

# The Relationship between Exchange Rate and Stock Market Performance: Empirical Evidence from Sri Lanka

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## Abstract

The stock market is one of the fastest-growing sectors in the world at present. Such a stock market can be seen growing in Sri Lanka as well. The performance of a stock market is affected by various factors. Among those factors, foreign market stock prices, GDP, corporate performance, and the exchange rate are important. Of these, the exchange rate is the crucial one. Data of exchange rate depict the increasing pattern over time while stock market performance shows high fluctuation in Sri Lanka. Thus, this research aims to identify the impact of the exchange rate on the performance of the Colombo Stock Exchange (CSE). For

this purpose, we used price index of all stocks, exchange rate, inflation, foreign direct investment, and interest rate as the variables. We employed annual secondary data from Central Bank of Sri Lanka over the period of 1985 – 2018. The Augmented Dickey Fuller and Phillips Perron unit root tests approaches confirmed that none of the variables are I(2) which allows us to examine the long-run relationship between the variables using Auto-Regressive Distributed Lag (ARDL) bounds testing method. AIC is suggested to employ ARDL(1,1,0,4,4) model among the top 20 models. The bounds testing results detected the cointegrating relationship between the variables. Our results also suggest that there is no correlation between exchange rate and all share price indexes in the long run, whereas there is a positive relationship between exchange rate and all share price indexes in the short run. Inflation has a positive impact on all share price indexes in the long run while it does not have significant impact on all share price indexes in the short run. Moreover, the interest rate has a negative and weakly significant impact on all share price indexes both in the long run and in the short run. The Granger causality test indicates that there is a unidirectional causality between the price index of all stocks and the exchange rate. Therefore the results of this research emphasize that the exchange rate can be used as a policy tool to increase stock market performance.

**Keywords:** Stock Market, All Share Price Index, Exchange rate, Auto-Regressive Distributed Lag Model, Sri Lanka

## 1. Introduction

A stock is a license for a part of a company or business. Each listed company will divide its financial investment into several parts. Stocks are the allotment of the required shares to each claimant in the company. Thus, the market that sells and buys shares is called the stock market. That is the market in which the company mobilizes the financial investment it needs in public. The company may be private or state-owned.

There are two types of stock markets such as the primary market and the secondary market. If a company wants to sell shares in the stock market first, the private company must become a public company. The first company to come to the stock market in this way is called an IPO (Initial Public Offering). Thus when the shares purchased in the primary market are sold to the secondary market, small and private investors will engage in stock exchanges about the public stock. In short, by engaging in component trading, companies gain the investment they need and investors gain the ownership of the company they want. Such a stock market is becoming a widespread buzzword globally today.

The Mumbai Stock Exchange (CSE) is arguably the first and foremost stock exchange in Asia. It was started in 1852 and operates as a market with 5400 listed companies. Such a stock market can be seen growing in Sri Lanka as well. The reason for its rapid growth is the opportunity to make money working from where it used to be. The Colombo Stock Exchange plays a major role in Sri Lanka. Of these, 190 companies are listed and found. All companies use an index called the All Share Price Index (SPI) to indicate the movement of these companies and an index called S&P SL20 to select the top 20 of these companies.

Various factors influence the performance of such a stock market. In particular, stock prices in the foreign markets, GDP, corporate performance, and the exchange rate. Of these, the exchange rate is the main one. In particular, the exchange rate and the stock market are the major factors influencing a country's economic growth.

The exchange rate is that the rate at which one country's currency is changed into another country's currency. The currency exchange rate can be defined as simply valuing a foreign currency in the value of the component's domestic currency. Especially since 1997 when the open economic policy came into force in Sri Lanka the need for an exchange rate has become essential. Accordingly, the floating exchange rate policy was followed from 1997 to 2001. During this period there were many changes in the exchange rate. In particular, the value of the Sri Lankan rupee has been steadily declining. Thus, the average Sri Lankan value of one dollar was 28.0175 rupees in 1989. It changed from 40.0629 rupees in 1993 to 89.3628 rupees in 2001. After this, the value of the dollar which was 113.0647 rupees in 2010 will be 178.7776 rupees in 2019 (Central Bank Annual Report, 2019). So we can see that the Sri Lankan rupee is depreciating.

The continuing increase in world trade and capital movements has made the exchange rate one of the key factors in determining the profitability of stock prices. Changes in the exchange rate directly affect the international competitiveness of companies. The depreciation of a country's currency will be to the advantage of importers. That means those who import inputs into the country can make a profit. And those who buy output products from that country also have the opportunity to make a profit. The reason is that the output products are found at cheaper prices. This will lead to an increase in the income of the companies buying the export and increase the average level of stock prices.

In addition, several studies examined the relationship between exchange rate and stock market performance. Some studies have shown that the exchange rate does not affect the stock market (Suriani et al; 2015, Agarwal et al; 2010) and some other studies have the opposite effect on the two variables (Kumaran Khan; 2019, Sabariah et al; 2014, Makan; 2017), few studies indicate that there is a short-run relationship between these variables and no long-run relationship (Gopalan Kutty; 2010). So, different studies have different conclusions.

Therefore, it is necessary to explore the relationship between these two variables in Sri Lanka using relevant data and the most appropriate econometrics techniques. Further, in the case of Sri Lanka, the stock market and the exchange rate are generally flat. These can be seen to be subject to various changes on a daily. And there is no clear idea of the relationship between these two variables. Therefore, it is necessary to find out whether the exchange rate in Sri Lanka has had an impact on the stock market performance. Thus, this study aims to examine the relationship between the exchange rate and the performance of the stock market in Sri Lanka.

## **2. Literature Review**

The review of theoretical literature helps to understand the real relationship between variables

in a study. Since no direct theoretical explanations are found for this research topic, theories aimed at indirectly relating these variables are intended here.

First is the Effective Market Hypothesis (EMH). An Effective market is a market where all the information related to property prices is available to the borrower and lender at a very low cost. Thus no opportunity for profit to work here will be missed. As well as, the available information will be fully utilized without wastage. Also, like the stock market, every investor here will act rationally. As well as, here is the actual market price that appears to reflect all available information. Generally, no one can work for profit just because the information is equally available to everyone in this market. So here the expected effect and the actual effect are found to be equal. Here, the expected effect of increasing risk increases when investing in financial assets.

Next, Rational expectation theory is important to pay attention to this as the interest rate is to be used as an independent variable in this study. This is the modern theory that has emerged about interest rate determination. The theory is that if there is a change in prices and interest rates over some time, it is because of the unexpected availability of information. However, the changes here will be adjusted very quickly. Therefore, the trend of future prices can be predictive of interest rate changes. Thus the theory of rational expectation in interest-related theories seems to be related to our topic.

Further, the review of previous studies also aids in gaining a broader knowledge of the research being conducted, organizing the study, identifying the research methodology, and making recommendations. Although various studies have been conducted in this regard focusing on the effect of the exchange rate on the performance of the stock market, only a few important studies that are most relevant to our research topic are reviewed here. These studies include studies conducted worldwide and; Studies conducted in Sri Lanka are viewed here separately. Focusing on Sri Lanka, Rajapakse (2019) employed using the secondary quarterly data from 2004 to 2018 to determine the impact of foreign direct investment and the exchange rate on the performance of the stock market. Using, the granger causality test they found that FDI inflows and exchange rates do not have a significant impact on stock market performance. Menike (2006) conducted a study to fully explore the impact of economic variables on stock prices using the secondary monthly data from 1991 through 2002 based in Sri Lanka. The hypothesis test has been used to analyze the data. The study concludes that exchange rate and inflation have a major negative impact on stock prices.

Moreover, Nijam et al. (2015) conducted a study aimed at examining the relationship between stock market performance and economic variables in Sri Lanka. The research used secondary data from 1980 to 2012 and concluded that GDP has a positive effect on stock prices, while interest rates, exchange rates, and inflation harm the equilibrium. Next, Kumaran-Khan (2019) explored the impact of currency exchange rates on stock market earnings and short- and long-term relationships using data from China. The study concludes that exchange rate, interest rate, and inflation have a statistically negative impact on the earnings of the stock markets in the short run and long run. The secondary monthly data for the period 2008-2018 were used in this study and the data were analyzed using the ARDL

model.

Narhafiza and Ismail (2014) investigated the impact of commodity prices, interest rates, and exchange rates on stock market performance in the Malaysia using the data for the period 1996-2014. The data was analyzed using the causality test, which has concluded that economic variables such as commodity prices, exchange rate as well as interest rate negatively affect the performance of the stock market. Further, Makori (2017) conducted a study using annual time series data for 10 years (2006 to 2016) to examine the impact of the exchange rate on the performance of the stock market in Nairobi. Using a causality test, the study concluded that there was a significantly negative correlation between the exchange rate and the performance of the stock market. In particular, he said that the exchange rate would have an impact on the performance of the stock market, but the stock market would have no impact on the exchange rate. So there may be a one-way causal relationship here.

Rabia and Khakan (2016) examined the effects of stock exchange movements on the impact of the exchange rate. Time series data for the period 2008-2010 were employed in this study. The study concluded that the exchange rate has a negative relationship with the movement of the stock market. Another study has conducted by Suriani et al. (2015) employing Pakistan's monthly secondary data from 2004-to 2009. This study aims to understand the relationship between the exchange rate and the stock market. Using the ARDL model, they concluded that there was no correlation between the exchange rate and the performance of the stock market. Bagh et al, (2017) examined the impact of the exchange rate on the stock market based on Pakistan data from 2003 to 2015. The study concluded that the two variables are statistically closely related. Further, Olugbenga (2012) conducted a study that examined the exchange rate effects on the growth of the stock market-based in Nigeria using time series data for the period 1985-2009. Johnson cointegration test and the Granger Causality test were used to analyze the data. They concluded that the exchange rate has a positive impact on the performance of the stock market in the short run and a negative impact in the long run. Merchri et al. (2013) conducted a study to identify the impact of currency exchange rates on stock market fluctuations based on Tanzania and Turkey by adopting monthly secondary data from 2002-to 2017 periods. The data were analyzed using the ARCH and GARCH models. The study concluded that the exchange rate effect on stock market prices has not been adequately explained. Similar to these studies, Adebisi et al. (2009) also examined the impact of oil price shocks and the effect of the exchange rate on stock market returns in Nigeria using the data for the period 1985-2008. This study suggested that the stock market has a positive impact on oil prices.

By Indian daily data for the period 2007-2009, Agarwal et al. (2010) examined the relationship between stock market returns and exchange rate. The data was analyzed using the granger causality test and concluded that there is a negative correlation between stock market returns and exchange rates. That is, the exchange rate will have an effect on stock market activity but the stock market's activity will not have any impact on the exchange rate. Okwuchukwu (2015) investigated the impact on the stock market performance due to the exchange rate, foreign direct investment (FDI) in Nigeria using the data 1980-2003 periods. The study identified that there is a negative link between FDI and the exchange rate, which

has a positive relationship with the performance of the stock market. In addition, Babatunde et al. (2017) examined the relationship between the exchange rate, the stock market performance, and its total output using the Nigerian quarterly data over the period 1985-2015 and ARCH, and GARCH models. The results of this study depict that the exchange rate had a positive impact on the performance of the stock market and the overall output.

Moreover, Bhuvaneshwari and Ramya (2017) examined how the exchange rate and stock market prices affect one another employing the data from India over the period 2006-to 2015 using the Johanson cointegration test and the Granger causality test. This study concluded that there was no interaction between variables in the long run but that causal correlation between variables was found to be meaningful in the short term. Gopalan Kutty (2010) conducted a study based in Mexico to examine the relationship between stock price and exchange rate. The data obtained, in this study were analyzed by the Granger causality test and VAR method. This study concluded that there is a short-term correlation between the two main variables (the stock market return, and the exchange rate), and that there is no long-run correlation.

Focusing on India, Bhunia (2019) employed secondary data from April 02, 2001, to March 31, 2011, to examine the causal relationship between the share price and the exchange rate. According to the results of this study, the exchange rate has a positive impact on technical indicators and a negative impact on stock market indicators. He also observed a two-way link among the variables. Kisaka and Mwasuru (2006) conducted a study to examine the relationship between foreign exchange rates and stock prices using the secondary monthly data from November 1983 to May 1999 based in Kenya. The cointegration test and Granger causality test have been used to analyze the data. The results of the study show that two main variables are cointegrating significantly. Moreover, Aslam (2015) aimed at examining the impact of the exchange rate on the conversion of stock market returns in Pakistan. The study uses time-series data from January 01, 2006, to December 31, 2012, and concludes that there is a negatively two-way correlation between the variables.

Next, Kandy and Nourzed (2016) conducted a study based in the USA. The study examined how the exchange rate affects the stock market and changes its returns. The study concludes that the exchange rate was found to have an impact significantly on stock market volatility. The secondary daily data from January 01, 1999, to January 25, 2010, were used in this study, and the data were analyzed using the GRACH model, and OLS regression. Ishan and Baloch (2015) investigate the relationship between the exchange rate and the Karachi Stock Exchange (KSE) on the Pakistan data from September 2012 to May 2014. The data was analyzed using the Granger causality test, and the Johansen cointegration model. It has been concluded that there is no correlation between the exchange rate and the Karachi Stock Exchange. Further, Hussain and Bashir (2013) conducted a study using daily time-series data from 2007-to 2012 to examine the dynamic links between the volatility of the exchange rate and the volatility of stock market earnings based on Pakistan, India, and China (PIC) Asian countries. Using the GRACH model, and Johansen Cointegration test, the study concluded that there was no correlation between the exchange rate and the stock exchange. Ayedemir and Demirhan (2009) conducted a study to explore the causality relationship between stock

prices and the exchange rate using the secondary monthly data from 23 February 2001 to 11 January 2008 based in Turkey. The results of the study show that the exchange rate is said to have a negative causal relationship with all stock market indicators.

According to a review of previous studies mentioned above, using related variables to this study, studies have been conducted based in Sri Lanka, India, Pakistan, China, Malaysia, Nigeria, Turkey, Kenya, Tanzania, Nairobi, USA, and South Africa. Even there are limited studies on the performance of the stock market in Sri Lanka that do not give enough concern to the impact of the exchange rate in Sri Lanka. Therefore, this study attempts to fill this gap by investigating the influences of the exchange rate on the performance of the stock market in Sri Lanka.

### **3. Trends of the Stock Market and Exchange Rate in Sri Lanka**

#### *3.1 Trends of the Stock Market in Sri Lanka*

The Colombo Stock Exchange is the only stock exchange in Sri Lanka. According to reports, the stock market in Sri Lanka has been in operation since 1896. The stock market in particular was a closed entity created for the financing of British plantation companies. It was opened to the public in 1984. During this time the open screaming system (Open outcry) was introduced.

The stock market was renamed the Colombo Stock Exchange (CSE) as defined in 1990. This was followed in 1991 by the introduction of the formal central deposit system to expedite stock market operations and relocated to the World Trade Center in 1995. In particular, in 1998, it became the 52nd member of the World Federation of Exchange. It is also the first South Asian market to join the system. Apart from this, the Asian Federation of Exchange (SAFE) plays an important role in the stock exchange of South Asian countries. The Milankachutty was introduced in 1999. This was followed by the introduction of the Gross Revenue Index in 2004.

Similarly, the Colombo Stock Exchange is located on the fourth floor of the World Trade Center, near the Bank of Ceylon headquarters in Colombo. It has four branches. It was started in 1999 in Matara, in 2003 in Kandy, and in 2010 in Jaffna. Apart from this, a branch of this is also located in Kurunegala. There are several indicators to explain the trend toward this stock market. Chief among them is the price index for all stocks. It includes the prices of all the shares traded daily and is comparable to 1985. Its base is 100. As well as the Milankachutty is an indicator. It is a Sinhala word meaning price number. It is used to know the price level of the companies that engage in the most transactions in the market. Its base is 1000. In addition, the S&P SL20 indicator is also used.

The stock market is open from 9.30 am to 2.30 pm on weekdays. It has a capital inflow of \$ 497 billion as of mid-2005. The Colombo Stock Exchange has seen tremendous growth, especially since the 2001 ceasefire agreement. The ASPI, which was 500 in 2001, crossed the 3000 mark on February 13, 2007. The daily average sales turnover is 776.8 million. This is the trend of the Sri Lankan stock market.

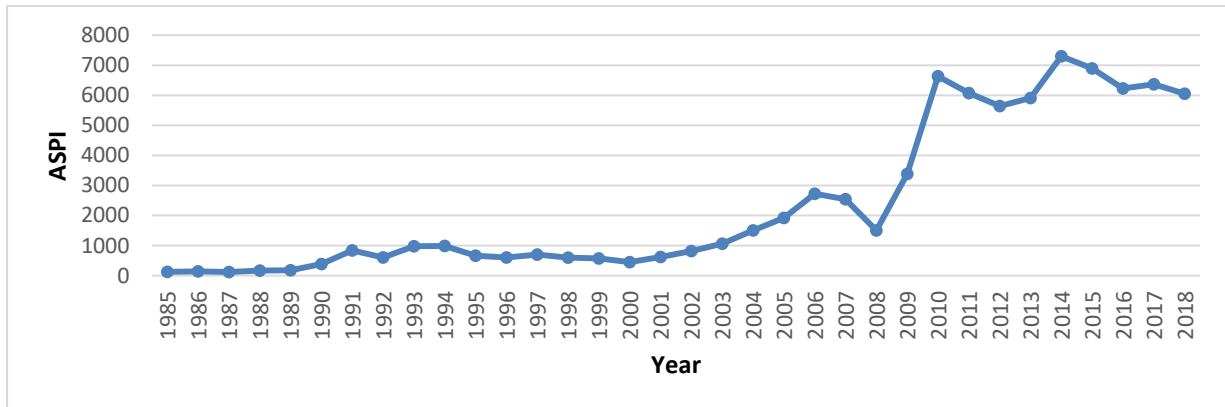


Figure 1. Trend of Stock price indicator in Sri Lanka (1985 - 2018)

Source: Estimated by Authors using CBSL data

As shown in this diagram we can see that the price trend of all stocks has an increasing trend with the base level. As already mentioned, many factors will influence the course of this.

### 3.2 Trend of Exchange Rate in Sri Lanka

The exchange rate is the value of a unit of domestic currency denominated in the value of a foreign currency. It is mainly classified as nominal exchange rate and real exchange rate. Such an exchange rate is further divided into two categories based on the method by which it is specified.

**Direct system** - Direct system is the number of foreign currency units required for a domestic currency unit.

**Indirect system** - Indirect system is the number of domestic currency units required for a foreign currency. Thus the indirect method is mostly used in Sri Lanka.

It has a long history when it comes to Sri Lanka's exchange rate. In particular, we can see that there have been many changes in the exchange rate from 1950 to the present. There are three major changes. They are,

#### 3.2.1 Fixed Exchange Rate System (1950 - 1977)

A fixed exchange rate system is a system of exchange rates determined by the Central bank or monetary authorities. Under this system, the exchange rate is not subject to any change due to the demand for foreign currency in the foreign exchange rate market. Fluctuations in the value of the currency under a fixed exchange rate are the most important aspect. The depreciation of the sterling pound in particular directly affected Sri Lanka. As a result, in 1949 the Sri Lankan rupee depreciated by 30.52 percent. From 1950 to 1966 the balance between the Sri Lankan rupee and the sterling pound was 13.33 and the exchange rate between the rupee and the dollar was 4.77. Similarly, in 1967, the rupee depreciated by 20 percent to balance the balance of interest.



Thus the dual exchange rate system was introduced in 1968 with the introduction of the Peaks scheme to supplement the devaluation of the exchange rate. This system is called the Foreign Exchange Entitlement Certificate- FEEC. Another aspect is the exchange rate of the Sri Lankan rupee against various foreign currencies. These include gold in the 1949s, a basket of coins in the 1970s, the dollar in the 1971s, and the sterling pound in the 1972s.

### 3.2.2 Flexible Exchange Rate System with Control (1978 -2000)

The period from 1978 to 2000 was the period when the flexible exchange rate system with control was followed in Sri Lanka. That is, the value of the Sri Lankan rupee has continued to appreciate since the introduction of the open economic policy in 1977. Although the exchange rate was kept afloat during this period, it was under the control of the Central Bank which helped to control the exchange rate base. Hence it was called the Controlled Exchange Rate System. The introduction of this liberal policy has led to three major reforms in the exchange rate. They are

1. Abandon the FEEC and CRA schemes and consolidate the rupee exchange rate.
2. To reduce the value of the rupee by 42 percent.
3. Significant reduction in the conceptual area of the foreign exchange control system.

In addition, in November 1977 the dual exchange rate system was abolished and the single exchange rate system was introduced with a devaluation of 46%. That is, the dollar was fixed at 16 rupees and a controlled exchange rate system was introduced. In 1987 the exchange rate policy was determined by the Real Effective Exchange Rate (REER) Index based on the basket of trading partner currencies. Furthermore, in 1988 the currency exchange rate was expanded to accommodate both trading partners and rival currencies. In addition, in August 1990, the central bank announced the pro-US dollar exchange rate at the beginning of each day. In 1992 the exchange rate increased by a further 1 percent. In addition, all restrictions on the current account were relaxed in 1994 and in 1995 all restrictions on the capital account were completely relaxed. As a result, the currency depreciated further by 2 percent.

### 3.2.3 Independent Floating Flexible Exchange Rate System (2001 - present)

The Independent floating flexible exchange rate system has been in place since January 23, 2001. The Sri Lankan rupee appreciated in anticipation of the massive foreign exchange inflows aimed at helping the people affected by the 2005 tsunami and rebuilding the affected areas. However, from late 2008 to mid-2009, Sri Lanka faced a major challenge due to the shortage of foreign exchange rates. As a result, the rupee depreciated to 125.25 against the United States dollar in Apr 2009. After the end of the war in 2009, the inflow of foreign exchange increased under the alternative regulation by the International Monetary Fund. Following this, the value of the rupee was revalued at 110.25 rupees. Therefore, a controlled and pure flexible exchange rate system was observed. After this, we can see that the exchange rate value is gradually depreciating. Further, it is 113.06 rupees in 2010, 135.94 in 2015, and 162.54 rupees in 2018.

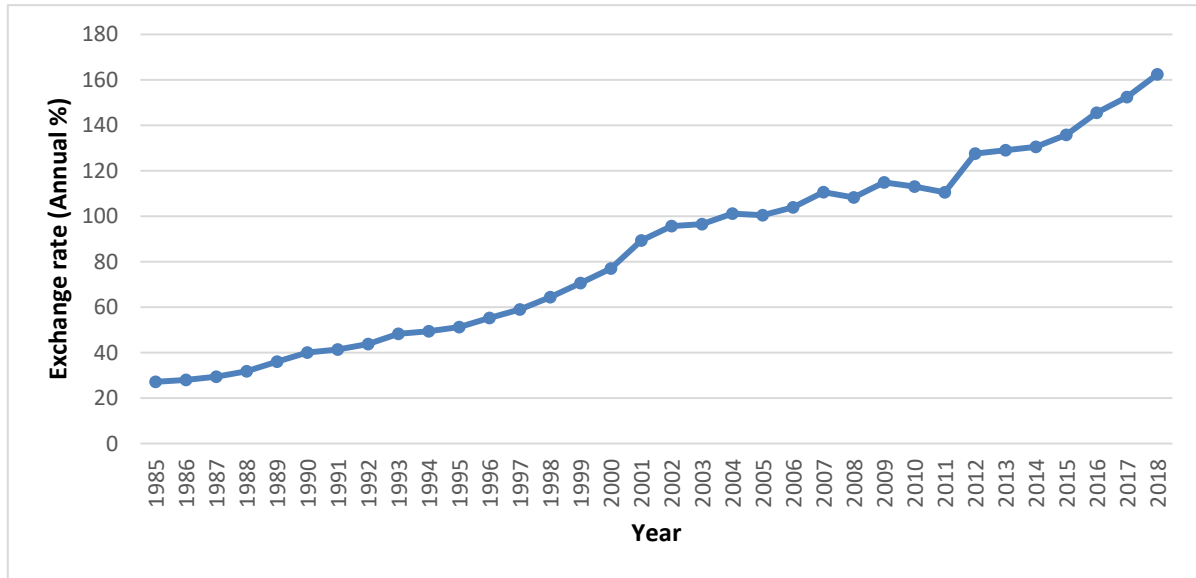


Figure 2. Trend of Exchange rate in Sri Lanka (1985-2018)

Source: Authors' estimation by CBSL report.

The above graph indicates the increasing growth of the exchange rate.

The scatter graph method is used to find the correlation of independent variables on the index of all stocks.

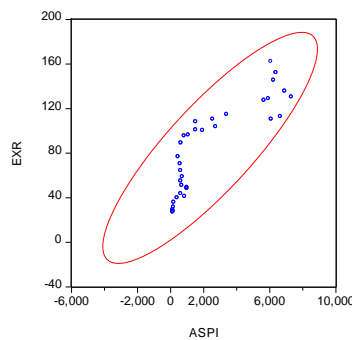


Figure 3. Correlation between the price index and the exchange rate of all stocks

Source: Estimated by Author

The scatter diagram illustrates that the confidence ellipse has a direct correlation between the index of all stocks and the exchange rate.

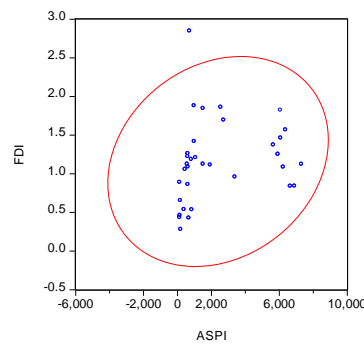


Figure 4. Correlation between the price index of all stocks and foreign direct investment

According to the scatter chart, the confidence ellipse stands for the direct correlation between the price index of all stocks and foreign direct investment.

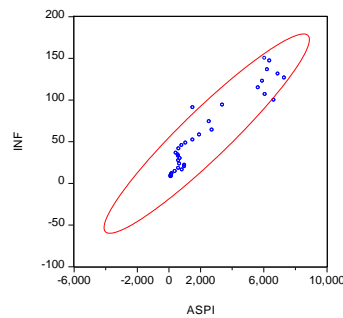


Figure 5. Correlation between all stock prices and inflation

Source: Estimated by Author

According to the scatter chart, the ellipse of optimism stands for the direct correlation between the inflation of all stocks and inflation.

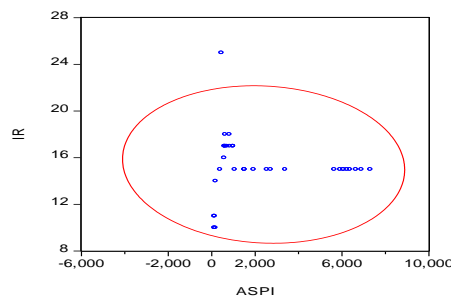


Figure 6. Correlation between the price index of all stocks and the interest rate

Source: Estimated by Author

According to the scatter chart, the confidence ellipse stands for the negative relationship

between the index of all stocks and the interest rate.

Finally, the performance of the stock market is a major source of economic growth in Sri Lanka, and the exchange rate has been a key factor in determining the stock price.

#### 4. Data, Variables, and Methodology

Annual time-series data on the price index of all stocks, exchange rate, inflation, foreign direct investment, and interest rate, which cover the 1985-2018 period, have been used in this study for the analysis. Due to the availability of data for variables that we have considered in this study, we have limited to above-mentioned period as the study period. The price index data of all stocks are extracted from the World Development Indicator's reports of the World Bank database while all other variables data are collected from the Central Bank of Sri Lanka Annual report.

In examining the effect of the exchange rate on the performance of the stock market, the model can be defined as follow:

$$ASPI_t = \alpha_0 + \alpha_1 EXR_t + \alpha_2 IR_t + \alpha_3 INF_t + \alpha_4 FDI_t + u_t \quad (1)$$

Where,  $\alpha_i (i = 0, \dots, 4)$  are the slop coefficients and  $u_t$  is the white noise error term. Variables are as described above.

First, this study employs ADF and PP unit root test techniques to check the stationarity property of each variable. When series are integrated at I(0) and I(1) or if all series are integrated at I(1), then the Autoregressive Distributed Lag (ARDL) bounds testing technique can be utilized to examine the existence of a cointegrating relationship between the variables, which can be described as below.

$$\begin{aligned} \Delta ASPI_t = & \beta_0 + \beta_1 ASPI_{t-1} + \beta_2 EXR_{t-1} + \beta_3 IR_{t-1} + \beta_4 INF_{t-1} + \beta_5 FDI_{t-1} + \\ & \sum_{i=1}^{q_1} \rho_{1i} \Delta ASPI_{t-i} + \sum_{i=0}^{q_2} \rho_{2i} \Delta EXR_{t-i} + \sum_{i=0}^{q_3} \rho_{3i} \Delta IR_{t-i} + \sum_{i=0}^{q_4} \rho_{4i} \Delta INF_{t-i} + \\ & \sum_{i=0}^{q_5} \rho_{5i} \Delta FDI_{t-i} + e_t \end{aligned} \quad (2)$$

Where  $\Delta$ : 1<sup>st</sup> difference operator,  $\beta_0$ : drift component,  $e_t$ : unobserved random error term,  $\beta_2 \rightarrow \beta_7$ : long-run slope coefficients, the remaining expressions with the summation sign ( $\rho_{1i} \rightarrow \rho_{7i}$ ) denotes the short-run dynamics relationship between the variables. Once we detected the existence of a cointegrating relationship among the variables, the long-run relationships can be identified via the same technique.

Next, the short-run dynamics relationship and long-run adjustment of the model can be obtained by the Error correction version of the ARDL model which can be defined as follows:

$$\begin{aligned} \Delta ASPI_t = & \lambda_0 + \sum_{i=1}^{q_1} \lambda_{1i} \Delta ASPI_{t-i} + \sum_{i=0}^{q_2} \lambda_{2i} \Delta EXR_{t-i} + \sum_{i=0}^{q_3} \lambda_{3i} \Delta IR_{t-i} + \\ & \sum_{i=0}^{q_4} \lambda_{4i} \Delta INF_{t-i} + \sum_{i=0}^{q_5} \lambda_{5i} \Delta FDI_{t-i} + \tau ECT_{t-1} + u_t \end{aligned} \quad (3)$$

Where,  $\lambda$  is the speed of adjustment coefficient, and  $u_t$  is a pure random error term. Since this methodology considers both long-run and short-run associations which will facilitate policy-making to achieve expected changes in the economy via these variables.

## 5. Results and Discussions

In the first steps of the estimation procedure, we have to confirm the order of integration of all the series. The results of ADF and PP unit root tests are presented in Table 1.

Table 1. Results of Unit Root Test

| Variables | ADF Test  |                            | PP Test   |                | Order of Integration |
|-----------|-----------|----------------------------|-----------|----------------|----------------------|
|           | Level     | 1 <sup>st</sup> difference | Level     | 1st difference |                      |
| LNASPI    | 0.6220    | 0.0011***                  | 0.6200    | 0.0002***      | I (1)                |
| LNEXR     | 0.3648    | 0.0003**                   | 0.3357    | 0.0002***      | I (1)                |
| LNFDI     | 0.0067*** | 0.0001***                  | 0.0270**  | 0.0000***      | I (0)                |
| INF       | 0.0074*** | 0.0000***                  | 0.0074*** | 0.0000***      | I (0)                |
| IR        | 0.1671    | 0.0001***                  | 0.1534    | 0.0000***      | I (1)                |

**Note:** Probability values are given in the Table. \*\* and \*\*\* depict the rejection of the null hypothesis at 5%, and 1% significance level respectively.

**Source:** Authors calculation

Both techniques of ADF and PP unit root test detected that all the series became stationary at their first difference except LNFDI and INF which are stationary in level form if we use intercept only in the model. Therefore, these two unit root test methods confirm the presence of I(0) and I(1) variables with intercept only in the model (see Table 1 above). Thus, we employ ARDL Bounds testing technique to estimate the parameter.

Using the unrestricted VAR model and AIC criteria, this study has chosen 4 lags as optimum lag for the model. Thereby we used this lags for the ARDL model in order to choose the optimum number of lags for each series that can be included in our model (ordering of the variables are EXR, FDI, INF, IR). The results of AIC (given below in Figure 5.1) advocate that to use ARDL (1, 1, 0, 4, 4) model among the best 20 models to evaluate the parameters.

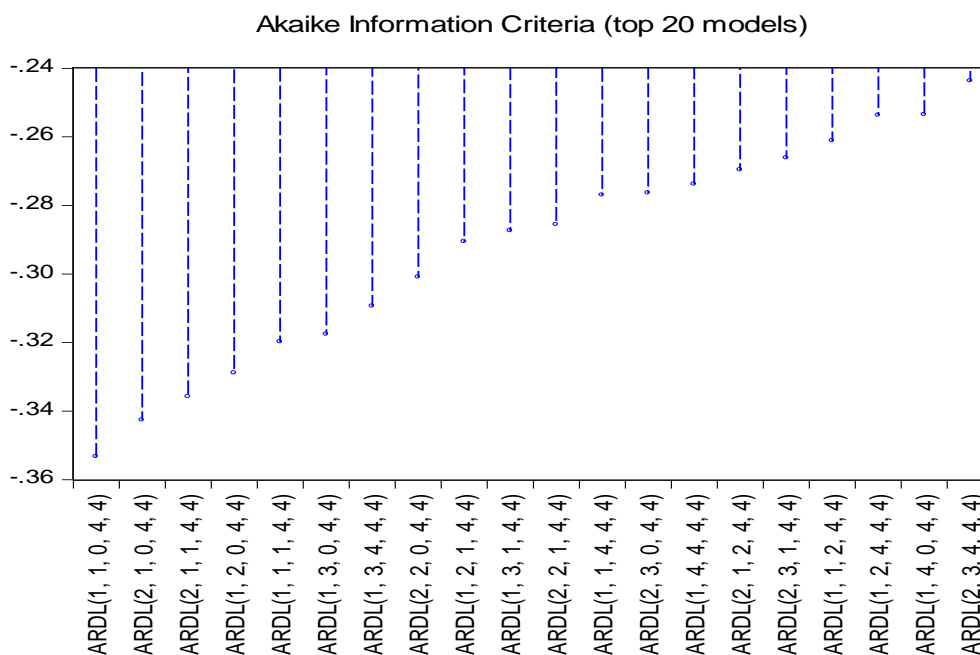


Figure 7. Results of Optimum Lag Length for Each Variable (AIC)

The above model passed all the diagnostics tests (see Table 5.2 below). First, the Lagrange Multiplier (LM) test reveal that there is no serial correlation between the error terms since we accept the null hypothesis of no serial correlation at 5% significance level as the probability value is greater than 0.05. Second, Jarque-Bera (JB) test confirm that error is normally distributed at 5% level of significance since we failed to reject the null hypothesis of error is normal as the probability value is higher than 0.05. Thirdly, the Breusch-Pagan-Godfrey (BPG) test of the heteroscedasticity suggest that variance of the error term in the model is homoscedastic at 5% level of significance as we accept the null hypothesis since the probability value exceed the value of 0.05. Finally, the result of Ramsey RESET test illustrate that model is correctly specified since we failed to reject the null hypothesis of no omitted variable in the model as the probability value is greater 0.05.

Table 2. The Results of Diagnostics Test of ARDL Model

| Test  | Probability value (F or Chi-square) |
|---|-------------------------------------|
| Normality Test (Jarque-Bera)                  | 0.4610                              |
| Serial Correlation [LM test: $\chi^2_{(d)}$ ] | 0.2914                              |
| Omitted Variable (Ramsey's RESET)             | 0.3038                              |
| Heteroscedasticity (BPG Test)                 | 0.7246                              |

Source: Authors' calculation

Next, ARDL bounds testing technique is applied to examine whether there is cointegrating relationship among the variables. The result of this test confirms that there exists cointegrating association between the selected variables since we reject the null hypothesis of no cointegration between the variables as test statistic (7.818046) is exceed critical value (3.49 ) of the upper bound [I(1)] at 5% significance level (see Table 5.3 below). Thus, it can

be concluded that there is a robust evidence to support the existence of a long-run link between the variables.

Table 3. The Results of ARDL Bounds Test (F- Bounds Test)

| Test Statistics | Value    | Significance Level | I(0) | I(1) |
|-----------------|----------|--------------------|------|------|
| F-statistics    | 7.818046 | 10%                | 2.20 | 3.09 |
| K               | 4        | 5%                 | 2.56 | 3.49 |
|                 |          | 2.5%               | 2.88 | 3.87 |
|                 |          | 1%                 | 3.29 | 4.37 |

Source: Authors' calculation

As cointegrating relationship exists between the variables in the model, there should be long-run association among the variables. The long run result is given in Table 5.4 below:

Table 4. The Results of Long-run Relationship (Dependent Variable: FDINI)

| Constant            | LNEXR                | LNFDI               | INF                  | IR                   | R <sup>2</sup> |
|---------------------|----------------------|---------------------|----------------------|----------------------|----------------|
| 31.6599<br>(0.0683) | -3.58126<br>(0.2091) | 0.45705<br>(0.4783) | 0.64965*<br>(0.0708) | -1.1790*<br>(0.0544) | 0.880143       |

**Note:** Probability values are given in parenthesis. \* denote the rejection of the null hypothesis at 10%, significance level.

**Source:** Authors calculation

The above Table illustrates even at the 10% of significant level, exchange rate and foreign direct investment do not have any impact on the price index of all stocks in the long run. This has been confirmed by Bhuvaneshwari Ramya (2017), Rajapakse (2019), Gopalan Kutty (2010), and Anjum et al. (2015).

Next, this study finds a positive and weakly significant relationship between the inflation and price index of all stocks in the long run. That is, if inflation can increase, it tends to raise all stock prices more in the long run while other variables remain constant. Further, the estimated results show that interest rate has a positive and significant impact on the price index of all stocks. However, empirical literature shows a negative correlation between these two series (Courage Mlambo et al., 2013).

In this model, the R square is 0.88 (88%), which shows that model is accurate. Out of 100% variation of all stocks prices, all these variables explain the 88% of that variation with this model. Only other factors explain the 12% variation of the all stocks prices variation.

In the long run, the key characteristic of the model parameters is their stability. Hence, the "CUSUM" test is employed to identify stability of the model parameter. The result of this test is given below:

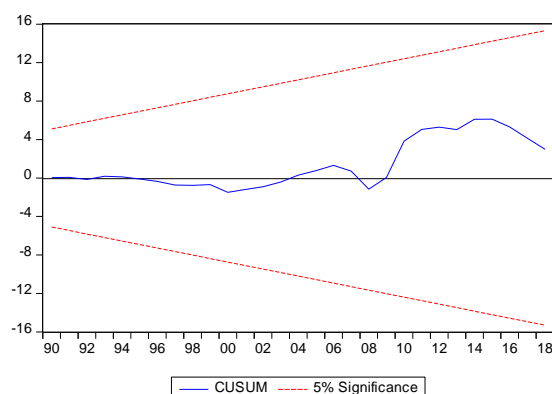


Figure 8. The Results of the CUSUM Test for ARDL (1, 1, 0, 4, 4) Model

Source: Authors' calculation

The graph of CUSUM test confirms the stability of model as the plot of residual lies between the 95% confidence interval. This vindicate that the selected ARDL model has stable parameters which can be applied for long-run forecasts.

Finally, we estimated the error correction version of the ARDL model to identify the short-run relationship between the variables and long-run adjustment of the model. The results are given below.

Table 5. Results of Error Correction Representation of ARDL (1,1,0,4,4) Model

| Dependent Variables : $D(LNASPI)$ |                     |                    |                    |                 |                     |
|-----------------------------------|---------------------|--------------------|--------------------|-----------------|---------------------|
| Variables                         | Lag order           |                    |                    |                 |                     |
|                                   | 0                   | 1                  | 2                  | 3               | 4                   |
| $D(LNASPI)$                       | -                   | 0.0010*** (1.4253) | -                  | -               | -                   |
| $D(LNEXR)$                        | 0.0233** (2.4997)   | 0.0388** (-2.2011) | -                  | -               | -                   |
| $D(LNFDI)$                        | 0.0397** (0.0819)   | -                  | -                  | -               | -                   |
| $D(INF)$                          | 0.5463 (-0.0063)    | 0.7298 (-0.0042)   | 0.0199** (-0.0399) | 0.3543 (0.0160) | 0.3145 (0.0106)     |
| $D(IR)$                           | 0.0733* (-0.0316)   | 0.2235 (-0.0268)   | 0.0060*** (0.0506) | 0.3533 (0.0184) | 0.0045*** (-0.0657) |
| $ECT(-1)$                         | 0.0000*** (-0.9671) | -                  | -                  | -               | -                   |

**Note:** test statistics values are given in the Table. \*, \*\*, and \*\*\* depict the rejection of the null hypothesis at 10%, 5%, and 1% levels of significance respectively.

**Source:** Authors' calculation

The above results reveal that the impact of EXR, FDI, INF, and IR are statically significant with theoretically expected signs. Concerning the short-run relationship, the last period of ASPI, the current period of EXR, the current period of FDI, and two periods before the IR have a positive and significant impact on ASPI in the short run. Last period EXR, two periods before the INF, current period IR, and four periods before the IR have a negative and



significant impact on ASPI in the short run.

Even though, Coefficient of error correction term ( $ECT_{t-1}$ ) carries an expected negative sign. The absolute value of the coefficient of the error-correction term (0.9671) indicates that about 96.7% of the disequilibrium in the ASPI is offset by short-run adjustment in each year one period after the exogenous shocks. Thus, it is important to reduce the existing disequilibrium over time to maintain long-run equilibrium.

## 6. Conclusions and Policy Recommendations

This economic analysis, which examines the effect of the exchange rate on the performance of the stock market in Sri Lanka, is essential for policymakers. Good performance of the stock market is an important key in promoting a country's economic growth and development and moving that country's economy to the next level. According to the Sri Lankan experience, the government is taking some steps to increase the performance of the stock market. However, Sri Lanka's stock market's performance is increasing trend with fluctuation over time. At the same time, the exchange rate has had a major impact on the performance of the stock market in recent periods in some developing countries. Moreover, the exchange rate changes in Sri Lanka and the monetary policies pursued from time to time by the government show instability of the exchange rate and a vague link between the performance of the stock market and exchange rate in Sri Lanka. Therefore, this study aims to examine the relationship between the exchange rate and the performance of the stock market in Sri Lanka and hopes to increase the performance of the stock market by taking steps to improve the monetary policy which related exchange rate. We hope that this study will help in finding ways to increase the performance of the stock market and will be essential for Sri Lanka's economic development planning.

ADF and PP unit root test techniques confirmed that none of the series are  $I(2)$  at a 5% level of significance. AIC was suggested to adopt ARDL (1, 1, 0, 4, 4) model as the best model among the top 20 best models. The ARDL Bounds test result confirms the co-integrating relationship between the variables at a 5% level of significance. According to the ARDL Bound test, which tracks the integration of long-term correlation between variables, the exchange rate (EXR) and foreign direct investment (FDI) at least at the 10% significance level have not been found to have any significant relationship with the index of all stock prices. The interest rate is having a significantly negative relationship with the index of all stock prices. Inflation is having a significantly positive relationship with the index of all stock prices. Next, the error correction model is used for short-run correlation and long-run adjustment between variables. Concerning the short-run relationship, the last period of ASPI, the current period of EXR, the current period of FDI, and two periods before the IR have a positive and significant impact on ASPI in the short run. Last period EXR, two periods before the INF, current period IR, and four periods before the IR have a negative and significant impact on ASPI in the short run. The selected ARDL model passed all the diagnostics tests.

The Exchange rate has a direct relationship in the short run and non-relationship in the long term with the index of all stocks. Therefore, the exchange rate can be used as a policy tool to keep the stock market stable. Therefore, the government should implement appropriate

monetary policy to increase the efficiency of the stock market. As the stock market is seen as the main source of revenue for the government in this way, effective modifications to the system of influential variables need to be made. To attract stock market investments in this way, the government must take steps such as maintaining stock prices, maintaining political and economic stability, and developing market facilities. At the same time, the government should develop the distribution system using new technologies such as information and communication technology (ICT) and implement policies that will facilitate easier participation in stock exchanges.

Domestic and foreign investors will have an impact on the stock market. Securities and Exchange Commission, policymakers, stock market analysts, investors, and security analysts can predict stock prices and thereby make a profit. Policymakers in general need to be aware of the economic implications of equities. Policies should be as not affecting any party involved in the stock exchange. It is also important to pay attention to the exchange rate and interest rate when implementing such policies. Therefore, stock market policymakers can focus on these and formulate policies to increase the stability of the exchange rate and increase stock market performance.

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