An Empirical study of Bi-Directional Relationship of Exchange Rates with Stock Market Returns an Evidence from South Asian Emerging Economies: An Econometric Analysis

by

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Abstract

The objective of this research is to investigate the relationship between exchange rates and stock market prices with the help of market indices. This study relates to comparative analysis of four South Asian countries such as India, Sri Lanka, Bangladesh and Pakistan. This research shows the empirical findings on both of the variables in terms of short and long run. Source of data is on secondary and quantitative in nature and research paradigm is positivism approach. Data collection is on monthly basis and timeframe of the data starts from July 2006 to June 2016. Econometric models that applied like as Johnsen Co-integration test, Granger causality test and for short run, vector error correction model (VECM) is used. The empirical test revealed the results that there is no co-integration for any of the stated country in long run but the causality witnessed for India. VECM showed the significant negative relationship in short run for Sri Lanka and Bangladesh. Concluding point is that exchange rates do not have a predictor tool to change the direction of stock market prices and indices in these four South Asian countries because the economic sentiments are almost same for each country.

Keywords: Exchange rates, Stock indices, South Asian countries, Econometric model

Background of Research:

There are many macro-economic factors that affect stock market and exchange rate of the country. Factors that affect the stock market are Inflation, Economic growth, unemployment and interest rate(Kurihara, 2006). Stock market always look for economic growth because the value of the stock increases due to economic growth which is profitable for the company. Declining Interest rate usually tend to grow the market because they are found to be the signal of economic growth, whereas high inflation have an opposite affect since it means that interest rate will increase in near future thus economic growth declines. When unemployment increases the economic growth of the country decreases and declining unemployment means the growth of investors in on the way.

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Before investing in any stock it's very important to loot at these factors in order to predict the market whether it goes up or down.

Exchange rate plays an important role in the organization and attracts analyst attention since exchange rate can affect the value of an organization through cash inflows received by the exports and cash outflows required for the imports to invest in another country. The factor that affect the exchange rate is the demand and supply of the currency, the demand of the currency comes from exports and supply of the currency comes from foreign investment. Any change in demand of currency affect its value for example if demand goes up the exchange rate will also increase whereas if supply increases exchange rate decreases in the market.

The relationship between stock market and exchange rate is defined in two ways theories, one is known as ''The flow-oriented exchange rate model'' by Dornbusch and Fischer (1980). This theory says that fluctuation in exchange rate would affect the stock market. Whereas the second theory which is known is ''Stock oriented exchange rate model, by Branson and Frankel (1983). This theory says that if stock price increases the exchange rate would also increase.

An empirical debate regarding the relationship between these variables has been started very earlier. There are many studies that are conducted to find out the relationship of these variables but every researcher has its own perspective. Some of the studies proved a positive relationship such as Aggarwal (1981), Jorion (1987), and Roll (1992). Some of the studies showed that there is a negative relationship such as Soenen and Hennigar (1986). But some studies couldn't find any relationship such as Fanck and Young (1972), and Solnik (1987).

So there is no empirical consistent among the researchers and there is a need of more researchers to contribute to literature.

Research Problem:

The relationship of stock market and exchange rate, some of the studies showed that they have a positive relationship while some studies proved a negative relationship. Another issue was that my purpose was to find out the relationship between exchange rate and stock market in short run, while the data is available in long run only. However the researchers do not have any mutual consensus regarding exchange rate impact on stock market because they think it applies to advance countries only so the data which is available on internet is somewhat vague.

Research Objectives:

The core purpose of this study is to understand the concept of stock market and exchange rate and to analyze the exchange rate impact on stock market. Another objective of doing this research is to find out the relationship between these two variables to understand how these variables react with each other when the market goes up or down. The primary objective of this research is as follows:

1. To examine the relationship of stock market and exchange rate returns movement in Pakistan.
2. To assess the impact of exchange rate on stock market movement in Pakistan.
3. To find out the bi-directional relationship between stock market and exchange rate.

Research Questions:

Research question is the initial step in the project. The objective of this research is to analyze and identify the factors on stock market returns which includes inflation, interest rate, economic growth and unemployment.

1. Some of the research questions are as given below:
2. What is the relationship between stock market return and exchange rate?
3. What are the impact/effects variables on stock market returns ?
4. What is the bidirectional relationship between stock market and exchange rate?

Literature Review:

A relationship of Macro economic variables with stock market is very limited in Pakistan. Frank and young (1972), was the first researcher who perform a study in order to determine the relationship between stock market and exchange rate, considering six different countries' currencies, and come up with the conclusion that the relationship between these variables is meager. The literature indicates that some of the authors believes that there is a negative relationship between these two variables however some of them think that there is no relationship between them. There has not been vast or wide information their relationship. Relationship of sudden change in economic activity is extensively recognized and interpreted in the literature, and it has been negotiated that positive economic shocks has a negative influence on economic activity Bernanke (1983), and Kimball (1990), which extremely have an impact on exchange rate and stock market. A financial crisis of 2007, also known as Global financial crisis have been a worst financial crisis after 1930's Recession.

The stock market has been badly affected due to this financial crisis. In order to investigate the impact of crisis on stock market, some studies have been conducted on its impact like Owole (2009), this study says that stock market and its unpredicted or sudden change is no longer restricted from severity of this crisis.

It's very important to give a brief introduction about the movements in exchange rate and changes in stock market in this research. Another thing that is also very important to be examine is to know Pakistan's relationship to come up with the conclusion that either our results are accurate or containing logical contradiction with past studies conducted in different countries over a different period of time.

Causal relationship has been evaluated in order to determine the relationship between macroeconomics stock volatility and stock exchange. A study has been conducted by Islam and Murinde (1997), which summarizes that when the currency's value increases or appreciate, helps stock to perform in a satisfactory way or perform well, however it shows a poor performance when the value of a currency depreciates or decreases.

Another study has been performed by Nyamute (1998), about fluctuation of exchange rates and returns of stock, results a positive coefficient. Furthermore, he discussed the stock market and its variables including interest rate, inflation, money supply and exchange rate which was carried out in Kenya. Chiang, Yang, and Wang (2000), stated a positive link amid stock prices and variation in exchange rates in the Asian countries. Sabri (2004), examines the relation in emerging countries in order to determine either exchange rate has any impact on stock prices in emerging countries or not, which results that their relationship is very strong and positive in the market.

Furthermore, there is an empirical literature that supports an argument that there is no connection with the fluctuation of exchange rate and stock volatility, this statement has been proved in a study conducted by Chiang, Yang, and Wang (1992) which concludes that there is no long-term association of movement between stock volatility and exchange rates. Nieh and Lee (2001) conducted a studies in the G-7 countries which proved that there no causal link between these variables and it also couldn't find any relationship between them.

A study encourages a link between an irregular rising and falling of currency and volatility in stock market with negative coefficient. So according to Ma and Kao (1990) there can be both positive and negative impact of currency appreciation on the prices of stock for export and import countries. A study has been performed by Granger, Huang and Yang (2000) which is based on link amid changes in the value of currency and stock prices volatility. It is analyzed that either depreciation in a currency causes to reduce prices of stock or decline in stock prices leads to reduce the value of a currency. It has been concluded that there is a negative causal relationship between stock prices and exchange rates in Asian countries.

Smyth and Nandha (2003), explained that economic factors follow ceteris paribus rule which means that all other factors remains constant for examining the causal relationship between economic factors. The study proved that there is no causal relationship between them until and unless the other remaining factors would keep constant. Apart from that the results would be different for each analysis and the relationship between the variables could not successfully reach an end. This author further discussed that exchange rates are dependent on other variables such as treasury bills of central bank, government policies, inflation fact, and investor behavior which results in changing stock price movements. Therefore it has been proved that exchange rates not only affect stock prices but it also have an impact on other factors which cannot be held constant while determining their relationship (Kim, 2003).

Another study has been conducted by (Zhao, 2010), to observe the macroeconomics variables not only nationally but also internationally by using the exact elements for both the countries by analyzing it with them help of regression model and investigated how macroeconomics variables for instant interest rate, CPI, T-bills, for the longer-term, industrial production index, changing movements of stock prices. They also determine the relationship for stock market of 500 index in USA by using the same variables in US economy. Their study reached to the finding that industrial index of Vietnam had an important impact on the prices of stock however T-bills issued by government for long run and interest rates for short run doesn't have any influence on VSE market.

Kim (2003) conducted a study based on the market of Turkish stock by using the variables like change in interest rates, manufacturing sector, money supply, industrial production sector, oil price rate, and exchange rates. The data that has been used in the study was from July 1997 till June 2005, and the examination were used for portfolio approach rather than single equity stock. The literature says that these variables had a great impact on Turkish stock market index, and three portfolios were used out of twelve which emphasizes that inflation has a great role, however no impact on industrial production, supply of money, and oil prices had been proved.

There is ample number of authors who have done the work on developed countries and very few of them described about the emerging markets and above all limited work has been done on South Asian countries. Franck and Young (1972) were the first researchers who described the relationship between exchange rates-stock prices and they considered six different countries' currencies revealing the result empirically showing the relationship between two variables are meagerly. In addition to this, some of the authors described the relationship between exchange

rates and stock prices are significant in the long run and no impact on the short run. The literature studies were indicated that some of the authors believe that these two variables have negative relations and some do consider it does not have any influence either. The exchange rate is not the only determinant which gives the accurate information regarding stock prices (Lazear, 2013). This relation is supposed to be described in the following paragraph by different authors in different countries.

Solnik (1987) performed the study of nine more advanced western countries like as USA, UK, Japan, Netherland, Germany, Belgium, Switzerland, Canada and France. His study indicated the three core variables such as exchange rate, inflationary pressure and interest rate and for this he extracted the monthly data for the above countries and checking the findings on stock prices. His empirical findings showed the depreciation in the exchange rate had a positive impact but had a very minute influence on the stock market and there was no evidence for interest rates and inflationary pressure regarding stock prices.

Wooldridge (2006) explained that economic factors are following the strategy of ceteris paribus i.e. other factors remain the same for determining the causal relations among economic factors. He described that it is not the link to check the relationship of one variable to the other unless rest of the variables is constant, otherwise the dissimilar result comes out and not having an exact causal relation between exchange rates and stock prices. He further added that exchange rate has dependent on several factors include government policies regarding exchange control parity, treasury bills rates by Central Bank, inflation factor, public sentiments and investors behavior that leads to change the direction of stock prices. Therefore, it is concluded that exchange rate does not influence only on stock prices, as the other factors cannot be stagnant while checking the relationship between exchange rates-stock prices.

Another study was taken place by Vygodina (2006) for USA economy. He considered in his study by using two levels of stock prices namely large-cap stock prices and small-cap stocks. He used Granger Causality Test for his empirical findings and concluded that on the basis of data information which covered the period of 1989 to 2005 showed the large-cap stock prices had causality but no causality in the small-cap stock prices items. He further said that it is very important nexus between exchange rates and stock prices like other macroeconomic variables for the country but it depends upon the nature of federal monetary policy which is prevailed in USA and this caused the sentiment of exchange rates-stock prices that is being changed over time.

Ratner (1996) applied the co-integration test for USA economy where two stated variables were opted and he did not revoke null hypothesis about no relationship between exchange rates-stock prices though his results used assets-based theory. Furthermore, Ajayi and Mougoue (1996) used to identify the causal relationship between exchange rates-stock prices on well developed countries such as Canada, Italy, Japan, Netherlands, France and Germany Their empirical findings reached to the conclusions by using econometric model of VECM for the stated variables are having bi-directional relationship in the short and in the long run for these countries.

Nshom (2007) performed his study on London Stock Exchange (LSE) where he considered FTSE 100 index and only considered 18 sample companies. His empirical findings were based on linear regression model and his findings documented that causation of exchange rates movement impacts on stock market prices. He used lagged values test for which he raised a point that stock prices are positively related on a daily closing price of FTSE-100 index for 18 companies.

Relating to the research work Kurihara (2006) documented his study for Japanese stock prices, and USA stock prices for considering the independent variables of exchange rates and interest rates and investigated the importance of the above stated markets. Collection of data source

commenced from March 2001 to September 2005 and results were indicated that Japanese stock prices did not have any significance influence while considering the domestic market interest rates. However, USA stock prices and exchange rate performed a cardinal role in Japanese stock prices. In short, 2001 quantitative easing policy which was introduced by Japan has performed a key role to influence its stock prices.

Fang & Miller (2002) studied on Korea where they recognized the exchange rates-stock prices were complementary with each other. They documented the data on daily basis where Generalized Autoregressive Conditional Heteroskedasticity Model (GARCH-M) was applied and daily data source ranged from January 3, 1997 to December 21, 2000. They described in their results that Korean currency changes the Korean stock market in three different ways. The first approach indicated that two variables have adverse relationship but depreciation in the Korean currency rate had a positive momentum and increases the returns on the share prices and lastly stock market volatility is just because of volatility in the Korean currency rates. If two or three more macroeconomic variables would have been included like as money supply circulation and interest rate then the results will be entirely different and it might have given a good output for investors to make rational judgment for the stock market investment.

Another study was taken place by (Hussainey & Ngoc, 2009) on Vietnamese stock exchange (VSE) by taking into account the macroeconomic variables not limited to domestically but extended internationally They used the same variables for both the countries and see the impression with the help of regression model and see how macroeconomic variables for instance CPI, interest rate, industrial production index and T-bills for the long run change the direction of the stock market indices in VSE. They examined the relationship for USA stock market of S&P 500 index and considering the same variables for USA economy. Their empirical investigation reached to the conclusion that industrial production index of Vietnam had a major influence on the stock prices whereas interest rates for short term or government T-bills for long term did not have any influence on VSE market. USA results of empirical investigation also suggested that when USA real production occurs then it indeed leads the enhancement of VSE market.

Neih and Lee (2002) described about G-7 countries in order to check association between exchange rates-stock prices on the above stated countries. They collected data from October 1, 1993 till February 15, 1996 of daily closing stock prices indices and foreign exchange rates. Johansen's co-integration and Engle Granger Causality test was applied and found that there is no relationship between these two variables in long run for each G-7 country but very few times the relationship is significant in the short run in G-7 countries but not each of them. The results were evaluated by using assets theory approach and it indicated a clear picture that every country is economically entirely different by its size, economic growth, and political stability and so on.

Gay, (2008) examined the emerging countries such as Brazil, Russia, China and India for which he considered two macroeconomic variables like as oil prices and exchange rates which impacts on stock markets indices The model used for this study was Box-Jenkins ARIMA and in this concern the monthly data was taken from the period of March, 1999 to June, 2006. His analysis findings indicated that there was no relationship of the two independent variables like as oil prices and exchange rates on stock market indices for the considered emerging market economies and the efficiency of the market is so much weak that it does not draw the satisfactory result for these capital markets.

Similarly almost the same view was also noticed by Umoru & O. Asekome, (2013) for Nigerian stock market. They used their study on the impact of exchange rates on Nigerian stock

market and for this they applied Co-interaction test for their findings and revealed that impact of exchange rates as a predictor on stock prices had a positive and bi-directional.

Seong (2013) documented the work for Malaysian stock market where he focused on the impact of exchange rates on stock prices. His study intimated about short and long-term negative influence on stock market due to variation in exchange rate during the considered time span which affects stock prices for this country.

Acikalin, Aktas & Unal (2008) documented their work for Turkish stock market and for this, exchange rates movement was checked on Istanbul stock exchange (ISE) and how it did volatile the ISE. They applied the econometric model of Johansson's Co-integration test and their results found on these two variables which showed a clear picture regarding changes in exchange rate changed the direction of ISE and this relationship was unidirectional.

Kandir (2008) examined the impact of macroeconomic variables on Turkish stock market. The key variables for this study were change in money supply, interest rates, manufacturing industrial production sector, exchange rates, oil price rate and Morgan Stanley Capital International (MSCI) equity index. The coverage of data was July 1997 to June 2005 and the analysis was checked on the basis of portfolio approach rather than single equity stock. This study revealed the empirical result and indicated the exchange rate, MSCI and interest rate had a significant influence on Turkish stock market index but three portfolios were witnessed out of twelve that emphasized the inflation had a major role whereas no influence from money supply, industrial production and oil prices on Turkish stock market. This market had its own sentiments. There was another study which was taken place by Pan, Chi-Wing Fok and Y. Liu (2007) indicated the two variables relations among the emerging countries and their results were based on 1988 to 1998 considering the causes of Asian Financial Crises before 1997. They reached to the conclusion that causality of exchange rates-stock prices are happened due to Asian crises and the countries which were severely affected are Taiwan, Japan, Singapore, Thailand and Hong Kong They also pointed out that due to this crisis it influenced the economy adversely in the emerging countries Qayyum & Kemal (2006) examined the relationship between exchange rates and stock prices and they empirically proved that one thing affects the other. Results were indicated about the exchange rate had a significant influence on stock prices and giving the good returns to the investors whether the investors are domestic level or international level.

Aggarwal, (1981) indicated the importance of exchange rates as well. His study showed that exchange rates are not only necessary for Multinational companies (MNC) but for domestic companies as well because when currency is devalued then Multinational companies are having more charm to invest and local firm also try to increase export base but affects adversely on imported items. His empirical study related to exchange rates-stock prices on US economy and the collection of data is monthly for both variables in the range of 1974 to 1978. He applied simple regression test in which he reached to the conclusion that the relationship between exchange rates and stock prices volatility is positively correlated in the short run as compared to long run.
Rehman & Uddin (2009) performed the work for India, Bangladesh and Pakistan for considering two chaotic variables i.e. exchange rates and stock prices and proved empirically that no causal relationship between these two variables was found in the above countries.

Smyth and Nandha (2003) documented the work for four South Asian countries such as India, Sri Lanka, Bangladesh and Pakistan and covering the data from the period of 1995 to 2001 on the basis of daily data. Their main focus was on exchange rates influenced on the stock prices and they empirically investigated by using Engle- Granger test and Johansen's co-integration test technique. The result revealed that there was no relationship between exchange rates and stock

prices in the long run. So far Engle- Granger causality test is as concerned they identified that it had impact in India and Sri Lank but for Bangladesh and Pakistan causality was not witnessed for its direction for both of the countries.

Literature Framework (2009 – 2016):

Table 1: Literature Framework

Title of study and Context	Author	Year/country	Findings
Effects of interest rate and exchange rate on volatility of market index at Dhaka stock exchange	Dewan Mukhtiar al Mukit	2012/Bangladesh	conclusion that connection between trade rates-stock costs was bi-directional
Causal relationship between stock return and exchange rate	Nishi Sharma	2015/India	The results established bidirectional causal relationship between exchange rate and return from all indices (except for pharmaceutical and media).
Relationship between stock market and macroeconomics variables	Sezgin acikalin,rafet aktas, seyfettin Unal	208/Turkey	Exchange rate and current account balance have negative impacts on the current changes in ISE index
Relationship between stock prices and exchange rates	Lutfur Rehman,Jashim uddin	2009/ South Asia countries	Outcome shows there is no way causal relationship between stock prices and exchange rates in the countries.
Impact of exchange rate on stock return	M. Dilip Kumar, Farhan Jamil	2015/USA	There is no relationship exist between exchange rate and stock price.
Stock Prices and exchange rate. Are they related?	Naeem Muhammad	2010/Pakistan	Results show no long run and short-run association between stock prices and exchange rates for Pakistan and India. No short-run association was also found for Bangladesh and Sri-Lanka
The impact of macroeconomics variable on stock prices in Pakistan	Ahmed Imran Hunjra, Muhammad Irfan	2014/Pakistan	On the basis of overall analysis it can be concluded that all of four variables are relatively more insignificant and likely to influence in short run only on stock prices.
Stock prices and effective exchange rate of the dollar	Bahmani-Oskooee, M Sohrabian	1992/Tunisia	Shows that large variations tend to be followed by strong and weak variations with small variations. So volatility changes over time.

Research Methodology:

Research methodology is a theoretical analysis for selection of methods. Since my research is quantitate in nature so it uses secondary data that has been collected from stock market and State bank of Pakistan. Quantitative techniques like Hierarchical regression, and ARDL in order to determine the relationship between macroeconomics variables and stock market.

Demographic Distribution of Sample:

The research conducted in the domain of finance and based on Archival data. The data collected of Pakistan Stock Market and Selected macroeconomic and financial variables. The data is time series and of last 10 years monthly data.

Geographic Distribution of Sample:

The research is based on Pakistan and time series data analysis of Pakistan Stock Market and financial variables to evaluate the impact for investors in Pakistan Stock Market.

Research Design:

The research design is conducted to find out that how the study is conducted. The research design gives an overview of research strategy and establish research methods to direct the research. Research design has further six components which includes Research paradigm, Research approach, Research strategy, Research methods, and Research data collection method (Creswell, 2009).

Research Philosophy and Paradigm:

The philosophy describes that how knowledge can be used and obtain and how the research would conduct. It explains the way in which the data would be gathered, used and analyzed

Research paradigm:

This study would be conducted in the characteristic of Epistemology which is the theory of knowledge. Epistemology shows positivism in the study and the term positivism is testing of theory.

Research Approach:

There are two research approaches Deductive approach, and Inductive approach. (Bryman and Bell, 2011). In order to estimate the relationship of exchange rate on stock market Deductive research approach has been selected since deductive approach expresses the relationship of variables on the basis of theory.

CAPM model and arbitrage pricing theory has been used for analysis the impact of macroeconomics variables on stock market of Pakistan and for determining the relationship between stock market returns and exchange rate.

Research strategy:

There are basically three types of research strategies which are explanatory research, descriptive research, and exploratory research. The research strategy used for this research is explanatory in nature which means that it is quantitative research type. The research is based on explanatory research because we choose independent variable and explain the impact of stock market returns furthermore, the causal study on relationship of macroeconomics variables on stock market.

Research methods:

Research methods are used to analyze or collect data and information for the purpose of research. There are two methods that has been used by everyone, Qualitative method and Quantitative method. This research is based secondary data of variables on the basis of quantitative method which means that statistical, mathematical, and numerical analysis of data collected is through questionnaire, and surveys, or by using the current or existing data of past 10 years using computational techniques.

Data collection method:

The data that has been used in this research is the data of last ten years from 2007 July till 2017 July. The data has been collected on monthly basis. The dependent variable is stock market taken from Pakistan stock exchange PSX, whereas the macroeconomics variables are exchange rate, inflation, interest rate and money supply.

Table 2: Data and Sources and Proxy

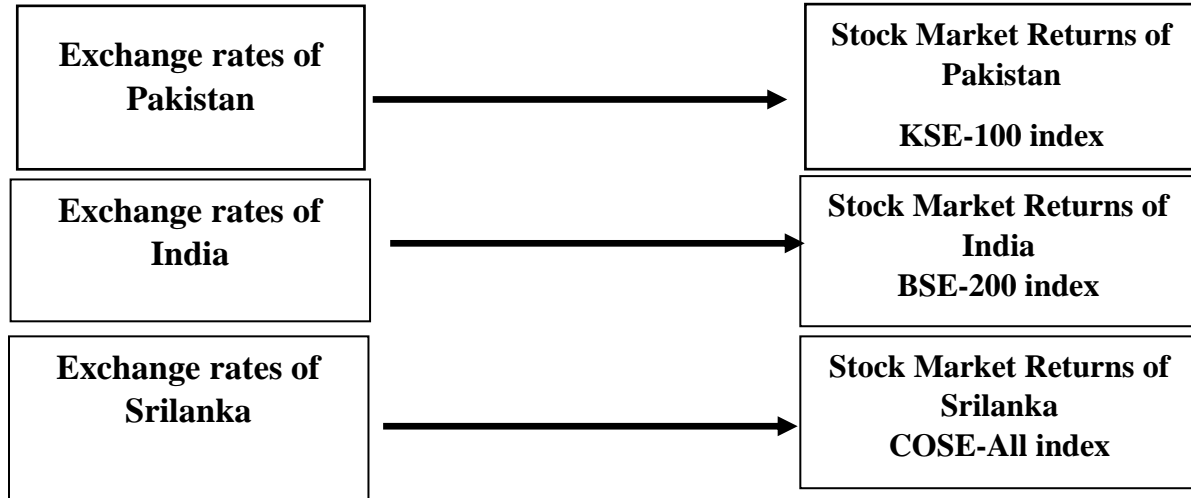| Data	Sources	Proxy
Stock market returns	PSX	PSX-100 index
Money supply	SBP	M3
Inflation	SBP	CPI
Interest rate	SBP	TBR
Exchange rate	FBS	ER

Theoretical Framework:

There are two theoretical approaches are selected for this paper flow-oriented models and stock-oriented models but most of the researchers have no mutual consensus on any existing theory regarding the relationship between exchange rate and stock prices. This study applies to South Asian Countries named as India, Sri Lanka, Bangladesh and Pakistan are to be taken account for their empirical results on the basis of these theoretical approaches and identifying the significance of these two variables on these four countries.

The first model that is a flow-oriented model (Frankel, 1983; Branson, 1983) is presented for exchange rate purposes. The ultimate target is to define the stock prices movement as it is believed that if the change in exchange rate occurs then it also changes the direction of the stock prices movements The second approach is the stock-oriented approach (Dornbusch & Fisher, 1980). It is based on portfolio approach and indicates the relationship of exchange rate and stock prices. This method is conceptualized through demand and supply function of money or diversified portfolio by means of international competitiveness.

Conceptual Framework:

To know the relationship of dependent and independent variables theoretical framework is made which describes the relationships;

Figure 3: Conceptual Framework[2]

Exchange rates of Pakistan	→	Stock Market Returns of Pakistan KSE-100 index
Exchange rates of India	→	Stock Market Returns of India BSE-200 index
Exchange rates of Srilanka	→	Stock Market Returns of Srilanka COSE-All index

Hypothesis Development;

Null Hypothesis:

H01: There is no relationship between exchange rate movements and stock market volatility in Pakistan.

H02: There is no relationship between exchange rate movements and stock market volatility in India.

H3: There is no relationship between exchange rate movements and stock market volatility in Sri Lanka.

Alternative Hypothesis:

H1: There is a significant relationship between exchange rate movements and stock market volatility In Pakistan.

H1: There is a significant relationship between exchange rate movements and stock market volatility in India.

H1: There is a significant relationship between exchange rate movements and stock market volatility In Sri Lanka.

Econometric Model and Tools used for Data Analysis:

Relationship between the variables will be checked on the basis of Johansen's (1988) co-integration test but before implementing this test, the researcher will have to use Augmented Dickey Fuller (ADF) test, Phillips-Perron Test (PPT) and Kwiatkowski-Phillips Schmidt-Shin test (KPSS) LM-Statistics for finding out the integration level before opting the Johannsen's co-integration test. After selecting the lag order criterion then Johansen's co-integration test will be

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[2] Source: Adapted from Smyth, & Nandha (2003) and Lin (2012)

applied. This study is expended to VECM if the co-integration test is having the issue of causation then researcher should apply Granger Causality test provided that co-integration is not there in long run. If the co-integration is proved on these two variables such as exchange rates and stock prices then VECM is used by using the following mathematical formula and equation.

$$\Delta Y_t = \alpha_0 + \beta_0 Z_{t-1} + \sum \gamma_{0i} \Delta Y_{t-i} + \sum \delta_{0i} \Delta X_{t-i} + \varepsilon_{0t}$$

$$\Delta X_t = \alpha_1 + \beta_1 Z_{t-1} + \sum \gamma_{1i} \Delta X_{t-i} + \sum \delta_{1i} \Delta Y_{t-i} + \varepsilon_{1t}$$

Δ is used as a difference that is ΔYt which consists of Y_ts and Yt-1 as earlier sign represents the current terminal price and later indicates the current price minus the one period before on which date the share had been bought. So the formula should be $\Delta Yt = Yt - Yt-1$ and this process is known as White Noise Error process which applied the structure of identically identified distributed (IID) data with zero mean and there should be constant variance. Lagging residuals will be obtained by using the co-integration equation.

$$Y_t = a_0 + b_0 X_t + Z_t \text{ (1.1)}$$
$$X_t = a_1 + b_1 Y_t + Z^*_t \text{ (1.2)}$$

This VECM approach can be used to identify the causality between the variables as in first equation showed X causing Y and $\beta 0$ is significant even in the long run $\delta 0i$ showed causality for short run. Granger, (1988) indicated the significance betas of $\beta 0$ and $\beta 1$ are long run bi-directional. Relating to this econometric model if $\beta 0 = \beta 1 = 0$ then there is a chance of no relationship between the stated variables in the long run and the chances of use Granger Causality test is also low.

Table 3: Statistical Tests used for Data Analysis

Tests	Purpose
Test of Stationarity	Unit Root Test, ADF
Correlation Analysis	Pearson Correlation
Multiple Linear Regression Model	Regression Analysis
Johnson Co-integration test	Long term relationship for Predictability

The Unit root tests applied to evaluate the normality of data and descriptive analysis applied to see the behavioral trends of various indicators. The correlation Analysis perform to evaluate the relationship of various factors with Stock Market returns and basic two model regression and co-integration applied to evaluate the impact and long-term relationship for forecasting the Pakistan Stock market returns.

Data Analysis:

The research conducted to evaluate the impact of financial and macroeconomics variables to analyze the volatility in stock market returns. The Stock market is very important for growth of economic and increase savings from nation. The investors invest in Stock market for earning profits and organizations who listed on stock market invest amount in economy and overall growth

cause beneficial for both stakeholders. The researcher conducted the research based on time series of 2007 July to 2017 June, 10 years monthly data collected from Pakistan Stock market and data of macroeconomic variables includes the money supply, inflation, interest rates, exports and exchange rates from Pakistan Beaureu of Statistics (PBS) and State Bank of Pakistan (SBP).

The research is Pure Quantitative research to evaluate the risk factor of investment to evaluate the Beta of market risk. The model followed in this research is CAPM which explain the relationship between the risk and returns and market risk and expected rate of return on investment. Mishkin (1996) and Roy (2005) explains the monetary mechanism channels explains the relationship and impact of financial and macroeconomic variables on economy the study reflects the same findings in various aspects of study. The study also considers the CAPM Model to evaluate the risk and return relationship in Stock Market.

The various tests applied in the data analysis chapter includes the unit root test, correlation analysis, regression analysis and co-integration model test to evaluate the short terms and long-term impact of Macroeconomic factors with PSX-100 index. (Change it)

Exchange Rates Graph BASED on Actual Data:

Graph 1: Exchange rates for India for monthly data for last 10 years


INR/USD
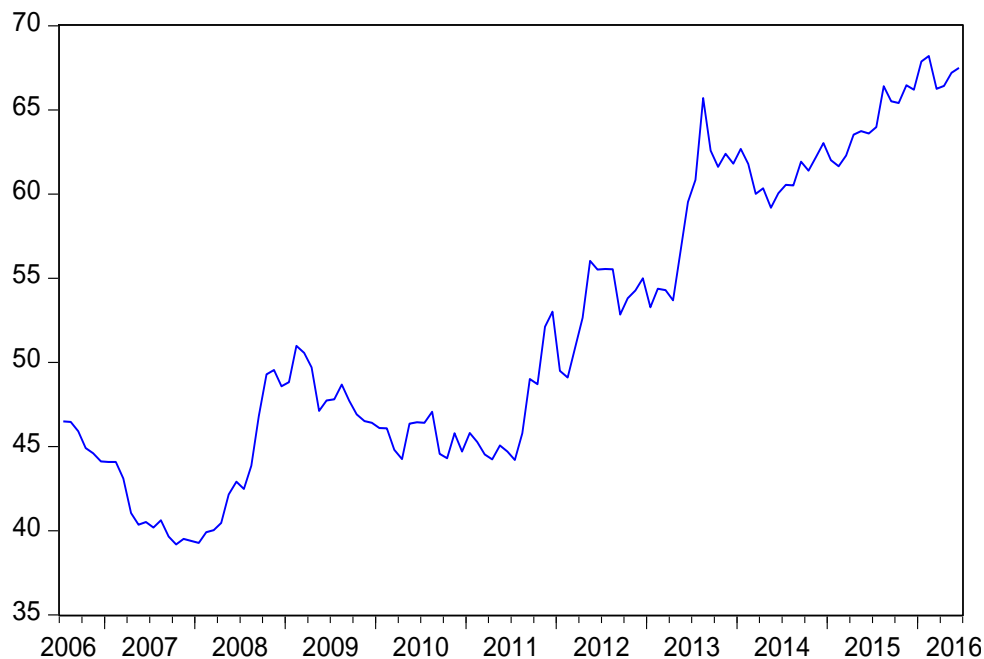
The above graph shows the historical data of exchange rates being prevailed in India for last one decade. The benchmark for exchange rate is USD for not only for India but also for other countries as well and the above graph depicts the idea that dollar rate is well managed in India. There are several reasons for Indian economy like as target growth rate is 8.5%, stabilization of Indian rupee by means of controlling inflation factor, reducing interest rates that enhances the moral of the local investors. As per the Morgan Stanley capital index (MSCI) report Indian FDI growth rate is 2.4% of GDP in every year and maintaining up to 2024.

Graph 2: Exchange rates for Sri Lanka for monthly data for last 10 years

USD/LKR
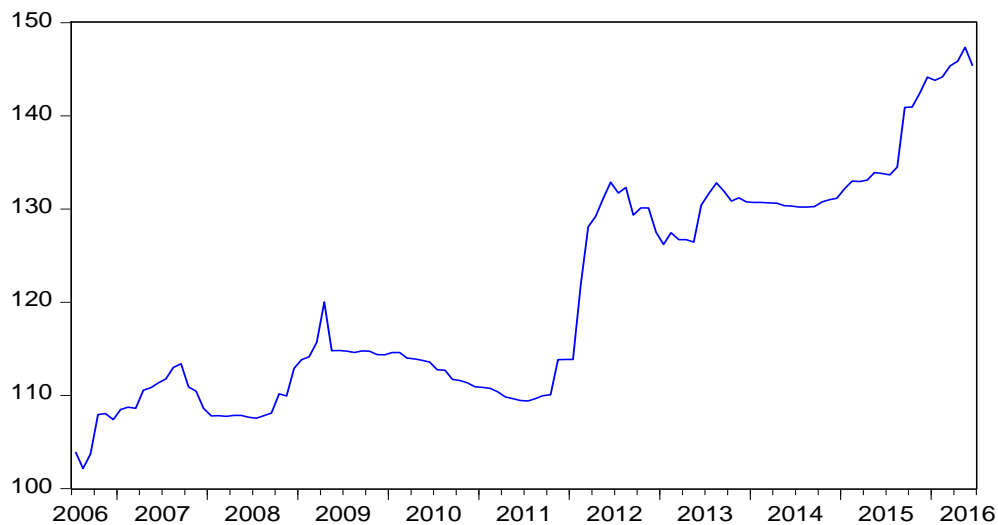
As the graph # 2 indicated the Lanka rupee against US$ and denoted the trend of one decade how Lankan rupee in 2006 was Rs. 104 which leads to Rs. 143 by the June of 2016. Sri Lankan government spent US$ 1.4 billion from its reserve account in the mid of 2015 and tried to maintain the home currency stability but it failed to do so. IMF also stated in the Wall Street Journal of 2015 publication that also demanded for macroeconomic sustainability for Sri Lanka.

Graph 3 Exchange rates for Pakistan for monthly data for last 10 years

PKR/USD
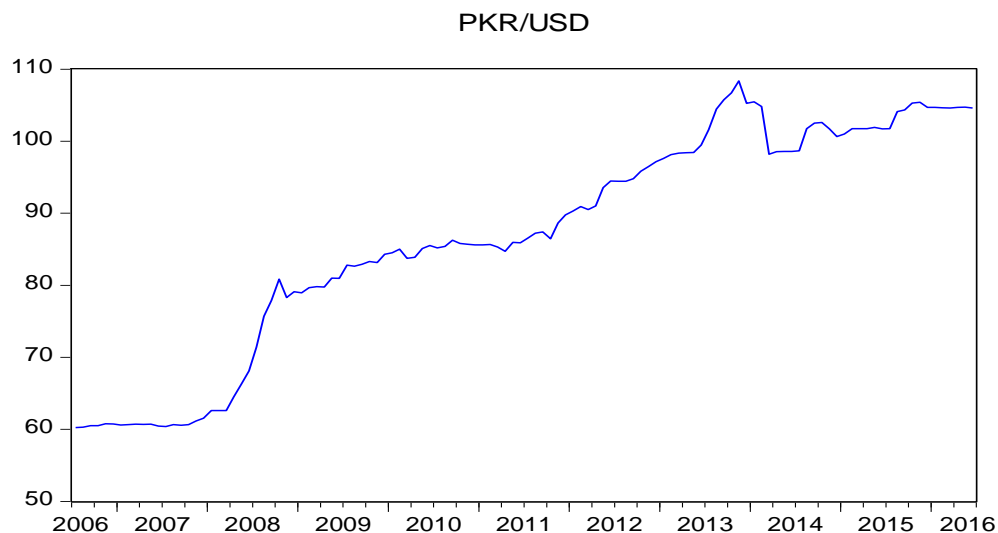
This graph is presented the exchange rates of dollar in Pakistan in one decade which is the historical data from July, 2006 to June, 2016. The temporal jump was noticed or rather be a shock in 2008 was due to high rate of inflation, government borrowings from Central Bank, hike in oil prices internationally and political instability. The same shock was also seen in November, 2013

where dollar touched the level of PKR.108 and the major cause was a 13% jump in external debts. But in the month of March, 2014 recovery occurred when Saudi Arab government gave one billion dollar for development fund and just because of this dollar slump to PKR.103 from the level of PKR 110.

Stock Markets Indices Graphs Based on Actual Data:
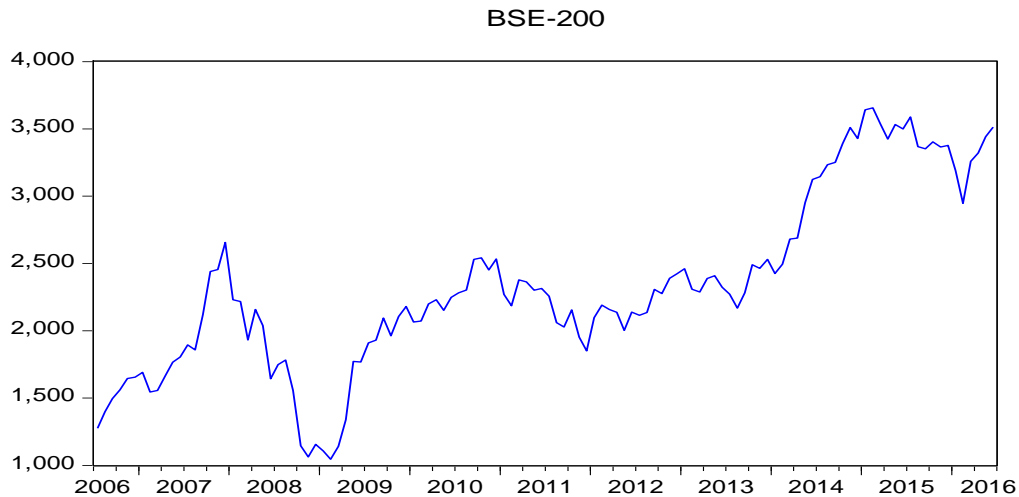
BSE-200

Bombay stock exchange (BSE) introduced BSE-200 index on 27-05-1994 where 200 companies have been selected and these are free float. Before the financial crisis of 2008, BSE-200 index touched the level of 2657 in December, 2007 but after that it shrined to 1062 points in November 2008 and it was reduced by almost 60 percent. There was a jump in BSE 200 index especially for 50 companies priced were almost more than three to four times though Sensex remain at the same level from the period of January, 2008 to November, 2013.

## COLOMBO STOCK EXCHANGE

CSE-ALL
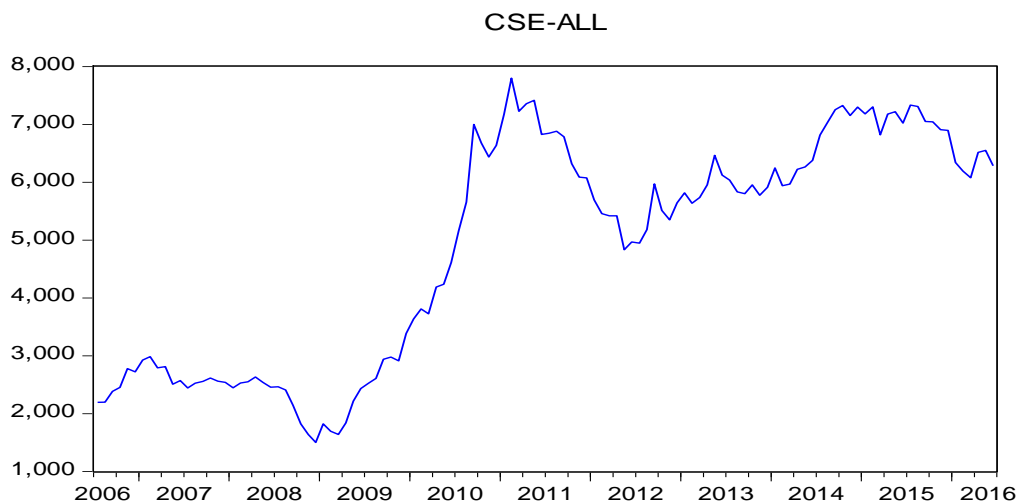
Colombo Stock Exchange (CSE) is having an old and well recognition in Sri Lanka being formed in 1985. Currently 296 companies are in operational mode and around 20 sectors are engaged with market capitalization of Lankan RS. 3115.52 billion as per the August, 2015 information. The graph depicts the level of 1638 points of all shares index in the timeframe of

March, 2009 but after that there was a turning point in CSE due to post war boom and October 2010 it touched the level of 6997 points in all index. The change in all share index was more than three times.

KARACHI STOCK EXCHANGE (KSE)
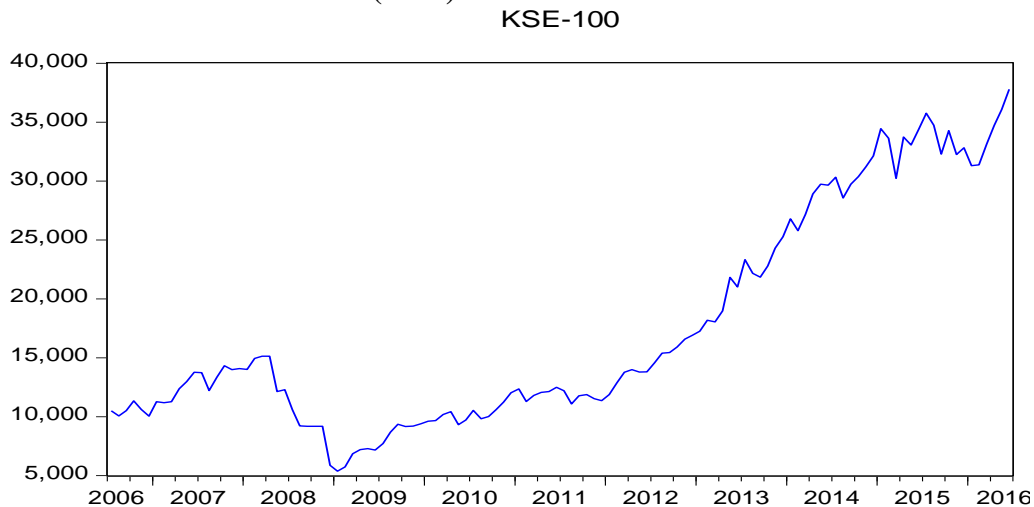
KSE-100

This graph indicates the KSE-100 index being introduced in the year of 1991 and it is the benchmark of Pakistan stock exchange (PSX) and its recognition is very important on account of showing the representation of the whole market. This market has many ups and downs throughout the whole decade but in the month of March, 2008 it achieved 15000 points milestone and Pakistani stock market entered into emerging market and secured the title of best market. One drawback is also witnessed in August, 2008 when the chaotic situation occurred and the whole market was collapsed and the market did get floor for 110 days. This action of KSE management gave the adverse impact and around $36.9 billion was out from the market and Pakistan stock exchange (formerly KSE) was designated frontier market and lost the title of emerging market. But now, the situation is under control and in June, 2016 KSE-100 index reached the level of 37784 points. Meanwhile the regulatory bodies monitor the check and balance and immediate action takes place if any discrepancy arises.

Test of Stationary of Data:

Data comes from appropriate and dependable sources, and the data is not stationary, there are shocks and impulses as the volatile nature of financial and macroeconomic variables. Monthly data for the last 10 years on variables, that is, exchange rates and returns on the stock market, are collected, and the unit root of the series is analyzed in data based on ADF (Augmented Dicky Fuller test at level). Data from non-stationary time series was often well-thought-out a problem in empirical analysis. Working with non-stationary variables leads to incorrect regression results, from which further consequences are meaningless, so it is important to check the limitations of all series included in the model. it was used to check the catch; the null hypothesis was that the variable to be examined had no unit root.

Ho= Series have no unit root (time series is stationary)

Table 1: Unit root test ADF

Variable	Compound t-statistics I (0)	Critical value of t at 5%	Decision of Null Hypothesis	Computed t-statistics I (1)	Decision of Hypothesis
PKR	-1.40	-2.88	Rejected	-8.58	Accepted
KSE	1.01	-2.88	Rejected	-11.66	Accepted
INR	-0.04	-2.88	Rejected	-10.06	Accepted
BSE	-1.08	-2.88	Rejected	-10.04	Accepted
LKR	-0.32	-2.88	Rejected	-11.37	Accepted
COSE	-3.47	-2.88	Accepted	-6.65	Accepted

In the above table we describe the assumption that a series cannot be accepted at the level and the hypothesis is accepted at the first level because of the stability of the data, except for Shanghai Stock market which can be accepted at level. Testing the ADF for co-integration test does have a unit root at level in any of the countries except China. Stationarity should be verified at the first level so that the researcher in each country carries out a cointegration test and examine the long-term effects and relationship of exchange rates on stock indices.

Descriptive Statistics:

Country	Variables	Mean	Median	Maximum	Minimum	Std. Dev
India	USD_INR	51.93755	49.19500	68.19830	39.18000	8.674
	BSE-200	2331.224	2252.270	3656.300	1044.940	654.8
Sri Lanka	USD_LK	120.7693	114.6750	147.3500	102.1600	11.87
	COSE_ALL	4881.712	5650.505	7797.960	1503.020	1962.2
Pakistan	USD_PK	86.69758	86.35000	108.3500	60.23000	15.19
	KSE-100	17489.13	13750.32	37783.54	5377.420	9216

Table 1 describes the brief information for the above variables where Indian exchange rate variation is 8.674 which is comparatively lower than Sri Lankan rupee that has deviation up to 11.87. Above all, Bangladesh Taka is more stabilized for considered countries and the variation is noticed just as 4.960 and lastly Pakistani rupee which is the highest variation among them pointed out 15.9. It is further noticed that Pakistani rupee was depreciated due to several causes like as debt repayment, law and order situation which reduced the foreign direct investment (FDI), external debts, oil payments and many more.

Stock market indices studies have been restricted to four South Asian countries and for this monthly data has been extracted from Thompson Reuters websites which is the range bound of July, 2006 to June, 2016. The empirical findings indicated the standard deviation of KSE-100 index is the highest index amongst all and the deviation is recorded at 9216 and thereafter Chittagong stock exchange all index (CHSE_ALL) that was second highest standard deviation being recorded as 4486. Researchers also indicated that Chittagong is more volatile stock market than Dacca stock exchange (DSE). Furthermore, Colombo stock exchange index- all shares

(COSE_ALL) is leading third rank in the standard deviation list which is 1962.2 and the last position for BSE-200 where the volatility is low and the variation is seen from the above table is 654.8 and Bombay stock exchange is more stabilized market because of low volatility . So in short, Pakistani stock market is very much risky as compared to other considered countries.

Correlation Matrix:

Table 4: Correlation Matrix of Pakistan Economy

Correlations		USD-PKR	KSE-100
USD-PKR	Pearson Correlation	1	-.702**
	Sig. (2-tailed)		.000
	N	120	120
KSE-100	Pearson Correlation	-.702**	1
	Sig. (2-tailed)	.000	
	N	120	120

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation matrix illustrates the association between independent and dependent variables.

At 95% confidence interval and a probability test below the 5% margin of error table show that variable is significant as $P<0.05$ and shows that exchange rates has negative relation with stock returns.

Table 5: Correlation Matrix of Indian Economy

Correlations		USD-INR	BSE-200
USD-INR	Pearson Correlation	1	.706**
	Sig. (2-tailed)		.000
	N	120	120
BSE-200	Pearson Correlation	.706**	1
	Sig. (2-tailed)	.000	
	N	120	120

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation matrix illustrates the association between independent and dependent variables.

At 95% confidence interval and a probability test below the 5% margin of error table show that variable is significant as $P<0.05$ and shows that exchange rates has strong relation with stock returns.

Table 6: Correlation Matrix of China's Economy

Correlations			USD-CNY	SHC-100
USD-LRK		Pearson Correlation	1	-.114
		Sig. (2-tailed)		.216
		N	120	120
CSE-100		Pearson Correlation	-.114	1
		Sig. (2-tailed)	.216	
		N	120	120

The correlation matrix illustrates the association between independent and dependent variables.

At 95% confidence interval and a probability test below the 5% margin of error table show that variable is insignificant as P>.05.

Hypothesis Testing – Correlation Hypothesis:

Table 7: Alternative Hypothesis

Alternative Hypothesis	Accepted / Rejected	Significant level (0.05 at two tailed)
H1: There is significant relationship of Pakistan Exchange Rates (EER) with Pakistan Stock Market Returns.	Accepted	0.00
H2: There is significant relationship of Indian Exchange Rates (EER) with Indian Stock Market Returns.	Accepted	0.00
H3: There is significant negative relationship of Sri Lankan Exchange Rates (EER) with Colombo Stock Market Returns.	Rejected	0.216

Models Analysis-1:

Model 1: Multiple Linear Regression Model

Dependent variables: KSE-100 index, BSE-200 index and CSE-100 index

The regression model is based on 119 observations, using 4-lag values in the data, and the model works to see the dynamic relationship of the variables in the long run. The mode shows a strong correlation of the variables, using different lags to increase the effect of the estimates.

Table 8: Regression Predictive Power of the Model

Variable	Co-efficient (B)	t-statistics	Probability
C	19789.5	5.04	0.00
PKR	-430.5	-10.82	0.00
INR	52.65	-10.53	0.00
CSE	316.72	1.10	0.27

The Multiple linear regression model explains the interrelationships of variables and the effect on stock market performance. The value of the coefficient of the beta effect and the t-statistic above is indicated by a confidence interval of 95%. Results shows that Exchange rates of Pakistan

and India has negative impact on stock market performance with t values -10.82 and -10.53 respectively and significant at 0.00. The Exchange rates of China is insignificant as because P= 0.27 which is greater than 0.05.

Table 8: Model Summery Pakistan Economy

Statistics	PAK	IND	CHINA
R Square	0.50	0.488	0.10
Adjusted R2	0.498	0.482	0.10
Hanan Quien criterion	20.44	15.16	16.29
F-Statistics	111.7	110.15	1.21
Probability of F-Statistics	0.00	0.00	0.27

The R square is 0.50 and 0.488 in Pakistan and India respectively that means this model is significant to evaluate the relation and impact of Exchange rates on stock performance in these two countries and F statistics is 111.7 and 110.15 respectively and significant at 0.00. The model is insignificant to evaluate impact and relationship of exchange rate with stock performance in china with F statistics of 1.21 and P value of 0.27 greater than 0.05.

4.7 Hypothesis Testing (Regression) Impact Hypothesis

Table 9: Alternative Hypothesis

Alternative Hypothesis	Accepted / Rejected	t-value (95% C.I)	Significant level (0.05 at two tailed)
H1: The exchange rate of Pakistan (ERA) has significantly impact the Pakistan Stock Exchange	Accepted	-10.82	0.00
H2: The exchange rate of India (ERA) has significantly impact the Bombay Stock Exchange.	Accepted	-10.53	0.00
H3: The exchange rate of China (ERA) has significantly impact the Colombo Stock Exchange.	Rejected	1.10	0.27

Model Analysis-2 Co-integration:

After selecting the lag order, now the researcher applies the Johansen co-integration test in order to check the long run relationship between exchange rates and stock prices among each country as this research is a comparative analysis of selected four South Asian countries. If the long run relationship exists between the variables then Vector Error Correction Model (VECM) is applied for seeing the short run relationship between exchange rates-stock indices. The hypothesis for this co-integration test is as under

H0 = Trace test indicates no co-integration at 0.05 level
HA = Trace test indicates co-integration at 0.05 level.

Table 4.5: Significant Results of Johansen Co-Integration Test

Country	Variables	Trace Statistics	Critical Value at 5%	P-Values	Results
India	DBSE_200 DLUSD_INR	9.895440	15.49471	0.2889	Accept H0
Sri Lanka	DCSE_ALL DLUSD_LKR	2.380296	15.49471	0.9880	Accept H0
Pakistan	DKSE_100 DLUSD_PKR	5.764456	15.49471	0.7232	Accept H0

Table 4 represents the co-integration test and it denotes the idea that exchange rates and stock prices or indices do not have long run relationship for any country. Trace statistic test is selected because it gives more robustness for identifying skewness and kurtosis of the tail. As Trace statistics value is lower than critical value at 5% meanwhile it identifies the P-value which is higher than 0.05 so Ho cannot be rejected. The results were also checked by using Max-Eigen statistic but the result remains the same in terms of accepting the null hypothesis. So there is no long run relationship between exchange rates and stock prices in the selected countries because the economic factors are almost same in each country but if there is a well-developed country is included then exchange rate is the real predictor of stock prices moment both in the short and long run market.

Granger Causality Test:

Causality test results are shown in the following table but before switching to this table hypothesis assumption is as follows:

Ho: There is no Granger causality among the variables

HA: Thera is Granger causality among the variables.

Table 4.6: Granger Causality Test Significant Results

Country	Variables	Observations	F-Statistic	P-Values	Results
India	DLUSD_INR $\Rightarrow$DBSE_200	118	6.12989	0.0147	Reject H0
	DBSE_200$\Rightarrow$ DLUSD_INR	118	3.62425	0.0594	Accept H0
Sri Lanka	DLUSD_LKR $\Rightarrow$DCSE_ALL	118	0.35110	0.5547	Accept H0
	DCSE_ALL$\Rightarrow$ DLUSD_LKR	118	0.42723	0.5147	Accept H0
Pakistan	DLUSD_PKR$\Rightarrow$ DKSE_100	118	3.47086	0.0650	Accept H0
	DKSE_100$\Rightarrow$ DLUSD_PKR	118	0.05474	0.8154	Accept H0

Granger Causality test table depicts the idea that almost exchange rate does not have the causation impact on stock prices and indices and majority of the results interpreting the idea of

acceptance of null hypothesis except India. India has gotten the exchange rates impact on stock indices, which is unidirectional, and it was also proved by Abdalla and Murinde (1997) who described that exchange rates caused the stock prices in India. Later on, Rahman & Uddin, (2009) also studied on Asian countries and described that Granger Causality had not occurred in these countries. Furthermore, Exchange rate does not lead to stock indices for any rest of the countries after India but stock indices Granger caused to exchange rates only for Bangladesh where Ho is rejected due to reverse unidirectional causation Thereafter stock indices do not affect exchange rates on any rest of the country.

Conclusion:

This research paper empirically investigated the exchange rates relationship with stock prices and indices with reference to four South Asian countries. The coverage of data source starts from July 2006 to June 2016 and information gathers on monthly basis. The findings indicted that these two variables have no long run relationship for any stated countries. Furthermore, alternative hypotheses do not show its acceptance in terms of long run relationship, impact of exchange rates on stock prices and there is no short run effect in the stock market. Several tests applied empirically in this concern like as descriptive analysis, unit root test, lag length criterion, Johansen co-integration test, Granger causality test but the satisfactory result has not come out. Neither exchange rate leads the impact on stock indices nor do stock indices have the leading position to show the impact on exchange rates. Relating to Granger causality test only in India, exchange rates caused the stock indices otherwise rest of the countries accept null hypothesis whereas in Bangladesh causation occurs due to stock indices of CHSE impact on exchange rates. Furthermore, this research follows the flow-oriented model where the depreciation in the home currency changes the direction of stock prices but it is not possible in the less developed countries. There are several reasons for not having any attraction for the foreign portfolio investment such as political instability, law and order situation in these countries, high inflation rates, and many more.

Research Implications:

This research paper investigated the empirical findings of exchange rates impact on stock prices and indices on four South Asian countries. Relating to this research paper it is useful for investors to invest in other countries can easily see the behavior of other countries stock market indices and the fluctuation in exchange rates during last one decade. Besides this, this research is a very helpful tool for concerned authorities for each country to check the real position of exchange rates and stock indices include management of stock exchange, Ministry of Finance, Central Bank, Securities and Exchange Commission, etc. Economics and finance students can also get help from this research as this research is one to one variable relationship so that they can use multiple variables of macro-economic and see these variables relationship on stock market prices and its indices for their further studies.

Recommendations:

This research extracted the monthly data of exchange rates and stock indices for each four countries. If the data will be taking over on daily or weekly basis then it may show a better presentation. If other control variables will be opted like import and exports, foreign direct investments, loans from International Monetary Fund (IMF) etc. then it may show the better dynamics of each country. The consideration based on one macroeconomic variable but other

variables such as interest rates, money supply, large scale manufacturing industrial index (LSMII) may investigate better than there may be a chance of significant results.

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