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ASSESSING THE DYNAMIC LINKAGE BETWEEN EXCHANGE RATES AND STOCK PRICES: EVIDENCE FROM SAARC COUNTRIES

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Abstract

This study examines the dynamic relationship between exchange rate and the stock market price, using the evidence from four South Asian countries where the research gap has prevailed from a lesser number of studies and research has made little to no attempt in investigating the predicting power of the stock price using the exchange rate. By conducting time series analysis on the dynamic relationship between the exchange rate and the stock price in Sri Lanka, India, Pakistan and Bangladesh it was found that the variables are stationary at first difference. The insignificance of Johanson cointegration test results revealed that there is no long-term relationship between the variables in each country. Using the VAR estimates, the impulse response and variance decomposition has been tested to discover how each variable absorbs the shocks from the other variable. Granger causality test has shown that both Sri Lanka and India recorded bidirectional granger causal relationship, Pakistan showed unidirectional relationship whilst Bangladesh showed no causal relationship between the variables. Finally, the machine learning model revealed that the exchange rate can predict the stock price at 70.19% accuracy. Thereby, results of this study support that exchange rate and stock price in South Asian countries have a short-term significant relationship. Implication of this study could be used by the managers, policy makers and enterprises in diversifying the portfolios and obtaining maximum advantages from currency depreciation. However, this study also makes pre warning that if the direction has been changed due to the higher volatility of this relationship currency depreciation would bring negative implications on the stock prices. Therefore, policy makers should not solely depend on the exchange rate in making decisions. Further, as this study only covers the short-term impact, future studies are encouraged to assess the long-term relationship considering multiple aspects such as different exchange rates, other macroeconomic variables etc. to provide greater insights.

Keywords: Stock Market, Exchange Rate, Cointegration, Granger Causality, Machine Learning

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1. INTRODUCTION

1.1. Background of the Study

The financial architecture of developing economies has changed dramatically as a result of globalization and banking sector reforms. In the avant-garde timeline, the activities in financial markets play a salient role in the economy and vice versa. In recent years, countries have used currency rates more liberally for the betterment of their economies). In the meanwhile, the goal of exchange rate interventions in developing nations is to establish a stable exchange rate regime. (Delechat, 2024; Ouyang et al., 2016). In the financial press, there is a widespread belief that stock prices and currency rates are inextricably linked which is considered to be a dynamic relationship.

Interestingly enough, referring to the theoretical aspect of this relationship, according to the standard macroeconomic theory, it was mentioned that changes in exchange rates have an impact on multinational companies' competitiveness, as well as their earnings and stock prices (Dornbusch & Fischer, 1980). A devaluation of the local currency lowers the cost of exporting goods, potentially increasing overseas demand and sales. In sequence, a depreciation of the local currency would increase the worth of an exporting company. When the local currency appreciates, however, foreign demand for an exporting firm's products decreases, and the firm's profit and stock price fall. On the other hand, appreciation of the currency will have negative impact on the exporting goods hence, profit falls. Further, exchange rate variations may have an impact on stock prices because they create equity flows. The other side of the coin could be depicted as, exchange rate swings can be influenced by stock price fluctuations. When a thriving stock market attracts capital from international investors, raising demand for a country's currency and vice versa. As a result, rising (falling) stock values are linked to exchange rate appreciation (depreciation). According to Gavin (1989), investors' wealth and money demand may be influenced by stock market performance, stock price swings may have an impact on exchange rates.

In order to define the dynamic relationship between the financial markets and the exchange rates many researchers have made an effort in different perspectives. Which avowed it as a dynamic relationship where the between the financial market and FOREX has depicted different results in different markets. Some studies have found a negative relationship between exchange rates and stock prices, while others have found a positive relationship and still others have found an insignificant interaction between the two factors (Lee et al., 2011; Arwade, 2019; Dash & Sahu, 2018; Kassouri & Altıntaş, 2019). Overall, the results have proven contentious. Further, regardless of the country, region and their development status the relationship between the stock market and FOREX has shown multifarious results. This has been depicted vividly especially in emerging and developing economies, where it shows different relationships which show far more different than previously perceived results from developed countries. As a result, emerging and developing markets tend to be unrelated to one another and to developed markets. (Bello, Zakri, 2013)

Hence, identifying the linkage between the stock market and FOREX in said economies has played a key aspect. Even though the theoretical aspect provides a sound base on the relationship between the stock market and the FOREX rates, Results in the researchers has depicted otherwise. Therefore, looking at this dynamic relationship with a holistic view could be considered as much important with the current globalized market perception.

Moreover, this research selects South Asia's major intergovernmental organization and geopolitical union, South Asian Association for Regional Cooperation (SAARC) countries, i.e., Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka. which was established in 1985 with the purpose of "promote economic growth, social progress and cultural development within the South Asia region" Having diversified culture, business etiquette and due to combination of economy structures SAARC which providing a best approach for this study.

1.2. Research Problem

Many researches have been done in proving different aspects of the relationship between the stock indices and exchange rates. Most of these research' empirical evidence has been inconsistent and ambiguous. This is due to the fact that the relationship between stock prices and exchange rates is studied in a bivariate or multivariate framework using various econometric methods for different time periods, different data frequencies (daily, monthly, and quarterly), different stock price and exchange rate measures (nominal or real), and for different economies (developed, emerging and developing). Therefore, this demands more regional and country specific studies to confirm what sort of a relationship is there between the exchange rate and stock prices.

Further, in spite of many research done with regard to this topic, Research gaps have been identified where researchers have paid little attention to SAARC countries where the empirical researches have been done half decade ago. Being an important regional association consisting of countries included in various emerging economies and political conditions i.e., emerging countries (India) and developing countries Sri Lanka, Pakistan, Bangladesh which belong to lower middle- income level, this research is expected to provide an extensive analysis. Moreover, apart from the traditional analytical methods, the machine learning model is built to confirm the predictive power of the exchange rate on stock price which can be considered as a novel attempt.

Given the above context, the main focus of this study is to investigate the relationship between exchange rate and stock price: evidence used from SAARC countries. Which raise the research question whether the share price is influenced by exchange rate and how.

1.3 Research Objectives

To explore the research problem outlined above, following research questions were addressed by this study.

1. To identify dynamic relationship between FOREX and stock prices in SAARC countries
2. To test the short run, long run relationship and causality between FOREX and stock prices

2. LITERATURE REVIEW

2.1 Theoretical Review

The relationship between exchange rates and stock prices has been a subject of extensive research in the field of international finance. Existing literature identifies two main channels through which exchange rates and stock prices are linked. The first is the flow-oriented model, which suggests that a country's trade balance determines its exchange rate. This model posits that adjustments in exchange rates can influence the international competitiveness of a country's domestic economy and trade balances, which in turn impacts stock prices (Wu et al., 2020). Specifically, the appreciation of a country's domestic currency makes exporting goods more expensive and induces a decline in both foreign demand and profits, leading to a decrease in the stock prices of the export-dominant economy (Wu et al., 2020).

On the other hand, the stock-oriented model suggests that stock prices can also influence exchange rates. This model argues that expectations regarding movements of financial asset prices play an important role in affecting exchange rate dynamics (Nandy & Chattopadhyay, 2019). Globalization has led to an increased market for currencies in which the securities are denominated, thus creating interdependence between stock returns and exchange rate changes (Nandy & Chattopadhyay, 2019).

The existing literature has also explored the dynamic linkages between exchange rates and stock prices, particularly within the context of emerging markets.

2.2 Empirical Review

Empirical studies examining the relationship between exchange rates and stock prices, particularly in SAARC countries, have yielded mixed results, reflecting the complexity of the interaction and the influence of country-specific factors, and the chosen time period.

Some studies have found a negative relationship between exchange rate appreciation and stock prices. (Lee et al., 2011) notes that early research, such as Frank and Young, found no significant interaction, while later work by Soenen and Hennigan showed a significant negative correlation. This negative relationship is often attributed to the reduced international competitiveness of domestic firms when the domestic currency

appreciates, leading to lower exports and profits, and consequently, declining stock prices. (Arwade, 2019), focusing on the Indian context, suggests that exchange rate depreciation can negatively impact stock markets, indicating a positive correlation between the two variables.

However, other studies have documented a positive or insignificant relationship. (Dash & Sahu, 2018) found unidirectional Granger causality from exchange rates to stock market returns in several countries, supporting the flow-oriented model where exchange rate changes precede stock price movements. (Kassouri & Altıntaş, 2019) examined the relationship between stock prices and the Turkish Lira, acknowledging the potential for non-linearity and asymmetric adjustments, suggesting that the relationship may not be uniform across different market conditions.

Using monthly data from 2001to 2018, based on VN-Index stock price collected from Ho Chi Minh Stock Exchange (HOSE) Dang et al., (2020) posited that the asymmetric effect of exchange rate changes on stock prices in Vietnam. According to ARDL results, the currency appreciation affects a stronger transmission of stock prices when compared to the long-run currency depreciation. In the absence of asymmetry, the exchange rate only has a short-run impact on stock prices. This implies a symmetrical assumption that underestimates the impact of exchange rate changes on stock prices in Vietnam.

Furthermore, the impact of external shocks and global economic conditions can significantly influence the exchange rate-stock price nexus. (Alimi & Adediran, 2023) analyzed the relationship during the COVID-19 pandemic, highlighting differences in the dynamics between advanced and emerging economies. This suggests that global events can alter the established relationship and introduce new complexities.

The role of capital flows and market sentiment has also been explored. (Attaullah et al., 2022) examined the interconnectedness of stock market volatility and exchange rate movements in emerging and developed economies, emphasizing the role of regime shifts and market interconnectedness. (Sanwal & Ismail, 2022) focused on India, finding a significant relationship between foreign institutional investment flows, the stock market, and the exchange rate.

Overall, the empirical evidence remains inconclusive, with studies supporting different theories and reporting varying results depending on the context. This highlights the need for further research that considers country-specific factors, industry dynamics, and the potential for non-linear relationships to fully understand the complex interplay between exchange rates and stock prices.

2.2.1 Machine Learning: Predictability of Stock Index using Exchange Rate

One of the main researches conducted using Machine learning (ML) is Amat et al. (2018). This research applies the random forest, support vector machine (SVM), and

neural network models to four fundamental theories utilizing an exponential weighted average technique and sequential ridge regression with discount factors (uncovered interest rate parity, purchase power parity, the monetary model, and the Taylor rule models).

Furthermore, the results' robustness is thoroughly tested in three machine learning models using six government bonds with different maturities (1, 2, 3, 5, 7, and 10 years) and four price indexes (the producer price index (PPI), the consumer price index (CPI) of all items, CPI excluding fresh food, and CPI excluding fresh food and energy). These factors should be combined to offer clear evidence for the outcomes gained. When compared to the random walk, the results show considerably different predicted accuracies, but some random forest results exhibit the same accuracy as the random walk. Second, when comparing the performance of core models integrated with machine learning, the PPI-based models consistently exhibit strong predictability. However, Mehak et al (2016) implies that Stock market performance can be predicted using machine learning techniques. Yet, with only 100 instances, the model was able to forecast the model's 33 performance to a good extent, demonstrating that stock exchange can be predicted using machine learning approaches.

2.3 Theoretical Framework

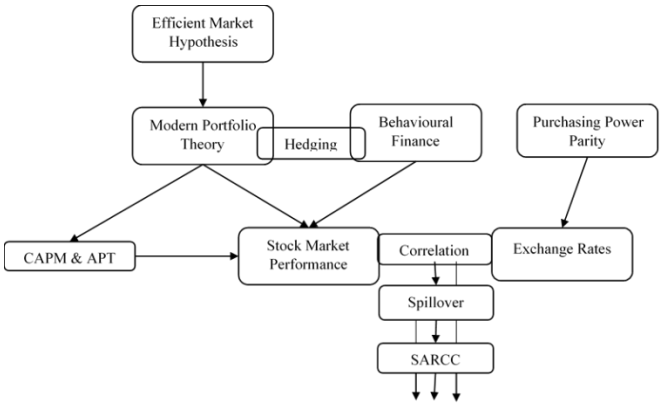


Figure 1: Theoretical Framework

3. METHODOLOGY

3.1 Research Design

Through this study, it is expected to understand the dynamic relationship between the exchange rate and stock market which was broken to identify the short-term relationship and the long-term relationship. Further, the prediction power of the exchange rate on the stock price will be tested using machine learning

3.2 Sample and Data

Data, Weekly average FOREX and Share price indices has been collected for the period 2014-2024 of 10 years from Investing.com and world bank database. the accuracy has been randomly crossed checked using the respective websites of the stock exchange and respective central bank reports. Number of observations is summed up to the 4440 observations, 555 observations from each variable.

Table 1: Variables

Country	Forex	Stock Exchange	Stock Index
India	INR/USD	NSE	SENSEX
Pakistan	PKR/USD	PSX	KSE-100
Bangladesh	BDT/USD	DSE	DSE 30
Sri Lanka	LKR/USD	CSE	CSE All share price index

Analysis is started off with descriptive statistics of both variables then will be subjected to the unit root test on checking stationarity. Then the Johannsen cointegration test will be conducted on identifying the weather each country is having long term or short-term relationship with regards to forex and stock price. Depending on the results if the null hypothesis being accepted it is deciding that countries have short term relationships within the variable. Thereby only the VAR model will be conducted if not VECM will be conducted. The necessary diagnostics has been conducted on deciding the viability of the mode. Impulse response and variable decomposition test how the shock of one variable impact on another. Ultimately granger causality will be looked upon whether the data has unidirectional or bidirectional results. This result will be directed to the machine learning model on identifying the predicting power of exchange rate on stock price.

4. DATA ANALYSIS

4.1 Descriptive Statistics

Since the data used in the study is continuous, main descriptive measures such as mean, median, max, min, std deviation, skewness and kurtosis of each variable will be explored.

Table 2: Descriptive Statistics- Stock Price

	ASPI	DSE	KSE	SENSEX
Mean	7523.619	1971.551	43270.81	13033.69
Median	6722.200	1959.940	41335.53	11174.75
Maximum	13371.61	2767.380	101439.8	26178.95
Minimum	4439.040	1321.490	28109.57	6694.800
Std. Dev.	1971.939	286.0032	12100.63	4937.252
Skewness	1.110740	0.204699	2.051302	0.796215
Kurtosis	3.189837	2.908185	7.857016	2.517516

Jarque-Bera	114.9546	4.070864	934.7578	64.02438
Probability	0.000000	0.130624	0.000000	0.000000
Sum	4175609.	1094211.	24015301	7233698.
Sum Sq. Dev.	2.15E+09	45315988	8.11E+10	1.35E+10
Observations	555	555	555	555

According to Table 2, the mean value of the stock index prices of ASPI, DSE, KSE and SENSEX are 7,523.62, 1,971.55, 43,270.81, 13,033.69 respectively. The direct comparison with regards to the value of the Price indices cannot be done as the value represents their respective currency values. However, in terms of volatility, KSE shows higher volatility while DSE being the lowest. All the Stock indices are positively skewed.

Table 3: Descriptive Statistics- FOREX

	LKR	**BDT**	**PKR**	**INR**
Mean	205.1710	88.07602	161.4516	71.89986
Median	180.2500	84.24000	153.1800	71.26800
Maximum	368.5000	119.5770	306.6900	84.56000
Minimum	130.1700	77.25000	96.42000	58.52500
Std. Dev.	75.30333	12.00454	63.99442	7.207167
Skewness	0.991430	1.334095	0.904860	0.256425
Kurtosis	2.469967	3.384879	2.466112	1.909861
Jarque-Bera	97.41791	168.0580	82.32784	33.56406
Probability	0.000000	0.000000	0.000000	0.000000
Sum	113869.9	48882.19	89605.67	39904.42
Sum Sq. Dev.	3141507.	79836.33	2268788.	28776.57
Observations	555	555	555	555

As depicted in Table 3, Mean value of the of the LKR BDT, PKR and INR are shown as, 205.17 Sri Lankan rupees (LKR), 88.08 Bangladesh Taka (BDT), 161.45 Pakistani rupees (PKR) and 71.90 Indian rupees (INR) respectively. The highest currency can be seen from LKR while lowest being the INR. Within the selected time range, the Maximum currency value is 368.50- LKR while minimum currency value is owned by INR (84.56). Further, the mean value is higher than median value which indicates that LKR, BDT, PKR and INR are positively skewed. According to standard deviation, PKR and LKR show much volatility compared to the other two currencies. Higher volatility can be seen in LKR as the standard deviation being higher compared to INR which shows the lowest standard deviation. As these currencies are based on the dollars this implies that Sri Lanka has the highest local currency depreciation compared to the other South Asian countries.

4.2 Bivariate Statistical Analysis

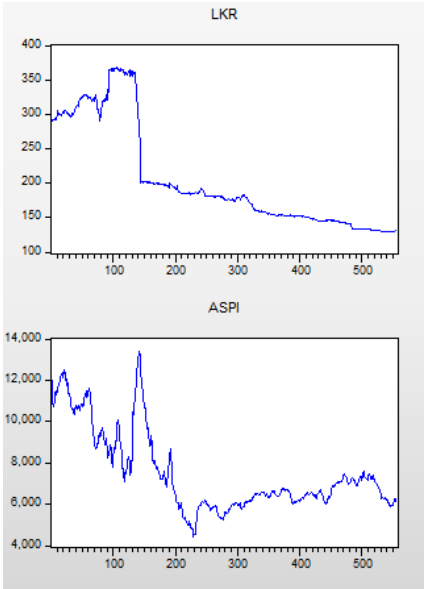
4.2.1 Correlation

Table 4: Correlation

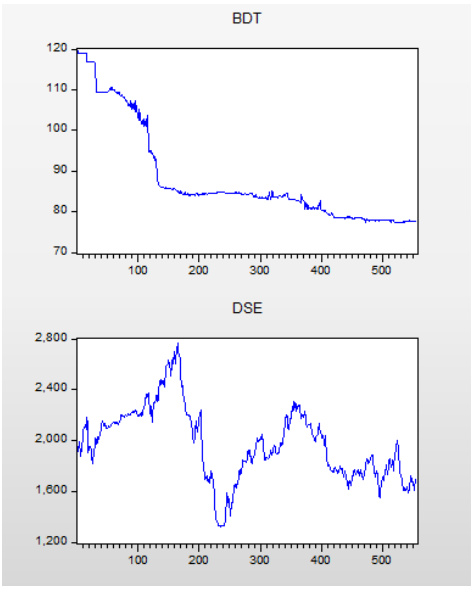
Variables	Correlation	Description
ASPI- LKR	.7126	Strong positive correlation
DSE - BDT	. 3316	Weak positive correlation
KSE - PKR	.6440	Moderate positive correlation
SENSEX- INR	.8999	Strong positive correlation

Thereby, in Bangladesh, the correlation between the DSE and BDT shows weak positive correlation (.3316) whilst, KSE and PKR shows moderate positive correlation (.6440). However, SENSEX vs INR and ASPI vs LKR on the other hand is having the strong positive correlation of .8999 and .7126 respectively. this relationship can be confirmed graphically
as depicted in figure 2.

LKR-ASPI



BDT-DSE



KSE-PKR

INR-SENSEX

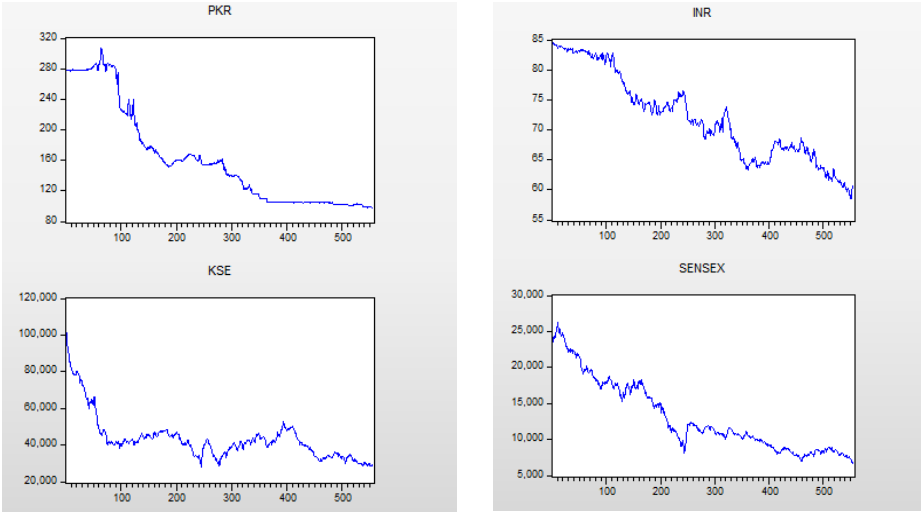


Figure 2: Share Price and FOREX Movement in Each Country

4.2.2 Assessing the Stationarity

Trend identification and graphical confirmation can be observed from the graphs depicted in the figure 2 where it shows mixed results hence, the statistical test as ADF test is needed to confirm the stationarity of the data set.

Dickey and Fuller (1979, p.427), if $p < 1$, ($p < 0.05$) the time series yt goes towards stationarity, thereby the ADF test has been run for each variable on three test equation models i.e. Constant, trend and intercept and none. All the variables are stationary under 1st difference.

4.2.3 Optimal Lag length

Firstly, to find the lag length selection criteria, unrestricted VAR was performed in selecting the information criterion. Consequently, lag specification test was performed on identifying the optimal lag length criterion. Thereby for each country analysis, optimal lag length was decided as,

Sri Lanka	10
Inida	2
Bangladesh	3
Pakistan	7

On selecting the lag length, apart from based on lowest AIC criterion, other criterion decisions were considered as well.

4.2.4 Cointegration

After the optimal lag length decision. Cointegration test will be conducted on identifying whether the variables are having short term/ long term relationships. Accordingly, to the test results of the cointegration (null hypothesis being rejected) the suitable VAR model will be decided. The test statistics summary depicts in table 5.

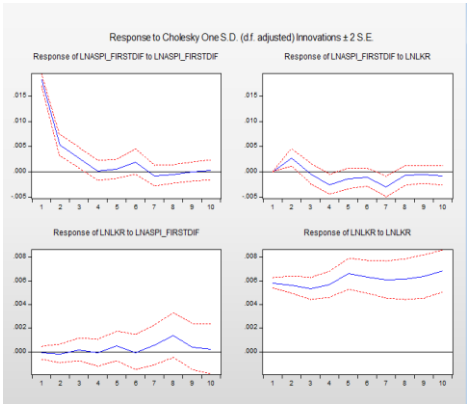
Table 5: Johanson Cointegration Test

		Eigenvalue	**Trace Statistics**	**0.05 critical value**	**Probability**
lnASPI_ lnLKR	Trace	0.0197	8.2146	15.4947	0.4427
	Maximum Eigenvalue	0.0197	8.0177	14.2646	0.3769
lnSENSEX lnINR	Trace	0.0183	7.5416	15.4947	0.5156
	Maximum Eigenvalue	0.0183	7.5290	14.2646	0.4286
lnDSE lnBDT	Trace	0.0202	8.4404	15.4947	0.4196
	Maximum Eigenvalue	0.0202	8.3253	14.2646	0.3466
lnKSE and lnPKR	Trace	0.0149	5.5855	15.4947	0.7439
	Maximum Eigenvalue	0.0140	5.5634	14.2646	0.6696

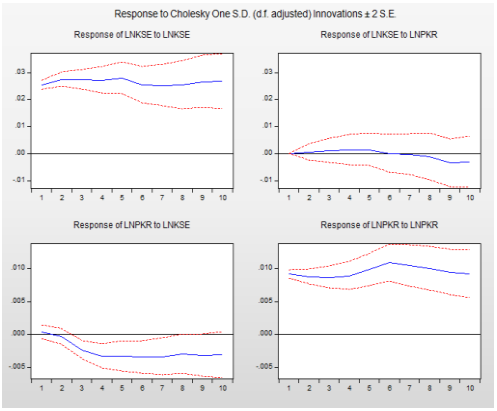
Based on Table 5, according to the test statistics, all the equations fail to reject the null hypothesis, “No cointegrating in equation”. Thereby all the equation fails to prove that there’s a long run relationship between exchange rate and stock price in four countries. In conclusion it is to say that there’s no cointegration relationship between the exchange rate and stock prices in South Asian Countries. This brings up a mixture of results compared to the previous research done Muhammad & Rasheed (2002), showing a long run relationship exists in Sri Lanka and Bangladesh and no long run relationship between India and Pakistan.

4.2.5 Impulse Response

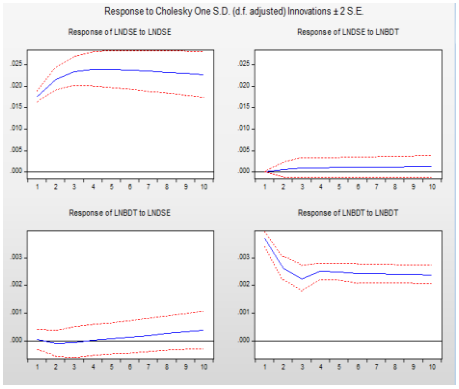
LnASPI and ln LKR



LnKSE and lnPKR



lnDSE and lnBDT



lnSENEX and lnINR

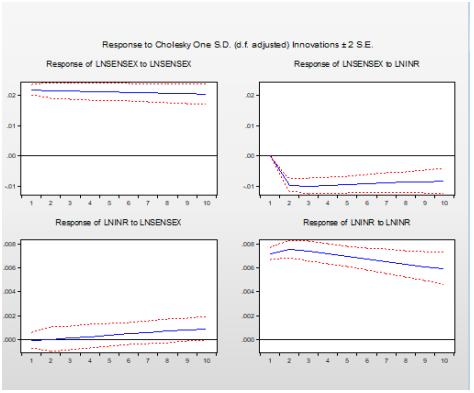


Figure 3: Impulse Responses of Each Country

As in the figure 3, In terms of lnASPI and lnLKR when one standard deviation shock happened to the LKR, when LKR increases, the lnASPI_first difference too will increase reaching maximum percentage variation of .3 around 2nd week, in starts to decrease an till 4th week and gradually steady around 10th week. On the other hand, when standard deviation shock happens to lnASPI, LKR does not show immediate response except small volatility till 4th quarter, around 5th week till 6th week, from 6th week to 10th week, LKR will show slight increase and then back to the steady state.

The impulse response of KSE and PKR, when standard deviation shock occurred to PKR, KSE is showing a small volatility yet shows steady movement. On the other hand, when standard deviation shock occurs in lnKSE PKR will start to decrease.

As depicted in the chart, a standard deviation shock occurred to lnBDT, lnDSE will make slight increase and make it a steady movement. Inversely, when standard deviation shock happens to the lnDESE BDT shows no significance changes till 4th week yet will make slight increase in from there.

The impulse response of INR and SENSEX, when standard deviation shock arises in lnINR, lnSENSEX will start a steep decrease till 2nd week then make the impermeable increase from 2nd week. Contrarily, when standard deviation shock occurred to lnSENSEX, lnINR does not show significant volatility till 2nd week yet will make slight increase from then.

4.2.6 Granger Causality

Table 6: Granger Causality

Dependent Var	Independent Var	Probability
lnASPI	lnLKR	.0001
lnLKR	lnASPI	.0002
lnDSE	lnBDT	.8380
lnBDT	lnDSE	.0747
lnPKR	lnKSE	.0006
lnKSE	lnPKR	.3535
lnSENSEX	lnINR	.0000
lnINR	lnSENSEX	.0500

P value (0.0001) less than critical value of 0.05, rejects the null hypothesis,

As per in the table 6, Granger causality results can be described as,
“Whereas the independent variable LKR, do not granger cause ASPI” is rejected at 5% level of significance. This implies LKR granger cause ASPI
Further, second scenario, P value (0.0002) less than critical value 0.05, rejects the null hypothesis, “Whereas the independent variable, ASPI do not granger cause LKR” is rejected at 5% level of significance. This implies ASPI granger cause LKR.

Considering the scenario in Bangladesh, according to the Granger causality test, both Stock index and Exchange rate do not show significant results hence, null hypothesis is accepted.

However, in Pakistan the situation is different as the influence of exchange rate (PKR) on the stock index (KSE) is significant (.0006< 0.05) indicating that exchange rate granger cause Stock index. Yet conversely, the impact of stock Index (KSE) on the exchange rate (PKR) is insignificant at 5% level. Do not reject the null hypothesis.

Finally, In India, independent variable INR, do not granger cause SENSEX” is rejected at 5% level of significance. Yet could be accepted at 10% significance. This

implies INR granger cause SENSEX. Contrariwise, the influence of Stock index (SENSEX) on exchange rate (INR) is also significant at 5% hence, it is to conclude that SENSEX Granger cause INR.

4.2.7 Machine Learning: Predictability of Stock index (ASPI) using the exchange rate (LKR)

As the Granger causality test depicts that exchange rate granger cause stock index, the extra step has been taken to predict the Stock index price (ASPI) using the exchange rate (LKR/USD). This has been built around the RNN model (number of hidden layer units and number of samples in sequence) and it is comparing the accuracy of different parameter values. In the adjusting phase, the optimal model is applied to all selected stocks and the actual stock trades are reproduced.

In the field of artificial neural networks, optimizing the number of neurons in the invisible layer for various tasks remains an unresolved challenge. Very few hidden units can cause major errors due to overfitting, and very few hidden units can cause major errors due to overfitting. Some scholars have suggested statistics to determine the optimal number of invisible units for all ANN functions. Consider the following scenario. The number of hidden units should not exceed the number of units in the input layer. The size of the hidden units should be between the input and output units, and the number of neurons should capture 70-90% of the variance in the input data set.

The five samples in the sequence are used to evaluate alternative hidden layer configurations and are prone to repetitive training errors (less than 10). As the output and input of the RNN block are equal, the number of neurons in the hidden layers A and B should be the same. The following figure shows the test results.
As depicted in the figure 4, according to the machine learning prediction, the predicted stock price will vary in the steady price range which is depicted in the blue

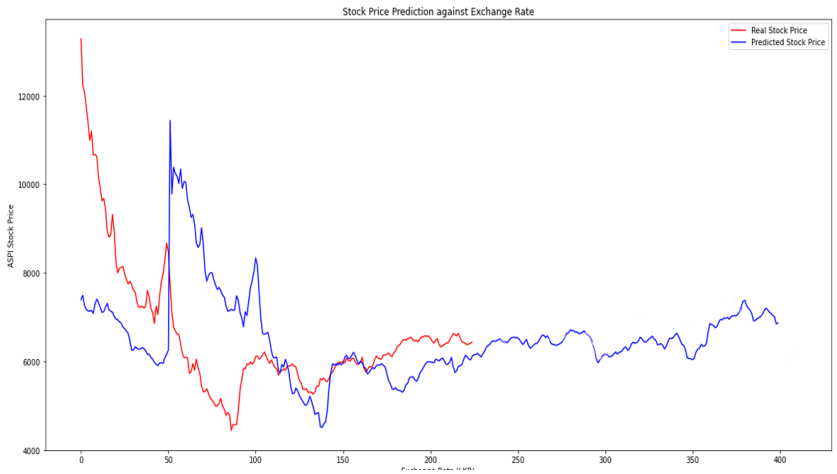


Figure 4: Machine Learning Prediction

line. However, considering the data input exchange rate is expected to rise.
discussing the technical aspect machine learning model, the LSTM, a subclass of LSTM, has been used to predict the stock market. Frequently occurring neural networks to test the generalizability of the LSTM model, an inventory is chosen at random to test optimal allocation as a configured inventory. Once the LSTM model to the entire dataset. As a result, the LSTM model gives 70.19% accuracy in its forecasts for all stocks.

Thereby, it is concluded that at 70.19% accuracy, exchange rate can be used to predict the stock price. However, the result can be subject to change due to the impact of other economic factors.

5. DISCUSSION

Considering the empirical analysis, 1st the univariate analysis has been done to identify the individual statistical characteristics of the variables. Thereby, with regards to the exchange rates arbitrary comparison can be done as all the values are representing their exchange rate for a dollar. The higher volatility can be seen in LKR as the standard deviation being higher compared to BDT which shows the lowest standard deviation. As these currencies are based on the dollars this implies that Sri Lanka has the highest local currency depreciation compared to the other South Asian countries. First, the variable ASPI, LKR, KSE, PKR, DSE and BDT were subjected to the descriptive statistical analysis, thereby, results show that LKR, PKR, ASPI, SENSEX and DSE have positive skewness and while INR, BDT and KSE have negative skewness. The Pearson Correlation Analysis shows positive correlation of all the variable pairs yet, except India, all the countries showed weak positive correlation between exchange rate and the stock index price. Antecedent to the descriptive analysis, Stationarity has been checked using ADF test and all the variables are stationary at the 1st difference. This implies that all the data series in four countries are integrated for order one i.e. I (1) which shows the need of applying cointegration test to check the long-term relationship. In performing Johannsen cointegration tests, it reveals that there's no long run equilibrium relationship between exchange rate and stock prices in all four countries. According to the VAR estimations, in Sri Lanka, India and Pakistan, lags of both variables can be used to estimate the endogenous variable i.e. exchange rate or stock price. However, Bangladesh shows a unidirectional relationship. This has been proven from Granger Causality test statistics. Finally taking the insights from all the statistical tests, the machine learning model has been run on predicting the stock price using the exchange rate capturing 70% - 90% variance.

6. CONCLUSION

The empirical evidence brought up in this paper shows that there's a significant short run relationship between the exchange rate and the stock price. This has been proven by employing Cointegration, VAR estimations, Granger Causality, Impulse response function and Variance decomposition. All four countries have positive correlation

which implies that depreciation of the domestic currency will increase the stock prices. Further, this relationship is statistically tested to be the short term. These findings support the portfolio balanced theory which implies that currency depreciation causes the stock price appreciation. Hence, local enterprises could gain advantages. Nonetheless, these discoveries satisfy the objective 01 and objective 02 of this study to investigate the dynamic relationship between the stock price and the exchange rate.

However, from the Granger Causality it was found that stock price and exchange rate is bidirectional in Sri Lanka, India, while Pakistan shows the unidirectional relationship where only the exchange rate granger cause on stock price. Nevertheless, except India, all the other four countries imply weakly positive correlation between exchange rate and stock price. Which implies two factors. First, even though there's positive relationship domestic markets depreciation of the currency rate would not be greatly reflect within the stock price. Second, disregarding the direction of the relationship according to the traditional approach, between e bidirectional relationship can be connected with the theories explaining the linkage between exchange rate stock price accordingly, as argued by the floworiented models when the domestic currency of Sri Lanka countries depreciates, cash flow and the profitability of local firms should deteriorate this will lead to fall in the stock prices. According to the stock-oriented theory, decrease in the stock prices would reduce the domestic wealth lower the demand for money and low interest rate that which causes capital outflow eventually. (Ding, 2021) This implies that currency depreciation not always brings the positive impact. Hence the floating exchange rate should be managed with care.

Further, the shock of a variable will be reflected in the other variable after a certain period of time (lag) which may or may not improve the predictive power of the model. Therefore, it is recommended that policy makers should pay proper attention the "reaction" gap of policy changes in the economy. Moreover, it can be concluded that policy makers could not use exchange rate alone to make policies. However, with a well-developed machine learning model, moving forward from the initial attempt of this study, could be used as a good indicator to understand how the stock price would behave in the future.

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