

THE IMPACT OF EXCHANGE RATE ON STOCK MARKET PRICES OF SRI LANKA

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Abstract

This paper empirically investigates the long-term and short-term impact of exchange rates of Sri Lanka's stock market prices, other macro-economic variables affecting stock market prices and the causal relationships between them. Annually data from 1990 to 2019 were used. The All-Share Price Index, the nominal exchange rate, broad money, the proxy variable wholesale price index for inflation, the proxy variable bank rate for interest rates, and the GDP growth rate were used. The Augmented Dicky Fuller test has confirmed that all variables were stationary at logarithm first difference. The major periodicals analysis such as the Johnson Cointegration test and Vector Error Correction Model. It has been found that long-term correlations between variables were observed. It has been found that in the short term, Broad money is statically significant at 5% of the level, and in the long run, other than the GDP growth rate, other variables are statistically significant in the 5 percent significant level. Based on the adjustment speed coefficient, it has been found that the short-term imbalance in the All-Share Price Index due to external shocks adjusts approximately 85.5 percent each year after one year and moves towards the long-term equilibrium.

Keywords: All Share Price Index; Real Exchange Rate; Johnson Cointegration Test; Vector Error Correction Model

1.0 Introduction

The Colombo Stock Exchange is seen as a secondary market structure where investors can easily exchange shares between themselves (Samarakon, 2011). As of 30.06.2020, there are 289 companies in 20 GICS industry groups with a market capitalization of Rs. 240,467 billion. The stock market system has become an important and advanced sector in recent times and its importance in the economy has increased relatively (Badullahewage, 2018).

The positive developments in the stock market realized in an economy are a sign that the economy is growing. In fact, the stock market has always been considered the primary indicator of a country's economic strength and growth. The stock market plays an important role in economic growth as funds from credit and savings units are transferred (Naik and Padhi, 2012; Pal and Mittal, 2011).

The bomb blast in the Central Bank building complex by the Liberation Tigers of Tamil Eelam (LTTE) on 31.01.1996 badly affected the stock market, badly affecting the mood of investors (Siddeek, 1997). The surviving Sunday attack on 21.04.2019 was the main reason for the fall in stock market prices (Central Bank, 2019). It is noteworthy that the stock market was closed for a few days due to the world-threatening epidemic Covid-19 that occurred in the first quarter of 2020.

Hence the importance of the stock market at present, and the vibrations that occur in it have prompted economists to emerge as new stock market-based studies. They focus on stock market fluctuations and their financial returns (Turkyilmaz and Balibey, 2013). It is notable that the price of stocks plays an important role in changes in economic activity (Constantinescu, 2012). Just as there are some reasons for a company's stock price to rise, there are many reasons for a stock price to fall.

In general, while there are many factors that can affect the stock market structure, the influence of macroeconomic variables takes priority (Badullahewage 2018). Changes in macroeconomic variables can cause stock market prices to fluctuate (Siddeek, 1997). Almansour (2015) argues that it is important to note that macroeconomic variables are one of the factors influencing stock returns. It has been proven that the exchange rate, the wide range of cash flow industrial production, and the consumer price index influence stock market indices in the short and long term (Bekhet and Mugableh, 2012; Kumar, 2011; Rangel, 2011; Karim and Majid, 2010; Ibrahim and Aziz, 2003).

The exchange rate, which is one of the most important macroeconomic variables in the economy, is also one of the most important macroeconomic variables that determine the stock market price. Sanni and Hassan (2018) point out that the exchange rate, one of the macroeconomic variables, is seen as a very important factor in the severity of stock price fluctuations.

Each economy can be assessed for its growing or developing financial position from its currency exchange rate stability (Hassan et al., 2017). Currency rate volatility can cause shocks in the economy. This is because it negatively affects the price level, the profits of companies and the overall functioning of an economy (Sanni and Hassan, 2018). Each economy can be assessed for its growing or developing financial position from its currency exchange rate stability. Currency rate volatility can cause shocks in the economy. This is because it negatively affects the price level, the profits of companies and the overall functioning of an economy.

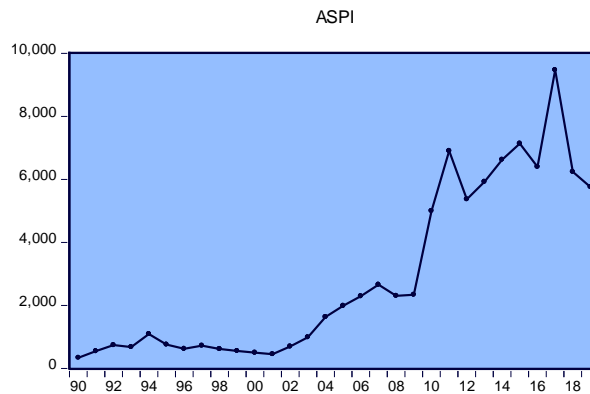
2.0 Research Problem

Financial economists, policymakers and investors have long sought to understand the dynamic relationship between the exchange rate and stock returns (Amarasinghe, 2015). The exchange rate and other macroeconomic variables influence the price of the stock market. Positive or negative changes in the macroeconomic variables can make the price of the stock market volatile.

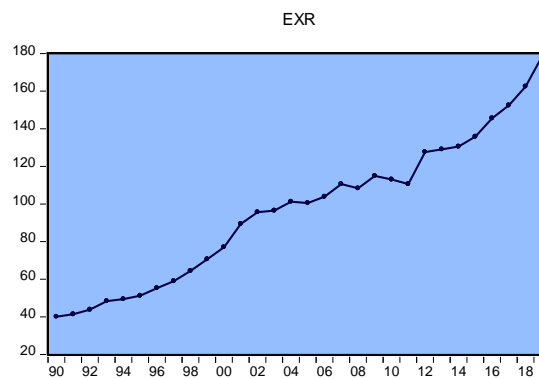
Sri Lanka's capital market has undergone tremendous changes since Sri Lanka began to pursue a policy of liberalization. Due to the significant economic growth and the peaceful political environment, the stock market recorded a strong growth in the post-war period. Nevertheless, despite the impressive economic environment, stock market growth has not continued since 2012. (Kulathunga, 2015). Everyone's attention is focused on the fact that the stock market and the exchange rate are two different concepts that play an important role in the economic growth and development of a country.

In recent years, international diversification, cross-market return correlation (OPCs), and the gradual establishment of gold have become one of the factors contributing to the gradual strengthening of barriers to investment and exchange rate controls (Mangala, 2016). Named the World's Best Stock Exchange in 2010 by Bloomberg. It did not last long. In 2012, the Colombo Stock Exchange became the second stock exchange to perform worse than Bangladesh's Dhaka Exchange, according to an analysis by the Bespoke Investment Group (Jayasundara et al., 2019).

In some cases, the Colombo Stock Exchange and the exchange rate reflect behavior that could affect the economy. So, one of the worst situations of this kind is having a negative impact. The following chart illustrates the recent trend of the All-share price index of Colombo Stock Exchange and the value of the Sri Lankan Rupee against the US Dollar, respectively.



Graph 1: All share price index of Colombo stock market (1990-2019)



Graph 2: Nominal Exchange Rate of Sri Lanka (1990-2019)

Therefore, when looking at the research problem, “all the stock price indexes of the Colombo Stock Exchange in Sri Lanka between 1990 and 2019 are found to be fluctuation and the exchange rate is on the rise”.

3.0 Research Gap

Although many studies have been published on the impact of the exchange rate on the stock market in the case of Sri Lanka, it is imperative that some of the identified research gaps be filled. The study was conducted differently from previous studies in that the duration was increased and the results of the analysis were explained by the Johansson integration test method, and changes were made in the replacement indicators for the variables.

4.0 Objective

The main objective of this study is to find out whether the exchange rate in Sri Lanka influences the stock market price. At the same time, the sub-objectives are to identify other macroeconomic variables affecting the stock market of Sri Lanka, to examine the short-term and long-term relationships between the genetic variables that influence the Sri Lankan stock market and the causal relationship between the genetic variables that influence the Sri Lankan stock market.

5.0 Important of the study

This review is as an important one. The exchange rate and the stock market price are directly or indirectly linked. This is because today the nations of the world are very closely related due to trade liberalization and globalization.

Foreign investors are keen to invest their capital in stock markets worldwide. Thus, international investment is rising rapidly and moving around the world. Investor benefits are determined by the foreign exchange rate. Uncertainty in the exchange rate can bring uncertainty in the stock market. The exchange rate is considered to be one of the most important concepts in international trade. This is because it is closely related to the trade balance during export and import transactions with each foreign country (Mangala, 2016).

Some theories found in economics also provide evidence for the relationship between stock market prices and the exchange rate. That is why it is necessary to examine these two related concepts. The traditional approach, based on explanatory theories that combine stock market prices and exchange rates, argues that the depreciation of the currency will lead to higher exports, and therefore the profits of large corporations will lead to higher stock prices in the short term. (Chirchir, 2011).

The portfolio Balanced Approach suggests that declining stock prices will lead to currency depreciation and that the flow-based model will be affected by the depreciation of the stock market and the downward trend of the stock market and the Flow oriented model suggest that the exchange rate may have a negative impact on stock market prices (Chirchir, 2011). This study will help you to better understand the exchange rate and the functioning of the stock market and will help you to find strategies to ensure their stability. It will cover the way for policymakers, investors and financial managers to come up with solutions to increase profits.

It will also be the basis for transforming the stock market into an internationally upscale market system. The results of this survey will cover the way for rapid economic development through the proper management of issues related to these two concepts. It is also worth noting that this review provides some basis for future research on the influence of the exchange rate on the stock market.

6.0 Literature Review

Using data from 23 May 2001 to 11 January 2001, Aydemir and Demirhan (2009) explores the causal relationship between stock prices and exchange rates. The study period has been selected due to the fluctuation of exchange rate base. Augmented Dickey-Fuller test, Phillips- Perron test and Kwiatkowski-Phillips-Schmidt-Shin all-in testing were performed to determine the stationary of data. The results of empirical research indicate that there is a two-way causal relationship between all stock market indices and the exchange rate. National 100, services, financials and Industrial are taken as stock price indices. The results illustrate that there is an negative causal relationship between the exchange rate and all stock market indices.

Caporale et al. (2013) examines the relationship between stock market prices and exchange rates in the six advanced economies of the United States, the United Kingdom, Canada, Japan, the Euro and Switzerland, using data on banking crises between 2007 and 2010. The VAR-GARCH model has been used. Based on the GARCH-BEKK model, it is estimated that in the United States and the United Kingdom there is a one-way causal relationship from share earnings to exchange rate, and in Canada the opposite is true, and in Euro and Switzerland there is a two-way causal relationship. The results thus obtained make it clear that investors have limited opportunities to diversify their assets during this period. (Sivarajasingham & Mustafa 2019) study employs the new science of 'econophysics' approach to explain the behavior of exchange rate between Sri Lankan rupees and Australian dollar and Visual inspection and inferential results reveal strong evidence of long memory property in the volatility of daily LKR/AUD exchange rate return.

Hussain and Bashir (2013) study using daily data to find dynamic relationships between the stock returns. The GARCH model has been used to differentiate between the exchange rate and the base of stock returns. The Johansen Co-integration test and the Granger Causality approach have been used to explore the dynamic relationship between the currency exchange rate platform and the stock return platform. The results of the study show that little evidence of a cointegration

between the exchange rate and the returns per share is based on the samples of all the countries surveyed. Furthermore, the Granger Causality has confirmed that there is no causal link between the exchange rate and stock returns in India and China. But it is also said that the null hypothesis that the exchange rate has no causal relationship to stock returns cannot be rejected.

Amarasinghe (2015) conducted a study using secondary monthly data from January 2007 to December 2013 to determine the causal relationship between stock prices and interest rates. Data on the All-share Price Index of the Colombo Stock Exchange and the interest rate are collected from the Central Bank of Sri Lanka as an indicator of stock prices. Augmented Dickey Fuller test was used to determine the stationary of the data series, the results also showed that all stock price indices and interest rates were stationary with the first difference. The Granger Causality test method was used to find the causal relationship between share income and interest rate and it was concluded that there is a one-way causal relationship between the variables. Finally, a regression model was set up to verify the results of the Granger Causality. According to the results of the post-exposure analysis, the interest rate is considered to be a factor in the changes in the share return and the interest rate is said to have a negative correlation with all the stock price index.

Badullahewage (2018) analyzes the major impact of macroeconomic factors on stock market performance in Sri Lanka. It examines all the factors that have a direct impact on the functioning of the emerging stock market. Systematically analyzed with the help of a correlation index between key factors such as inflation, GDP, interest rates and exchange rates. The data period is from 1990 - 2012 and is based on the Central Bank Annual Report and Economic and Social Statistics of Sri Lanka. Multiple regression model has been used and the log log form has been used. According to the results of the analysis, the GDP and interest rate at the 5% level and the exchange rate at the 1% level have significantly a positive impact on the All-Share Price Index. At the same time, inflation and inflation are not statistically significant. Sri Lanka's stock market performance has finally gone through many ups and downs. It is clear that inflation and exchange rates have a relatively high impact on stock market performance. It shows a fluctuation due to the immeasurable nature of these factors. The Colombo Stock Exchange claims to have seen the biggest change in its performance.

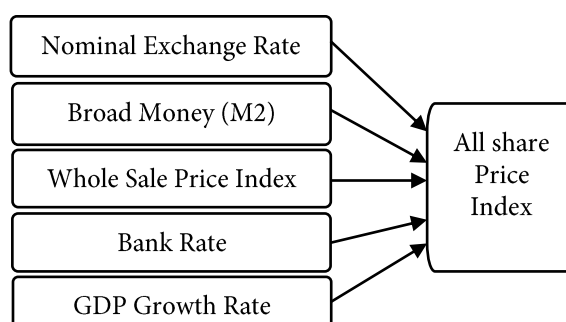
Sabeeha (2019) find the answer to the question of "Are macroeconomic economic variables affecting Sri Lanka's stock market prices?". In a study entitled, Inflation Rate, Interest Rate, Cash Flow and Exchange, explain variables have an impact on stock prices. Used monthly data from January 2006 to January 2019 for analysis. Correlation and regression analysis were used. According to the results of the study, broad money, inflation and the exchange rate have a positive and statistically significant impact on stock prices. R^2 of the estimated multiple expense equation was found to be 0.86.

7.0 Research Methodology

Conceptual Frame work

The basic stages of the subject to be studied can be better explained through the study conceptual frame work (Camp, 2001). The conceptual diagram of the study is clearly shown by the graph 03 as follows.

Graph 3: Conceptual Frame work



Operation Table

The following operation table shows the indicators of the dependent variable and independent variables used in this review and their units as shown in Table 1.

Table 1: Operation Table

Variable	Index	Unit	Abbreviation
Dependent Var	Share Price	All Share Price index (Base year, 1985)	Index
	Nominal Exchange Rate	Sri Lankan rupees against US Dollar	Rupees
Independent Variable	Money Supply	Broad Money	Million Rupee
	Inflation	Whole Sale Price Index	Index
	Interest Rate	Bank Rate	Percentage
	Gross Domestic Product	Gross Domestic Product Growth Rate	Percentage

Data and data sources

Six variables were used in the study. All of these data are seen as secondary data. This is shown below in Table 2.

Table 2: Variables and the sources from which they are derived

Variable	Source
Dependent Variable	<i>aspi</i> Colombo Stock Exchange
Independent Variable	<i>exr</i> World Bank Website
	<i>m2</i>
	<i>wspi</i>
	<i>br</i> Central Bank of Sri Lanka
	<i>gdpgr</i>

Time series data used in this study are for the period 30 years from 1990 to 2019. The study period was chosen to be longer in this study than the previous studies with the title.

Regarding the variables used in this study, Sabeeha (2019) also used all share price index in his study of the stock market. In stock market studies on nominal exchange rate; Oguzhan and Erdal (2009); Anshul and Biswal (2016) used the nominal exchange rate in their study. Sabeeha (2019); Olukayode and Akinwande (2010) used a wide range of cash in their study. Naik (2012) used the whole sale price index as a proxy for inflation in his study of the relationship between macroeconomic variables influencing the stock market. Geetha (2011) used this bank rate in his study. Jayasundara et al. (2019) also used in their study.

8.0 Data analysis

Unit Root test

The stationary test of the variables is carried out according to the results of the Augmented Dickey Fuller test. With this test, the stationary of each variable is measured by adding only the Intercept and the level (I(0)) and first difference (I(1)).

The results of the unit root test comparing its results have been obtained on the basis of the Schwartz eligibility criteria. This is shown by the table 3.

Table 3: Output of Unit Root Test

Variables	Test Statistics		Critical Value		P-Value		Stationary
	Level form	1 st Different	Level form	1 st Different	Level form	1 st Different	
<i>lnaspi</i>	-1.152104	-5.003674			0.6809	0.0004*	I(1)
<i>lnexr</i>	-1.032539	-4.724099	1% - -3.679322	1% - 3.689194	0.7279	0.0008*	I(1)
<i>lnm2</i>	-0.811711	-3.234979	5% - -2.967767	5% - 2.971853	0.8008	0.0284**	I(1)
<i>lnwspi</i>	-1.049026	-4.341014	10% - 2.622989	10% - 2.625121	0.7217	0.0020*	I(1)
<i>br</i>	-3.542642	-9.006188			0.0138**	0.0000*	I(1)
<i>gdpgr</i>	-4.018759	-7.905096			0.0044***	0.0000*	I(1)

*1% Significant Level, **5% Significant level ***10% Significant Level

The hypothesis test for unit root testing is defined as follows, according to the Augmented Dicky Fuller test.

H_0 : The series has stationary

H_1 : The series has non stationary

The results are based on the calculate value of t value in this study. At the log level the test statistical value of all share price index, exchange rate, money supply and wholesale price index are found to be lower than the critical value. So, the alternative hypothesis is rejected and the null hypothesis is accepted. It is therefore decided that the series has the non-stationary. The test calculate value of the money supply at the 5% significant level and the other three variables at the 1% significant level is found to be larger than the critical value when performing the stationary test on the first difference. So, the null hypothesis is rejected and the alternative hypothesis is accepted. It is therefore decided that the variables are statistically stationary.

The study considers the bank rate and the GDP growth rate as the first difference variable in the form of a logarithm. It has been concluded that they have a stationary as they are found to be larger than their test statistical value and critical value at the 1 and 5 percent significant levels, respectively. Therefore, ADF test has been carried out to find the long-term cointegration of the variables as all the variables follow the stationary form in the first difference. In general, the Engle Granger test method is used when the model has only one independent variable. In general, the Engle Granger test method is used when the model has only one independent variable. However, long-term relationships have been explored by the Johansson cointegration test as more than one variable has been used in this study.

Optimum lag selection

The most important step is to select the optimal lag level of the time series data after the unit root test. Based on the stationary of variables, a Vector Auto Regressive test has been carried out. The optimal lag level for variable observations has been found with the basic VAR results. They are each estimated at a 5 percent significant level. The output for the optimum lag selection is based on the results of the bellowing table. According to the conclusion of the output, the LR

eligibility criterion is one lag, the FPE eligibility criterion is three lags, and the AIC, SC, HQ eligibility criteria are four lags. Zero lag is only the present value of the variables. The lag associated with the lowest value is considered to be the optimal lag. Thus, a lag based on the LR eligibility rule has been selected as the optimal delay level for this review.

Table 4: Results of optimum lag selection

Lag	Log L	LR	FPE	AIC	SC	HQ
0	27.33275	NA	7.31e-09	-1.706620	-1.414090	-1.625485
1	63.14696	51.57246*	8.14e-09	-1.691757	0.355954	-1.123809
2	101.8836	37.18721	1.17e-08	-1.910691	1.892201	-0.855931
3	184.6037	39.70561	2.42e-09*	-5.648293	-0.090219	-4.106719
4	4597.787	0.000000	NA	-355.8230*	-348.5097*	-353.7946*

(Here ‘*’ refers to the number of optimistic lags recommended by each optimization selection rule).

Johansen Cointegration Test

The Johansen Cointegration test method has been used because of the use of a model with more than one variable for this study. This test method is used to determine the number of cointegration and to determine the long-term relationship between variables. Non stationary variables will be used during this test. The results obtained can provide two types of results and present interpretations accordingly. Accordingly, the results of the Johansen Cointegration test method are shown in the table 5.

Table 5: Results of the Johansen Cointegration

Result	Hypothesized	Trace Statistic/ Max-Eigen Statistics	0.05 Critical Value	Prob.**
Trace	None *	136.9262	95.75366	0.0000
	At most 1*	75.99642	69.81889	0.0148
	At most 2	45.64884	47.85613	0.0794
	At most 3	24.20288	29.79707	0.1920
	At most 4	12.01813	15.49471	0.1561
	At most 5 *	4.363565	3.841466	0.0367
Maximum Eigenvalue	None *	60.92982	40.07757	0.0001
	At most 1	30.34758	33.87687	0.1246
	At most 2	21.44596	27.58434	0.2502
	At most 3	12.18475	21.13162	0.5295
	At most 4	7.654568	14.26460	0.4149
	At most 5 *	4.363565	3.841466	0.0367

(* refers to the rejection of the witch hypothesis at the level of 5%)

Here, the results were obtained as two cointegration based on the Trace statistics at the 5 percent significant level and one cointegration based on the Max-Eigenvalue results. Therefore, based on the above results, it has been concluded that the model for this study has a cointegration based on the Trace statistics and that there is a long-term correlation between the variables. The sample was further evaluated by the Vector error correction model.

Long run relationship

The equation for the long-term model has been developed based on the results obtained by the Johansen Cointegration test. An equation for a long-term relationship is found with respect to the model. The explanation is given on this basis. Thus the estimated equation for long-term cointegration is shown by the following equation (01).

$$\begin{aligned}
 [1] \quad \ln aspi_t &= 1.429495 \ln exr_t^* - 0.911638 \ln m2_t^* - 0.487270 \ln wspi_t^* + 0.077677 br_t^* + 0.013392 gdpgr_t \\
 &\quad (0.12799) \quad (0.09912) \quad (0.16491) \quad (0.01316) \quad (0.01110) \\
 &\quad [11.16880] \quad [9.19732] \quad [2.95476] \quad [5.90250] \quad [1.20649]
 \end{aligned}$$

(Here, () stands for standard error and [] stands for calculated value)

In the long run, the exchange rate of the stock market, the money supply, the wholesale price index and the banking rate are statistically cointegrated at the 1 percent level. At the same time, the growth rate of GDP has not had a significant cointegration with stock market prices in the long run. When looking at the coefficients in the estimated long-term equation, the exchange rate and the banking rate have a positive impact on the stock market price over the long term, while the money supply and wholesale price index have a negative impact.

A one percent increase in the exchange rate over the long term, while other factors remain unchanged, will increase the stock market price by 1.429495 percent. That is, an increase in the depreciation of the exchange rate or the appreciation of the Sri Lankan rupee against the US dollar is driving up stock market prices. At the same time, an increase in the value of the currency or a depreciation of the Sri Lankan rupee against the US dollar will reduce stock market prices.

Similarly, a one percent increase in the bank rate over the long term, while other factors remain unchanged, will increase the stock market price by 0.077677 percent. On the other hand, a one percent increase in the money supply and wholesale price index over the long term, while other factors remain unchanged, reduces the stock market price by 0.911638 and 0.487270 percent, respectively.

Short run relationship

The VECM is used because it is determined that there is a cointegration relationship based on the results obtained from the Johansen Cointegration. The estimated short-run equation (02) based on the VECM result is formed.

$$\begin{aligned}
 [2] \quad \ln aspi &= -0.833543 + 0.349129 d(\ln aspi(-1)) + 1.43622 d(\ln exr(-1)) + 5.320646 d(\ln m2(-1))^{**} + \\
 &\quad 0.232738 d(\ln wspi(-1)) - 0.009854 d(br(-1)) 0.018790 d(gdpgr(-1)) \\
 &\quad \text{(Here ‘*’ means statistically significant at the level of 5 percent.)}
 \end{aligned}$$

The value of the All-Share Price Index of the Colombo Stock Exchange will fall by 0.833543 percentage per annually while all other factors remain unchanged in the short run. It describes the annual average base when other factors are constant. Based on the estimated equation for the short run, the exchange rate, money supply, wholesale price index and GDP growth rate on the Colombo Stock market; Have a positive impact and a bank rate has a negative impact.

The results can be determined by comparing the calculated value of the estimated coefficients with the critical value. As such, the calculated value of the money supply is higher than its critical value, so last year's money supply has a statistically significant impact on the current stock market level of 5 percent. This means that in the short run, the money supply will increase by one percent while the current stock market price will increase by 5.320646 percent. It is noteworthy that the other four variables, apart from this one, were found to have no significant impact on the stock market price in the short run. Therefore, only the money supply of the variables included in the model has an impact on the stock market price in the short run.

Adjustment speed coefficient is considered to explain the long-term adjustment. The value of this coefficient, standard error, and the calculated value are found to be -0.855375, (0.33565), [-2.54845] respectively. Therefore, this coefficient is statistically relevant as it is found to be negative and less than one. It is also significant at the 5 percent level. So, the short-run imbalance in the All Share Price Index due to external shocks may be adjusted to approximately 85.5 percent each year after one year and move towards the long-term equilibrium.

Causality Test

The statistics on causal relationship based on the results of causality test obtained are shown in Table 6 as follows

Table 6: Test results of causal relationship

Dependent Variable D(LNASPI)		Dependent Variable D(LNEXR)		Dependent Variable D(LNM2)	
D(LNEXR)	0.6634	D(LNASPI)	0.1029	D(LNASPI)	0.1817
D(LNM2)	0.1504	D(LNM2)	0.1828	D(LNEXR)	0.9700
D(LNWSPI)	0.9751	D(LNWSPI)	0.5065	D(LNWSPI)	0.8690
D(BR)	0.4257	D(BR)	0.0283**	D(BR)	0.9420
D(GDPGR)	0.6734	D(GDPGR)	0.8324	D(GDPGR)	0.3680
All	0.5592	All	0.0281	All	0.7849
Dependent Variable D(LNWSPI)		Dependent Variable (BR)		Dependent Variable (GDPGR)	
D(LNASPI)	0.8498	D(LNASPI)	0.6227	D(LNASPI)	0.1066
D(LNEXR)	0.3028	D(LNEXR)	0.8792	D(LNER)	0.4344
D(LNM2)	0.4670	D(LNM2)	0.8263	D(LNM2)	0.5748
D(BR)	0.4509	D(LNWSPI)	0.5978	D(LNWSPI)	0.6001
D(GDPGR)	0.8570	D(GDPGR)	0.6093	D(BR)	0.0856***
All	0.7454	All	0.6093	All	0.0045

(** 5% significant level, *** 10% significant level)

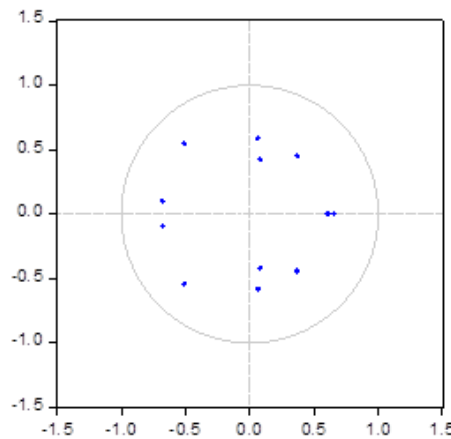
It is also worth noting that the results show that the past values of independent variables do not have a significant causal relationship to past stock market prices. Apart from these, it can be determined that the past bank rate has a statistically causal relationship over the past exchange rate of 5 percent and the past bank rate over the past GDP growth of 10 percent. So, it is possible that only two such causal relationships can be identified.

Stability Tests

Some tests may be needed to test the suitability of the samples, the variables embedded in the study, and the accuracy and reliability of the analysis results. The overall study will be considered as an appropriate study when making confirmations through such tests. Some such basic test has been carried out in this study as well.

Output of Inverse Roots of Characteristic Polynomial

Diagram 1: Inverse Roots of Characteristic Polynomial



The diagram can be used to identify whether the results of VECM test defined. On this basis the relevance of the level of truth can also be ensured. Since all the level values of the VECM test values defined in the diagram are located within the defined circle, it is possible that the estimated model follows the consistency process. As well as the fact that the arc of the finite circle is intertwined on the basis of the absolute magnitude of the horizontal and vertical constants, it is possible to ensure that one is chosen as the optimal lag level.

Autocorrelation LM test

This test method is carried out to examine the uniform trend of time series data. The hypothesis for examining the problem of autocorrelation and finding its solution is therefore defined as coming.

H_0 : There is no autocorrelation

H_1 : There is autocorrelation

Table 7: Autocorrelation test results

LRE* stat	Prob.	Rao F-stat	Prob.
27.07771	0.8584	0.679980	0.8803

Probability value or test statistics value can be used to test the result. Here we can accept the null hypothesis that there is no autocorrelation because the probability value is higher than the 5 percent significant value. It is therefore concluded that the model is not affected by the autocorrelation.

Normality Test

This test is find out whether the residual normal or not normal. Based on the results obtained from this test, especially the Jarque-Bera estimate is based on the probability values of the normality distribution test.

H_0 : Residual is normally distributed

H_1 : Residual is not normal distributed

Table 8: Output of Jarque-Bera normality test

Component	Jarque-Bera	df	Prob.
1	2.080244	2	0.3534
2	0.492954	2	0.4740
3	0.860365	2	0.6504
4	0.652947	2	0.7215
5	0.278456	2	0.8700
6	0.060703	2	0.9701
Joint	5.425669	12	0.9422

Based on the test results, we accept the null hypothesis that the residual is normally distributed since the probability value at the level of 5 percent. Overall, the probability value is found to be 0.9422 higher than the 0.05 significant value. Therefore, the residual is normally distributed with zero mean and constant variability ($(e_i \sim N(0, \delta^2))$).

Heteroscedasticity

The hypothesis for this testing is given below.

H_0 : Error variances are all equal

H_1 : Error variances are not all equal

Table 9: Output of Heteroscedasticity

Chi-sq	df	Prob.
299.2204	294	0.4046

Probability value or tested relevance value can be used to test the result. Since the probability value here is found to be higher than the 5% significant value, we will accept the null hypothesis that the model does not have a Heteroscedasticity problem. so the model is homogeneous or Error variances are all equal.

9.0 Suggestions

The Government of Sri Lanka should cover the way for Sri Lanka's Colombo Stock Exchange to be of international standard and to create opportunities for close contact with other well-performing foreign stock exchanges. The central bank should find a way to reduce the exchange rate base by managing the exchange rate properly and contribute to the corresponding stock market growth and reduce the base level of stock market prices by safeguarding the stability of the other macroeconomic variables considered in the study.

Only five variables are included as macroeconomic variables. It is necessary to examine the macroeconomic variables that are not included in the model, such as foreign direct investment, the price of gold, the price of oil and the balance of payment. In view of the war situation in Sri Lanka, studies should be carried out in this regard in the future along with the variable. The implications of macroeconomic variables in all stock price indices and other stock price indices should be examined separately. Such a research topic should be explored in other methods as well. Monthly data should be considered in the study and the study should be conducted over a long period of time. It is imperative that such a study be carried out in the future by removing the definitions found in the study and combining such issues. This will allow

researchers to write conclusions that are relevant in the future. That is, the terminal should be able to obtain strong results through variables, data, and research methodology.

Furthermore, the fact that the survey is based on predictions may lead not only to investors but also to those who depend on it through the stock trading process. Monetary authorities should try to formulate policies that keep the exchange rate stable, competitive, and stimulate financial investment in the stock market.

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