

THE EXCHANGE RATE AS SIGNIFICANT PREDICTOR OF MOVEMENT IN STOCK MARKET INDICES IN SOUTH ASIAN COUNTRIES: AN ECONOMETRIC ANALYSIS

Sarfraz Nawaz Khatri, Dr. Muhammad Kashif,
and Abdul Samad Shaikh

ABSTRACT

This research investigates the relationship between exchange rate and stock market prices in Asian Economies. The study relates to the comparative analysis of four South Asian countries, i.e., India, Sri Lanka, Bangladesh, and Pakistan. The study demonstrates the empirical findings on both of the variables regarding short and long-run analysis. The Exchange rate is considered as Independent variable, and the Stock Market returns as the dependent variable. Quantitative research is conducted based on Post Positivism research paradigm with flow-orientated model given by Dornbusch and Fisher (1980). The monthly frequency data starting from July 2006 to June 2016 is taken from Thomson Reuter's data sources. Econometric models like Johnsen Co-integration test, Granger causality test for Long run, and Vector Error Correction Model (VECM) is applied for short-term analysis. The empirical test results revealed that there is no long-term relationship as no co-integration for any of the stated states was found except causality witnessed for India. VECM illustrated a significant negative relationship in short run for Sri Lanka and Bangladesh. However, 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 Rate, Stock Indices, South Asian Countries, Co-Integration and VECM.

INTRODUCTION

Exchange rates and stock price markets were an integral part for researchers in the early 1990s, because the world was moving towards

globalization. For this selected area, Branson (1983), was the first researcher who studied a topic on the impact of exchange rate on stock prices, but he did not achieve any satisfactory results. Zhao (2010), pointed out various reasons for the hike in exchange rate-stock prices which include dividend yield rate, economic growth rate, interest rate, level of employment and others as key drivers for economic prosperity. In addition to this, movement of the exchange rate has an impact on share prices, and it is recognized as a symbol of international competitiveness. There are two theoretical approaches for constructing a relationship between exchange rate and stock prices; i) They are 'flow oriented model approach,' and ii) They are 'Stock oriented model approach or Portfolio balance approach.' The later model also has its own importance, and several authors like Frankel (1983), and Branson (1983), have used this model for their studies.

Phylaktis and Ravazzolo (2005), in particular, have cited a considerable amount of literature and endorsed that, exchange rate and stock prices have a significant relationship. The relationship between exchange rate and stock markets are so much correlated that world trade enhances and increases productivity in the global capital markets due to changes in these variables and it has also proved to be a positive symbol for promoting the relationship among the countries (Ajayi, Friedman, & Mehdian, 1998).

RESEARCH PROBLEM

The relationship of the exchange rate and its impact on stock prices has become an increasingly important research topic, especially for evaluating the South Asian markets, as high volatility is seen in stock prices in these markets due to change in exchange rates. The exchange rate can affect stock prices not only for multinational and export-oriented firms but also for the domestic companies. The portfolio balance approach suggests that if the currency depreciation occurs in the local country, then it will enhance the demand for the money supply by both domestic and foreign investors. Our problem is to find the relationship between exchange rate and stock prices in Asian countries, especially in the short run, while the data is available on the long run only. The previously researchers however, do not have the mutual consensus regarding exchange rate impacts on stock prices as they think it applies only to the advanced countries.

RESEARCH OBJECTIVES

The core objective of this study is to analyze the exchange rate impact on stock prices focusing the South Asian countries. Another purpose of

this study is to find out the extent at which exchange rates change the dynamics of a country. The primary objectives of the research are presented as follows:

- To measure the impact of exchange rate on stock prices movement in South Asian Countries including Pakistan, India, Srilanka, and Bangladesh.
- To examine the long-term relationship of exchange rates on stock market returns movement in the selected four countries.
- To investigate the short-term relationship effects of Exchange rate on stock prices movement in the selected four countries..
- To determine if there is any difference in short-run and long-run effects of exchange rates on stock market indices.

LITERATURE REVIEW

Measuring the impact of exchange rate changes on stock market returns is an important research area investigated by many authors in the past (Aydemir, & Demirhanm, 2017; Huang, An, Gao, Wen, & Hao, 2017; Chkili, & Nguyenm 2014; & Ma & Kao,1990). Previously some research has been done on developed countries (Andersen, Bollerslev, Diebold, & Vega, 2007; Ajayi, Friedman, & Mehdian, 1998), however, very few studies have considered the emerging markets (Bailey, & Chung, 1995; Abdalla, & Murinde,1997). Above all, an inadequate work has been conducted in South Asian countries, in this regard. Frank and Young (1972), were the first researchers who described the relationship between exchange rate and stock prices and considered six different countries' currencies, revealing the results that the relationship between these two variables is meager. The literature indicates that some of the authors believe that these two variables have a negative relationship, and some do consider that there is no influence of one over the other. However, the exchange rate is not the only determinant, which gives the accurate information regarding stock prices (Kurihara, 2006).

Chiang, Jeon, and Li (2007), performed a study on nine advanced countries including the USA, UK, Japan, Netherlands, Germany, Belgium, Switzerland, Canada, and France. The study specified three core variables such as exchange rate, inflationary pressure, and interest rate, and extracted the country wise monthly data on stock prices for the

investigation. The empirical results demonstrated that the depreciation in the exchange rate had a positive but a very insignificant influence on the stock market, furthermore, there was no evidence for interest rates and inflationary pressure regarding stock prices.

Smyth and Nandha (2003), explained that economic factors follow *ceteris paribus* rule, i.e., other factors remain constant for determining the causal relations between economic factors. There is no link to check the relationship of one variable to the other unless rest of the variables are held constant. Otherwise, the result would be dissimilar for each study and the exact causal relation between exchange rates and stock prices could not be achieved. Smyth and Nandha (2003), further added that exchange rate is dependent on several factors including government policies regarding exchange control parity, treasury bills rates by the central bank, inflation factor, public sentiments and investors behavior which leads to change the direction of stock prices. Therefore, it is concluded that exchange rate does not influence only on stock prices, as other factors cannot be held constant while examining the causal relationship between exchange rates and stock prices (Kim, 2003).

Bautista (2006), performed his study on London Stock Exchange (LSE), where he considered FTSE 100 index and only measured 18 sample companies. His empirical findings were based on linear regression model and his conclusions documented that causation of exchange rate movement had an impact on stock market prices. For this study, lagged value test was applied, and it was reported that stock prices positively relate to a daily closing price of FTSE-100 index for the selected 18 companies. Referring to the research work by Kurihara (2006), for his study on Japanese and USA stock prices, he considered the exchange rates and interest rates as independent variables and investigated the importance of the above-stated markets. Results indicated that Japanese stock prices did not have any significant 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 pivotal role to influence its stock prices.

Zhao (2010), studied on Korea where they recognized that the exchange rates-stock prices were complementary with each other. They documented the data on a daily basis where Generalized Autoregressive Conditional

Heteroskedasticity Model (GARCH-M) was applied on 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 an antagonistic relationship but depreciation in the Korean currency rate had a positive momentum and increased the returns on the share prices, and lastly, stock market volatility is just because of the instability in the Korean currency rates. If two or three more macroeconomic variables would have been included, like money supply, circulation and interest rate then the results will be entirely different, and it might have given a sound output for investors to make a rational judgment for the stock market investment.

Another study was undertaken by (Zhao, 2010), on Vietnamese stock exchange (VSE), by considering the macroeconomic variables not limited to domestic but extended internationally. They used the same variables for both countries and analyzed the impression with the help of regression model and investigated that 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 also 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 significant influence on the stock prices whereas interest rates for short-term or government T-bills for long-term did not have any impact on VSE market. USA results of empirical investigation also suggested that when USA real production occurs then, it indeed leads to enhance the VSE market.

Moore (2007), investigated on G-7 countries to check association between exchange rates and stock prices. Johansen's co-integration and Engle-Granger Causality test was applied and found that there is no relationship between these two variables in the long run for each G-7 country but for very few times the relationship was significant in the short run but not for every country.

Kim (2003), 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 were checked for portfolio approach rather than single equity stock. The empirical results indicated that 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 that the inflation have a substantial role, whereas no influence from money supply, industrial production, and oil prices was witnessed. Walid, Chaker, Masood and Fry (2011), indicated the two variables relation among the emerging countries and their results were based on 1988 to 1998-time period, considering the causes of Asian Financial Crises before 1997. They reached to the conclusion that causality of exchange rates-stock prices happened due to Asian crises, the countries, which were severely affected, were Taiwan, Japan, Singapore, Thailand, and Hong Kong. They pointed out that due to this crisis the economies were affected adversely in the emerging countries.

Qayyum and Kemal (2006), examined the relationship between exchange rates and stock prices and they empirically proved that one thing affects the other. Results revealed that the exchange rate had a significant influence on stock prices and provided good returns to the investors whether the investors were domestic or international.

Wang and Moore (2008), performed research on India, Bangladesh, and Pakistan, 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 selected countries.

Moore (2007), documented the work for four South Asian countries such as India, Sri Lanka, Bangladesh, and Pakistan and covered daily data from 1995 to 2001. Their focus was on exchange rates influences on the stock prices. The results revealed that there was no relationship between exchange rates and stock prices. Muktadir-al-Mukit (2012), investigated the significance of exchange rates on stock prices of Bangladesh and reached to the conclusion that relationship between exchange rates and stock prices was bi-directional.

Exchange rates criteria were also noticed in Pakistan's economy where exchange rate was taken as a dependent variable, whereas interest rates, foreign exchange reserves, the balance of trade and changes in CPI were taken as the independent variables. The examination of the data performed

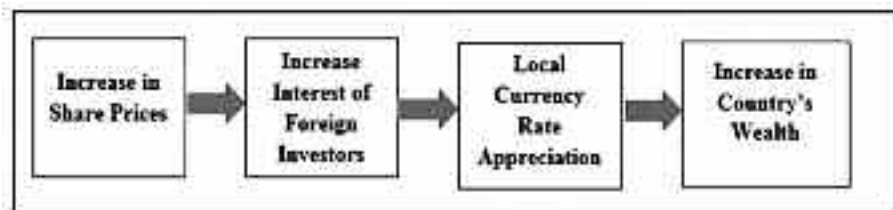
the result that the nominal and real exchange rates were significant for the above variables (Baxter, 1994).

Summing up from the above literature and the findings of different authors we conclude that, researchers did not have unanimously mutual consensus between the exchange rates and stock prices relationship. Some do believe that the influence of two variables has a significant impact on the economy, but some do realize that two variables do not influence each other. Some studies prove the relationship as causal, whereas some consider it as unidirectional or bi-directional (Lin, 2012). In this research paper, the author intends to find the relationship between exchange rates and stock prices in selected South Asian countries and investigates the exchange rate as a significant tool to cause changes in the stock market prices and indices (Kanas, 2000).

THEORETICAL FRAMEWORK

Two theoretical approaches were selected for this paper, Flow oriented model and stock oriented model. Most of the researchers have no mutual consensus on any existing theory regarding the relationship between exchange rate and stock prices. 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.

Figure 1. Flow Oriented Model

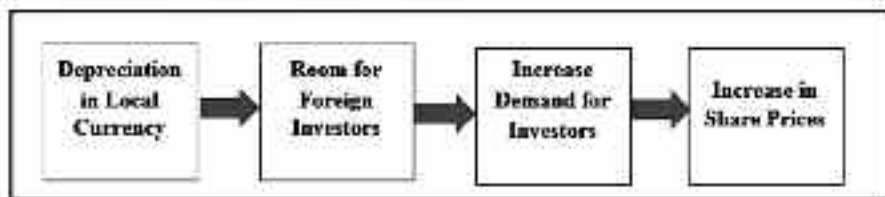


Source: Adapted from Frankel, 1983; & Branson, 1983

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. If the local investors face losses in shares values which ultimately led to reducing the

wealth of the investors, they would not have any intention to invest in the domestic market.

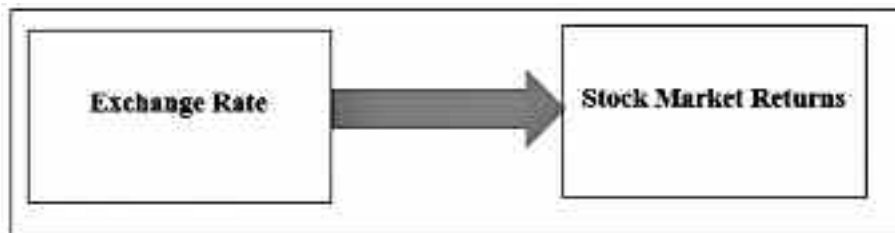
Figure 2. Stock Oriented Model



CONCEPTUAL FRAMEWORK

From the theoretical framework it is understood that exchange rate and stock prices are correlated with each other and for that two theories have been built which are described earlier (i) flow oriented model approach and (ii) portfolio balance approach model. Branson (1983), and Frankel (1983), explained portfolio balance approach model, and he expressed the relationship between stock prices and exchange rate by this portfolio theory.

Figure 3. Conceptual Framework



Source: Adapted from Smyth, & Nandha (2003) and Lin (2012).

The Conceptual framework is adapted based on various empirical researches conducted in developing economies to predict the Impact of Exchange rate on Stock Market Indices. Smyth and Nandha conducted a similar study in India. Based on comparative analysis Lin conducted study in Asia in Japan comparing the Exchange rate impact in various economies. This research also evaluates the effect of Exchange rate on Stock Market returns in Pakistan, India, Bangladesh, and India based on the time series data.

RESEARCH METHODOLOGY

Research Design

This is an empirical research, based on selected secondary data. The study follows a panel research approach to identify the relationship of

exchange rate and stock prices on four Asian countries. The data is extracted from Thomson Reuters software. The whole research covers the range bound of one decade, which commences from July 2006 to June 2016 and the results are investigated on a monthly basis where the causal relationship is checked on an econometric model.

This research pertains to Archival strategy as the data is stored in the secondary source and empirical testing is done in the order of investigating the research questions and test the causality between exchange rate on stock prices. For proving the research questions, the hypotheses should be built, and it should be analyzed with the help of empirical findings. Thus the archival research strategy is more appropriate for this research study. Data collection for stock prices indices are arranged as for India, Bombay Stock Exchange (BSE) 200 index; for Sri Lanka, Colombo Stock Exchange (CSE)-All Share Index, for Bangladesh, Chittagong Stock Exchange (CHSE_ All) and for Pakistan, Pakistan Stock Exchange (PSX) KSE-100 index is presumed.

Econometric Model for Data Analysis

Primarily, the Augmented Dickey-Fuller (ADF) test, Phillips-Perron Test (PPT) and Kwiatkowski-Phillips Schmidt-Shin test (KPSS) and LM-Statistics are used to find the integration level between the variables. The relationship between the variables is checked based on Johansen's (1988), co-integration test. After the selection of the lag order criterion, Johansen's co-integration test is applied. This study is also expended to VECM to overcome the causation issue in the co-integration test; the Granger Causality test could be administered, provided that co-integration not be there in the long run. If the co-integration is proved on these two variables such as exchange rates and stock prices, then VECM could be applied by using the following mathematical formula and equation.

$$\begin{aligned} \Delta Y_t &= \alpha_0 + \beta_0 Z_{t-1} + \sum \gamma_{0i} \Delta Y_{t-i} + \sum \delta_{0i} \Delta X_{t-i} + \varepsilon_{0t} \\ \Delta X_t &= \alpha_1 + \beta_1 Z_{t-1} + \sum \gamma_{1i} \Delta X_{t-i} + \sum \delta_{1i} \Delta Y_{t-i} + \varepsilon_{1t} \end{aligned}$$

Δ is used as a difference that is which consists of s and Y_{t-1} as the earlier sign represents the current terminal price and later indicates the current price minus the one period before on which date the share has been bought

$$Y_t = a_0 + b_0 X_t + Z_t \quad (1.1)$$

$$X_t = a_1 + b_1 Y_t + Z'_t \quad (1.2)$$

This VECM approach can be used to identify the causality between the

variables as the first equation showed X causing Y and b_0 is significant even in the long run d_0i showed causality for short run. Granger (1988), indicated that the significance betas of b_0 and b_1 are long run bi-directional. Relating to this econometric model if $b_0 = b_1 = 0$, then there is a chance of no relationship between the stated variables in the long run and the chances of using Granger Causality test is also low.

Hypothesis Testing

H1: There is a significant impact of exchange rate on stock prices movement as per the market indices on selected countries.

H2: There is a long run relationship of the exchange rate and stock prices in South Asian countries.

H3: There are different effects on a short and long run of the exchange rate and stock prices.

Empirical Analysis

This paper relates to an empirical investigation of exchange rate on stock market indices. For this purpose, ten-year data has been considered, which starts from the year of July 2006 to June 2016. This research is based on time series analysis where four countries data is extracted.

Stationary Testing of Data

Before checking the nexus of exchange rate and stock indices in terms of the co-integration test, it was necessary to check the stationery of the all data. In this regard, Augmented Dickey-Fuller (ADF), Phillips-Perron and Kwiatkowski-Phillips Schmidt-Shin tests are being employed to identify the unit root test.

H_0 = There is a unit root at level in the series.

H_A = There is no unit root at level in the series.

Table 1. Testing of Unit Root at Level and Level One

Country	Variable	Order of Integration	ADF P-value	Phillips-Perron Test (PPT)	(KPSS) LM-Stat.
India	INR	Level	0.94	0.93	1.15
		1 st Difference	0.00	0.00	0.18
	BSE	Level	0.72	0.68	1.00
		1 st Difference	0.00	0.00	0.05
Sri Lanka	LLKR	Level	0.93	0.87	1.18
		1 st Difference	0.00	0.00	0.10
	COSE	Level	0.66	0.60	1.01
		1 st Difference	0.00	0.00	0.10

Bangladesh	LBDT	Level	0.78	0.78	1.03
		1 st Difference	0.00	0.00	0.11
	CHSE	Level	0.2364	0.24	0.61
		1 st Difference	0.00	0.00	0.21
Pakistan	LPKR	Level	0.44	0.49	1.18
		1 st Difference	0.00	0.00	0.13
	KSE-100	Level	1.00	1.00	1.04
		1 st Difference	0.00	0.00	0.46

As the above table depicts the meaning which has hypothesized assumption that unit root cannot be rejected at level one and it is rejected at level one due to stationary of the data. All of the countries have a unit root at level one, by testing ADF and PPT and for the co-integration test, the stationary should be checked on level one, so the researcher has applied the co-integration test for every country and reviewed the significance of relationship of exchange rate on stock indices in the long run.

Selection of Lag Length Criterion by using Vector Auto Regression (VAR)

Lag length criterion is selected based on Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ), because both of these criterions are selected on lag order one for all of the four countries. The other's criteria are not having the same lag order for every country like as Akaike information criterion (AIC).

Table 2. Selection of Lag Order

Country	Variable	Order of Integration	Schwarz information criterion (SC)	Hannan-Quinn information criterion (HQ)
India	DBSE_200	Level	22.34113	22.31211
		1 st Difference	16.06463*	15.97759*
Srilanka	DCSE_ALL	Level	25.34585	25.31683
		1 st Difference	18.14487*	18.05783*
Bangladesh	DCHSE_ALL	Level	25.40607	25.37705
		1 st Difference	19.23167*	19.14463*
Pakistan	DKSE_100	Level	28.59519	28.56617
		1 st Difference	20.24704*	20.15999*

* indicates lag order selected by the criterion

Source: Author's Work

Co-Integration Test Analysis Part

After selecting the lag order, the Johansen co-integration test is applied to check the long run relationship between exchange rate and stock prices

for each country. If the long run relationship exists between the variables, then Vector Error Correction Model (VECM) is applied for testing the short-run relationship between exchange rate-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 3. Significant Results of Johansen Co-Integration Test

Country	Variables	Trace Statistics	Critical Value at 5%	P-Values	Results
India	DBSE_200	9.895440	15.49471	0.2889	Accept H0
Sri Lanka	DCSE_ALL	2.380296	15.49471	0.9880	Accept H0
Bangladesh	DCHSE_ALL	9.689815	15.49471	0.3054	Accept H0
Pakistan	DKSE_100	5.764456	15.49471	0.7232	Accept H0

Source: Author's Work

The table explains the co-integration test, and it denotes the idea that exchange rate and stock prices or indices do not have a long-run relationship with any country. Trace statistic test is selected because it gives more robustness to identify skewers 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 regarding accepting the null hypothesis. So, there is no long-run relationship between exchange rate and stock prices in the selected countries because the economic factors are almost same in each country but if a well-developed country is included in the study, then exchange rate is the real predictor of stock prices movement both in the short and long run market.

Granger Causality Test

This test is used for ascertaining whether causation occurs between the variables or not. The empirical testing of co-integration, in the end, investigated that nexus of exchange rate-stock prices is not there. Now, it is proved by using other tests like VECM and Granger causality test that VECM is not feasible when the long run relationship is not found, therefore it is understood that any short-run relationship is also not there. 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: There is Granger causality among the variables.

Table 4. Granger Causality Test Significant Results

Country	Variables	Observations	F-Statistic	P-Values	Results
India	DLUSD_INR ⇔ DBSE_200	118	6.12989	0.0147	Reject H0
	DBSE_200 ⇔ DLUSD_INR	118	3.62425	0.0594	Accept H0
Sri Lanka	DLUSD_LKR ⇔ DCSE_ALL	118	0.35110	0.5547	Accept H0
	DCSE_ALL ⇔ DLUSD_LKR	118	0.42723	0.5147	Accept H0
Bangladesh	DLUSD_BDT ⇔ DCHSE_ALL	118	0.61213	0.4356	Accept H0
	DCHSE_ALL ⇔ DLUSD_BDT	118	4.10142	0.0452	Reject H0
Pakistan	DLUSD_PKR ⇔ DKSE_100	118	3.47086	0.0650	Accept H0
	DKSE_100 ⇔ DLUSD_PKR	118	0.05474	0.8154	Accept H0

Source: Author's Work

The exchange rate does not lead to stock indices for any of the countries after India, but in stock indices, Granger caused to change exchange rate only for Bangladesh, where Ho is rejected due to reverse unidirectional causation. Subsequently, stock indices do not affect exchange rate on any other country.

VECM Model Application and Analysis

For VECM, following Hypothesis are derived:

Ho: The Series has a short run relationship.

H1: The Series has no short-run relationship.

Table 5. VECM Test and its Results

Country	Variables	Critical Value at 5%	Calculated Value at 5%	Results
India	DBSE	±1.96	-2.75	Accept H0
Sri Lanka	DCSE	±1.96	-1.29	Reject H0
Bangladesh	DCHSE	±1.96	-1.89	Reject H0
Pakistan	DKSE	±1.96	-2.0	Accept Ho

Source: Author's Work

The above table depicts the idea that there is no short run relationship between the studied variables, in Pakistan and India. Besides this, it indicates that relationship is positive for Sri Lanka and Bangladesh stock market for a shorter term. Nieh and Lee (2002), empirically found the

same opinion for VECM, and they had the same consent for these four South Asian countries. Meanwhile, the hypotheses test results intimated that calculated values of T-statistics are not significant and the null hypothesis for India and Pakistan do not fall in the rejected region; however for Sri Lanka and Bangladesh, the results are negatively significant, so the null hypothesis is rejected.

CONCLUSION

The research findings indicate that Stock prices and Exchange rates have no long-run relationship in the stated countries. Furthermore, alternative hypotheses do not show its acceptance regarding the long-run relationship of impact on the exchange rate on stock prices, and also there is no short-run effect in the stock market. Several tests were applied empirically to this concern like as descriptive analysis, unit root test, lag length criterion, Johansen co-integration test, Granger causality test, but no satisfactory results have been established. Neither exchange rate leads any impact on stock indices, nor stock indices have a leading position to show the effect on the exchange rate. Relating to Granger causality test only in India, exchange rate caused the change in stock indices otherwise, for rest of the countries null hypothesis was accepted. Whereas in Bangladesh, it was found that causation occurs due to stock indices of CHSE impact on exchange rate. 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 less developed countries. Thus, it is concluded that there are several reasons for not having any attraction for the foreign portfolio investments. These factors include political instability, law and order situation, high inflation rates, and other related factors.

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