drives from stock prices to exchange rates. In the event that the 2 markets/costs are associated then financial specialists will utilize this information to foresee the conduct of 1 market abuse the information on different market. Most of the observational writing that has analyzed this relationship has focused on inspecting this relationship for the developed nations with little consideration on the emerging nations.

The Asian crisis of 1997-

98 has naked an amazing pitch for dynamic linkage between stock prices and exchange rates. All through the crisis, it was identified that the growing markets collapsed on account of considerable devaluation of exchange rates (as far as US\$) besides as sensational fall inside the stock costs. This has turned out to be fundamental yet again from the real reason for enormous cross border movement of assets because of portfolio venture and undue to real exchange streams, despite the fact that exchange streams have some effect on stock costs of the organizations whose primary origin of income comes from trade.

The common quality of the BRICS economies is of regularly expanding significance to the strength of the worldwide economy. In the meantime as developed economies over the world battling with huge spending deficiencies, powerless development and rising joblessness, the BRICS are mounting quickly, lifting individuals out of destitution and driving the worldwide economy. The way wherein pioneers in the troubled Eurozone as of late begged these business sectors for assets to help facilitate sovereign obligation emergency

more basic advance in the switch of financial power from 'west' to 'east'. Obviously, when estimated on a for every capita basis, the GDP of BRICS economies still are falling behind the G7 nations. Be that as it may, on an absolute basis, they are getting up to speed quick. As indicated by

Besides investment movement in BRICS nations appears to be solid which is evaluated that it will have 47% expanded. These measurements and data condenses the significance of BRICS in the advanced world business network and rising worries for Europe and other developing countries.

As BRICS ended up being greatest argument in the advanced period numerous specialists led different investigates on BRICS nations and about their way of life, geology, developing economy, modernization, industrialization and different zones.

With the quick development of the BRICS, numerous analysts have done numerous examinations on them and attempted to discover their contributing variables. BRICS nations, among developing markets continue to showcase expanded enthusiasm for financial investors and economists, however not adequately on the unpredictability of their financial and energy markets. Their potential monetary development for the following thirty years is accepted to make of the BRICS nations the next world financial and economic power. Their protection from financial crisis, for example instability diligence, together with a higher territorial money related incorporation, has made of BRICS nations an intriguing contextual investigation confirming the interrelation between financial stability and monetary development.

There is an extraordinary vulnerability as sees to who will develop as a noteworthy power and when the US strength will wind up unequivocal history. Truth be told, all things considered, just couple of nations will rise as focal center points of the framework in the 21st century, making a kind of unbalanced multi-extremity with a refinement between dominant or focal forces, significant forces, regional forces and local powers.

1.3 Objective of the Study:

It is very essential to study the stock market efficiency of emerging nations on a continuous basis as the efficiency poses worries for the development of other nations. As indicated by Claesson (1987) the economic situations such as innovation improvements and stock exchange turnover adjust ceaselessly, which underpins testing the financial market efficiency routinely. Since as of late, various extreme events have occurred in the financial exchanges of different nations, it is of extraordinary interest to know and inspect if these progressions have affected different nations strategy making characteristics somehow.

Our objective ⁴ in this project is to contribute this body of literature by examining the relationship between stock prices and exchange rates in an emerging market, namely BRICS Countries.

The principle target of this exploration is to discover how proficient the securities exchanges of BRICS nations were working over the most recent 10 years. This will assist us with understanding the advancement period of these nations so that how they posture to remain a challenge for USA and other developing European economies. Also the examination is done so as to discover the developing sectors in which the nation is pushing ahead which could assist the financial specialists with digging in. Additionally an outline on the advancement strategies in these nations are discovered with the goal that how their improvement has changed the policy making process in different nations and furthermore what influence that these BRICS have on worldwide economy can be investigated. This examination additionally points in knowing the investment avenues in BRICS.

For this examination the time frame considered will be most recent ten years as the monetary conditions changes occasionally. The example units considered for this examination will be the stock trades of different nations like India (BSE SENSEX), Brazil (IBOVESPA), China (Shanghai Composite Index), Russia (MOEX) and South Africa (FTSE/JSE) and exchange rate of USD/INR, USD/BRL, USD/CNY, USD/RUB and USD/ZAR.

CHAPTER 2: REVIEW OF LITERATURE

Exploring the subject of how macroeconomic variables affect the firm-specific performance, has been a matter of interest to academicians as well as researchers ever since. Many deliberations have been made in the past, some of which have been noteworthy contributions to the existing literature and the contemplations are still continuing.

Attributing the growing importance of the studies relating the causal relation between exchange rates and stock market returns to the broadening of international global financial markets and flourishing international trade, Chir (2011) has asserted that if this relation can be empirically documented, the crisis in the stock market of an economy can be controlled to some extent, if not avoided. Focusing on a nine-year time period from 1993-2001, the author has examined that how monthly values of exchange rates (Kenya Shilling price vs. U.S. Dollar) changes are related to the stock price movements of similar frequency. They have analyzed a two-way causal relationship between the variables of the study using *Vector-Auto Regression (VAR)* model and *Modified Wald Test (MWALD)*. The findings of the tests along with *Granger-Causality* test indicates that there is a *bi-directional negative relationship* between the variables, implying that when exchange rates increase, Kenya shilling depreciates, and *vice-versa*. Also, when the stock prices change, the exchange rates respond to it, in the opposite direction.

Taking cues from the evidence in economic theory, Jamil & Ullah (2013) have explored the impact of exchange rate on stock market returns in the context of Pakistan. With the specific objective of analysing the *short-term sensitivity* of returns to exchange rates, they have focused on monthly data over twelve-year time-period. Gathering data relating to stock returns from *Karachi Stock Exchange (KSE)* for KSE 100 index and exchange rates (U.S. Dollar vs. Pakistan rupee) the *Vector Error Correction Model (VECM)* analysis signified a positive impact of exchange rate on stock returns. Also, they have highlighted that in the short-run, the market correct itself because the investor's objectives in Pakistan has been observed to liquidate their holdings often, thereby setting the equilibrium automatically. In the long run, however exchanges rates should be maintained to stabilize the market.

Muhammad & Rasheed (2003) attempted to conduct a comprehensive study focusing on exploring the short-run as well as the long-run relation between exchange rate and stock prices of four *South-Asian* countries, viz; India, Pakistan, Bangladesh, Sri Lanka over five-

year term from 1994-2000. It has been first explored using Co-integration approach. Further, to explore the causation modelling of error-correction with GC test has been used. Findings of study reveal that no short-run association could be established between variables of study for any of the sample countries. Also, in the case of India and Pakistan, the long-run relation could be identified. It is just the long-run relation which persists among the two sample nations- Bangladesh and Sri Lanka.

Going a step ahead of the conventional studies, Yousafzai & Masih (2017) administered a study exploring the relation between Shariah stock index Consumer Price Index, over a ten-year period, 2007-2017. Also, the study explores- “whether stock prices lead or lag the rest of the variables in the study”? In order to overcome the limitations of standard co-integration techniques, the study employs *ARDL* technique, popular of time series analysis. The results indicate that stock prices do not lead rest of the variables, and in fact, exchange rate and money supply lead them. The authors attribute the findings to the policy framework of Japan where *quantitative easing* mechanism of monetary policy works as a catalyst to drive the behavior of all the mentioned variables.

observation, where more concrete asset management strategies can be worked upon to insulate from exchange rate fluctuations.

In order to gather some evidences on the subject, Cakan & Ejara (2013) investigated the exchange rate and stock return linkages with reference to twelve emerging market economies namely, *Brazil, India, Indonesia, Korea, Mexico, Philippines, Poland, Russia, Singapore, Taiwan, Thailand and Turkey* over a period of eighteen years from 1994 to 2010. Except for a few countries like Brazil, Poland, and Taiwan out of the sample nations, all other nations have registered evidence of bi-directional causality between stock prices and exchange rates. Attributing the difference of results to the distinct institutional framework and policy regulations, authors suggest that further deliberations in this direction can lead to concrete and meaningful result to build on cross-country comparisons.

Developing on the lessons learned from the Asian crisis, Nath & Samanta (2003) examined the much talked about the relation between exchange rate and stock returns between in Indian context using daily data frequency of returns from S&P CNX Nifty index of National Stock exchange of India over a period ranging from 1993 to 2002. Using the conventional methodology of checking for stationarity and then examining the causality between the mentioned variables, the test results unfold interesting findings that ‘the return in the stock market had a causal influence on return in the exchange rate with the possibility of mild influence in reverse direction’. Authors further argue that although a very small portion of household savings are channelized to stock markets from the viewpoint of institutional investment the results can have significant implications.

Investigating the significance of the relation between stock price and exchange rate in Brazilian economy, Tabak (2006) employed the Granger causality methods after checking for stationarity on the daily data value of stock prices obtained for the nine-year time period from 1994 to 2002 and foreign exchange rate with reference to US Dollar. The econometric testing procedure does not indicate the presence of any long-term relationship between the variables under study. However, the evidence of linear causality could be found from stock prices to exchange rate indicating that stock prices lead to exchange rate and non-linear causality could be observed flowing from exchange rate to stock prices.

CHAP 3: RESEARCH DESIGN

Data Collection

- India (BSE SENSEX),
- China (Shanghai Composite Index),
- Russia (MOEX), and
- South Africa (FTSE/JSE)

Exchange rates of-

- INDIA- USD/INR,
- BRAZIL- USD/BRL,
- CHINA- USD/CNY
- RUSSIA- USD/RUB
- SOUTH AFRICA- USD/ZAR

All the data is collected for period: 1st April 2008 to 31st March 2018 (2171 observations).

The data has been collected from the Bloomberg© database.

3.1 Methodology

We performed the following tests using R.

- Correlation Test
- Augmented Dickey-Fuller (ADF)

The Correlation Test of the stock indices and trade rate indicates the extent of degree of linkage between them. unit root presence in the information is checked by ADF test. Data is said to be stationary if there is the existence of unit root. Stationarity of data, a pre-requisite for conducting any statistical analysis. The first difference is taken to conduct the analysis if the data is not stationary in its original form.

Granger causality test, VAR is conducted. Granger causality examines the existence of a causal relationship between the variables.

Below mentioned are the brief details about the each test for analysis:

1. Correlation Test: Correlation is a *dimensionless* measure of how two variables in time series analysis vary together, or "co-vary". Generally, it is the covariance of two arbitrary factors standardized by their separate spreads.

In the formula beneath,

- \mathbf{x} & \mathbf{y} are two vectors of length \mathbf{n}
- m_x and m_y corresponds to the means of x and y , respectively

$$r = \frac{\sum (x - m_x)(y - m_y)}{\sqrt{\sum (x - m_x)^2 \sum (y - m_y)^2}}$$

The denominator product of the two spreads will constrain the correlation to lie within the interval $[-1,1]$

- A correlation of $\rho(x,y) = +1$ shows the exact positive linear association
- A correlation of $\rho(x,y)=0$ shows no linear association at all
- A correlation of $\rho(x,y)=-1$ shows the exact negative linear association

Scatter Plot is used to do an initial analysis before any statistical analyses are conducted. It displays the values of two variables at a time using symbols, where the value of one variable determines the relative position of the other depicting the nature of the time series. The following R code plots the graph for graphical analysis:

```
> plot(x, y, ...)
```

```
> plot(SOUTH_AFRICA$`CLOSING PRICE`, SOUTH_AFRICA$`USD/ZAR`)
```

Post Graphical Analysis, We computed the correlation. The Correlation Test between the stock indices and exchange rate indicates the degree of association between them. We have used the closing prices of stock indices of BRICS as x on horizontal axis and exchange rates of BRICS with comparison to USD as y on the vertical axis

determine the correlation determining how significant the relationship is.

Code is as follows:

```
> correl(x,y)
> cor(RUSSIA$`CLOSING PRICE`,RUSSIA$`USD/RUB`,method = "pearson")
```

2. Augmented Dickey-Fuller (ADF Test): Plays out the Augmented Dickey-Fuller test for the null hypothesis of a unit root of a univariate time series x (equivalently, x is a non-stationary time series). Below code is given in R to run ADF test:

```
adf.test(x, nlag = NULL, output = TRUE)
urca=ADF.TEST(RUSSIA$`CLOSING PRICE`)
```

Arguments:

x	the numeric vector/univariate time series.
nlag	a lag order with default which calculates the test stat. See below mentioned details for the default.
output	a logical value which indicates to print the test results in R console. The default is TRUE.

ADF is used if the expectations of stationarity are met or violated. We tested ADF on the differences of the X and Y (In our case between closing prices of stock indices and exchange rates wrt USD) we used while computing ADF in R. Observations in the stationary time series are not dependent on time and vice versa. Observations from the non-stationary time series depicts the seasonal effects, trends, and other structures which depend on the time index.

As indicated by Chris Brooks (2014), In the book written by him, "If one wishes to use hypothesis tests, either separately or together, to inspect the statistical significance of the coefficients, at that point it is fundamental that the majority of the parts in the VAR are stationary."

Granger Causality tests attempt to decide whether one variable (x_1) can be utilized as a predictor of another variable (x_2) where the past estimations of that another variable might help or not. This implies that (x_1) explains beyond the past values of (x_2). Two significant

assumptions here are both (x1) and (x2) are STATIONARY and there exists a linear relation between their present and past values. This implies if (x1) and (x2) not stationary, we require them in the form of stationary before testing for Granger Causality. Along these lines, it very well may be applied in both stationary and non-stationary cases, yet we need to make the data stationary before using it.

2. Vector Auto Regression (VAR): The Vector AutoRegression (VAR) model is one of the most flexible, successful, and easy to use technique for the analysis of multivariate time series (Time series which has more than 1 time-dependent variables). It is basic model typically used to estimate and evaluate the relationships between multiple variables over time.

In a VAR model, each variable is a linear function of its past values and the past values of all the other variables. In addition to forecasting and data description, the VAR model is also used for policy analysis and structural inference. Selection of an appropriate/optimal lag order is important before conducting Causality tests between time series. If a large of an order is used then model loses power, but if it is too small then the model is subject to omitted variable bias. The fact is that there is no universally accepted method of estimating the correct order.

- **Optimal Lag Length Selection**

The lag length for the VAR(p) model may be estimated using model selection criteria. The general technique is to fit VAR(p) models with orders $p = 0, \dots, p_{max}$ and choose the value of p which minimizes some model selection criteria. Model selection criteria for VAR(p) models have the form-

$$IC(p) = \ln |\hat{\Sigma}(p)| + c_T \cdot \varphi(n, p)$$

where $\hat{\Sigma}(p) = T^{-1} \sum_{t=1}^T \hat{\epsilon}_t \hat{\epsilon}_t'$ is the residual covariance matrix without a degrees of freedom correction from a VAR(p) model, c_T is a sequence indexed by the sample size T, and $\varphi(n, p)$ is a penalty function which penalizes large VAR(p) models.

The three most common information criteria are the Akaike (AIC), Schwarz-Bayesian (BIC) and Hannan-Quinn (HQ):

$$\begin{aligned}
AIC(p) &= \ln |\tilde{\Sigma}(p)| + \frac{2}{T}pn^2 \\
BIC(p) &= \ln |\tilde{\Sigma}(p)| + \frac{\ln T}{T}pn^2 \\
HQ(p) &= \ln |\tilde{\Sigma}(p)| + \frac{2 \ln \ln T}{T}pn^2
\end{aligned}$$

4. Granger Causality: The Granger causality test is a statistical hypothesis test for deciding if one time series is useful in forecasting another, first proposed in 1969. Usually, regressions reflect "minor" correlations, however Clive Granger argued that causality in financial aspects could be tried for by measuring the ability to anticipate the future estimations of a time series using prior values of some other time series. Since the topic of "true causality" is profoundly philosophical, and because of the post hoc ergo propter hoc error of accepting that one thing going before another can be used as a proof of causation, econometricians declare that the Granger test finds just "predictive causality".

A time series X is said to Granger-cause Y if it can be shown to have appeared through a progression of t-tests and F-tests on lagged values of X (and with lagged values of Y additionally included), that those X values give measurably significant information about future values of Y.

Granger additionally focused on that a few studies using "Granger causality" testing in areas outside financial matters reached "ridiculous" ends. "Obviously, numerous ridiculous papers showed up", he said in his Nobel lecture. However, it remains a common strategy of analysis for causality in time series because of its computational simplicity. The first meaning of Granger causality does not account for latent confounding impacts and does not capture immediate and non-linear causal relationships, however many extensions have been proposed to address these issues.

Granger defined the causality relationship based on two principles:

- The cause happens prior to its effect.

- The cause have exceptionally different information about the future values of its effect.

Methodology:

If a time series is a stationary process, the test is performed using the level values of at least two factors. If the factors are non-stationary, then the test is carried out using first (or higher) differences. The number of lags to be incorporated is generally picked using an information criterion, for example, the Akaike information criterion or the Schwarz information criterion.

Hypothesis Formulation:

- **Correlation Test:** The correlation test has been performed on daily stock index prices and exchange rate. For performing the correlation test we conduct the following hypothesis testing:

$$\begin{aligned} H_0: & \text{The two Series have no correlation;} \\ & r = 0 \\ H_1: & \text{The two Series are correlated;} \\ & r \neq 0 \end{aligned}$$

- **ADF Test:** For testing the stationarity of the data, ADF test is performed on the time series of index prices and exchange rates which are considered in this study. The regression equation of ADF is.

A series is said to be (weakly or covariance) stationary if its mean and autocovariance are time-

invariant. For performing the ADF test, we conduct the following Hypothesis testing:

$$\begin{aligned} H_0: & \text{The Series has a unit root (the series is non-stationary)} \\ H_1: & \text{The Series does not have a unit root (the series is stationary)} \end{aligned}$$

- **Granger Causality Test:** This test is conducted to establish cause and effect relationship between the stock index prices and exchange rate. If variable X helps in forecasting the value of variable Y, then it can be said that variable X Granger causes variable Y.

ble Y. Granger causality is run on the differenced values.

For India,

H1: Index prices do not cause the exchange rate

H2: Exchange rate does not cause Index prices

For Brazil,

H3: Index prices do not cause the exchange rate

H4: Exchange rate does not cause Index prices

For China,

H5: Index prices do not cause the exchange rate

H6: Exchange rate does not cause Index prices

For Russia,

H7: Index prices do not cause the exchange rate

H8: Exchange rate does not cause Index prices

For South Africa,

H9: Index prices do not cause the exchange rate

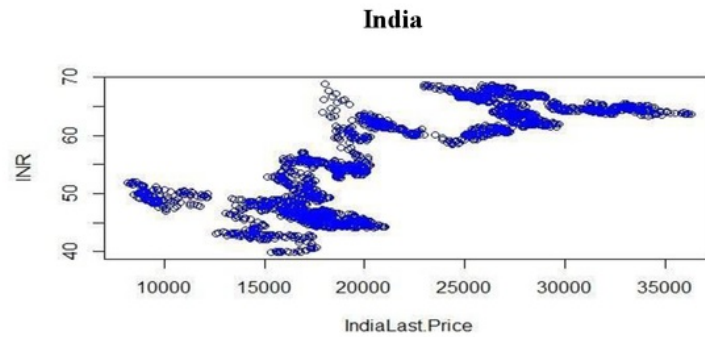
H10: Exchange rate does not cause Index prices

CHAPTER 4: RESULTS & ANALYSIS

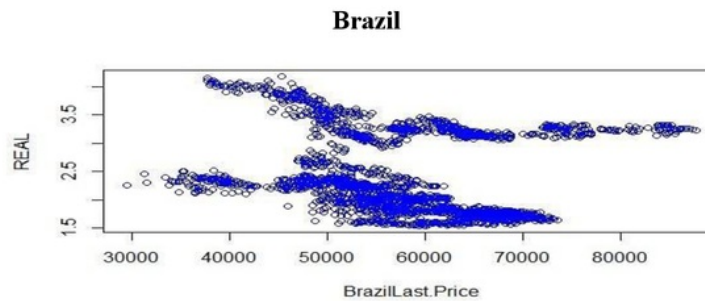
1. Correlation Test:

- **Graphical Analysis**

The graphical analysis has been carried out through scatterplot.

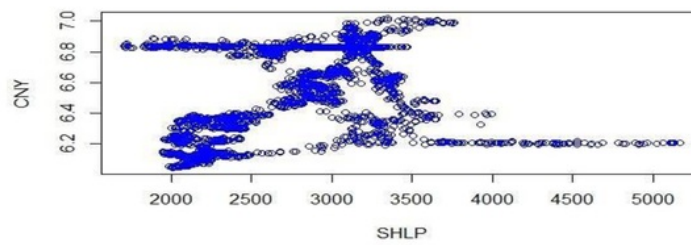


The daily prices of BSE Sensex and Exchange rate (USD/INR) are closely moving upwards. Thus, the graphical analysis seems to suggest strong positively correlated.



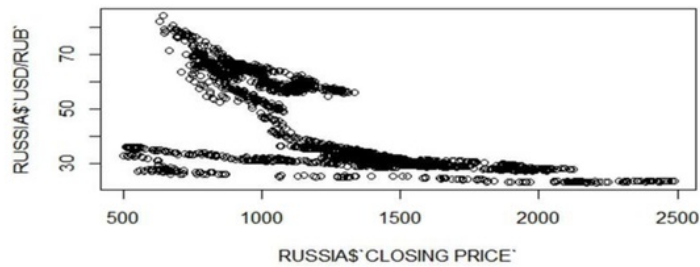
Daily price of IBOVESPA and Exchange rate (USD/BRL) are scattered around. Thus, the graphical analysis seems to suggest that very low negative correlated.

China



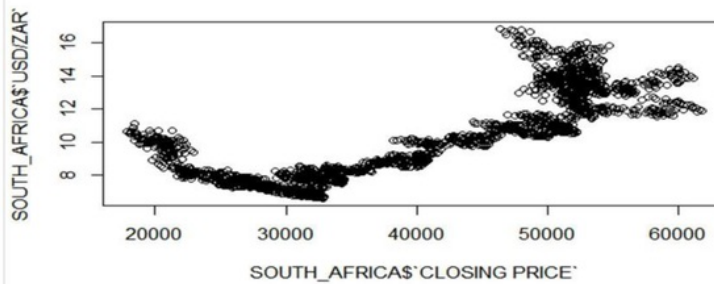
Thus, the graphical analysis seems to suggest that it is very low positively correlated

Russia



The daily prices of MOEX and Exchange rate (USD/RUB) are scattered around. Thus, the graphical analysis seems to suggest that there exists moderately negative correlation between them.

South Africa



The daily prices of FTSE/JLC and Exchange rate (USD/ZAR) are scattered around. Thus, the graphical analysis seems to suggest that there exists very high positive correlation between them.

- **Statistical Analysis**

	INDIA	BRAZIL	CHINA	RUSSIA	SOUTH AFRICA
Correlation b/w index prices and exchange rate	0.7915	-0.1833	0.2630	-0.6595	0.8151

From the results, we can conclude that –

India, High positive Correlation

Brazil, Low & Negatively Correlated

China, Index prices have very low and positive correlation with the exchange rate.

Russia, Index prices have moderate and negative correlation with the exchange rate.

South Africa, Index prices have very high and positive correlation with the exchange rate.

Since the corresponding p-values for all the above cases is less than 5% (refer Appendix B), the correlation coefficient is statistically significant.

2. **ADF Test:**

For the variable's level value, the null hypothesis cannot be rejected because ADF test statistics value yield p-values which are greater than the critical values at the 5% level in all the five cases. Therefore, our data is non-stationary. Hence, we calculated the first difference of data to conduct the Granger Causality Test. The results of the ADF test at the level and differenced data are shown in the Appendix C.

Result- We observed that in all the cases of differenced data that the test-statistic is smaller. The p-value obtained is less than 5%. This is a more restrictive test and thus we can reject the null with a higher significance level.

For all the variable level data, the p-value is greater than 0.05. We cannot reject the null hypothesis. The null hypothesis is that the data are non-stationary.

3. **VAR:**

The VAR test is conducted to determine the number of lags for each pair. We have used the Akaike information criterion to determine the lag order. AIC favors 10 lags for all five countries (Appendix D). The AIC determined lags are then used to perform Granger Causality Test.

4. Granger Causality Test:

Our results show that there is bi-directional relation between stock prices and exchange rates in India. The result is significant at 1%. However, we do not observe any significant causality between the index prices and the exchange rate of Brazil, Russia, South Africa and China.

The detailed results of the Granger causality test are shown in the Appendix E.

We interpret the results as follows:

- If $\Pr(>F) < \alpha$ (where α is your desired level of significance), reject
- If the inequality gets reversed, you accept.

CHAPTER 5: CONCLUSION

Through the analysis of this report, we can conclude that there exists bi-directional causality between the equity stock market and the foreign exchange rate market of India. The bidirectional causality between stock return and exchange rate shows that government should be cautious while making any changes in exchange rate policy as well as industrial policy. Further there is also a possibility to use information of the one variable to predict about the other. However, no causality between the equity stock market and the foreign exchange rate market could be found for Brazil and China. We came to this conclusion by using the Granger Causality test on 10 years daily data of index prices and exchange rate using R software. This result is partially supportive of the popular belief that the exchange rate is a function of the capital account of the BOP rather than the current account. Any innovation in the stock market leads to an increase in demand of the exchange rates, thus affecting it. This happens because; an increasing trend in the stock market attracts new investors both local and foreign, thus attracting a new inflow of funds into the market through the capital account to influence the exchange rates directly.

We believe the differences result from differences in degrees of capital market progression, capital controls, and exchange rate systems over the nations. The issue is likewise significant from the perspective of recent enormous cross-outskirt movement of assets. The relationship between stock prices and exchange rates is broken down into analysis by using high-recurrence data of exchange rates and aggregate stock indices of BRICS countries in our research. Using time-series methods, this research gives validation that a long-run stable connection between stock indices and exchange rate exists. Yet, our outcomes demonstrate that causality relationship exists just from exchange rate to industry sector index.

CHAPPER 6: LIMITATIONS

- **Non-consideration of all factors for Lead-Lag model:** This model that mainly relies on historical data in order to predict future returns of one variable by another, may not hold true as there must be other factors involved also to predict the same.
- **Historical data collection problems:** There are also practical problems associated with the model such as difficulties with gathering the data.
- **Time horizon:** This study considered only 10 years of data. More years can be taken into consideration.
- **Different Financial Systems of BRICS:** BRICS countries are very different from each other and have varied financial systems and their resources. Like: India and Brazil are Democratic; Russia and Brazil export hydrocarbon; India and China are Importers; Thus their financial systems, education, levels of income etc differ enough to coordinate their actions.

MBA Project report

ORIGINALITY REPORT

10%

SIMILARITY INDEX

3%

INTERNET SOURCES

7%

PUBLICATIONS

7%

STUDENT PAPERS

PRIMARY SOURCES

- | | | |
|---|---|----|
| 1 | Pan, M.S.. "Dynamic linkages between exchange rates and stock prices: Evidence from East Asian markets", International Review of Economics and Finance, 2007
Publication | 3% |
| 2 | Submitted to ISM Vadybos ir ekonomikos universitetas, UAB
Student Paper | 1% |
| 3 | Theophano Patra, Sunil Poshakwale. "Economic variables and stock market returns: evidence from the Athens stock exchange", Applied Financial Economics, 2006
Publication | 1% |
| 4 | www.sbe.deu.edu.tr
Internet Source | 1% |
| 5 | www.analyticsvidhya.com
Internet Source | 1% |
| 6 | Submitted to London School of Economics and Political Science
Student Paper | 1% |
-

7 Tarak Nath Sahu. "Macroeconomic Variables and Security Prices in India during the Liberalized Period", Springer Nature, 2015
Publication 1%

8 Submitted to University of KwaZulu-Natal
Student Paper <1%

9 pt.scribd.com
Internet Source <1%

10 Submitted to Pacific University
Student Paper <1%

11 Submitted to University of Lincoln
Student Paper <1%

12 Submitted to UCSI University
Student Paper <1%

13 krishikosh.egranth.ac.in
Internet Source <1%

14 www.cmi.no
Internet Source <1%

Exclude quotes On

Exclude matches < 10 words

Exclude bibliography On