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FACTORS AFFECTING EXCHANGE RATE VARIABILITY IN SRI LANKA: AN AUTOREGRESSIVE DISTRIBUTED LAG APPROACH

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ABSTRACT

A free float in the exchange rate has been recorded in the Sri Lankan rupee over the past few years affecting the Sri Lankan economy to a significant extent. This study intended to examine the factors affecting the exchange rate variability in Sri Lanka during the period from 1991 to 2020. For the study secondary data were obtained from the World Bank and the Central Bank of Sri Lanka. The exchange rate was considered as the dependent variable while inflation rate, merchandise trade, Gross Domestic Product (GDP) growth, foreign direct investments, balance of payments and external debt were considered as independent variables. Augmented Dickey Fuller (ADF) test was used to examine the stationary of the time series data, and Autoregressive Distributed Lag (ARDL) was adopted to figure out the long-run and short-run relationship between the variables. The results of ARDL bound test confirmed that there is a co-integration relationship between the variables, and the results of the error correction model revealed the significant impact of inflation rate, merchandise trade, Gross Domestic Product growth, foreign direct investments, balance of payments and external debt on exchange rate in both short run and long run. In the short run, balance of payment and GDP have no significant impact on the changes in exchange rate, and the results confirmed that there is a Exchange rate indicates negative relationships with external debt, inflation, and merchandise trade. *Finally, the results confirmed* the exchange rate is in a negative relationship with FDI and GDP in the long run.

KEYWORDS: Exchange Rate, External Debt, Foreign Direct Investments, Inflation, Merchandise Trade

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1. INTRODUCTION

Exchange rate is the most significant macroeconomic indicator which can be used to measure a country's relative level of economic strength. Exchange rate refers to the value of one currency against another currency in macroeconomic review. In the Sri Lankan context, fiscal and monetary policymakers follow the American dollar as the common exchange in currency. The changes in exchange rate will have both favourable and unfavourable impacts on the country's economy and citizens' living conditions because of the comprehensive trade and the financing related to the exchange in currencies. Furthermore, the increase in trend of domestic currency in terms of another currency is referred to as depreciation, and the decrease in the trend of domestic currency in terms of another currency is referred as appreciation. In the Sri Lankan context, it has been recorded an increasing trend in the recent few years. "Since 1948, Sri Lankan foreign exchange has moderately evolved from a fixed rate regime by 1948 to an independently free-floating regime by 2001."?Fluctuations in the exchange rate is considered as a critical determinant of the success of fiscal policies of any economy. A free float in the exchange rate has been recorded in Sri Lankan rupee over the past few years, which affected the Sri Lankan economy to a significant extent. As stated below in the literature review, around ninety percent of studies both local and foreign have used the independent variables as differentials in economic growth, differentials in inflation rate, differentials in interest rate and political and economic performances. In the Sri Lankan context, most of the empirical studies have been conducted as partial study of the factors affecting the exchange rate. There was no sufficient literature available to identify the positive impacts and negative impacts on Sri Lankan exchange rate. Thahara, A. F., Rinosha, K. F., & Shifaniya, A. J. F. (2021) has conducted a research on the relationship between exchange rate and trade balance, and the findings of the study have indicated that inflation has a positive impact on trade balance in the short run and that exchange rate and GDP have adverse effect on trade balance in the long run The researchers have discovered/proved that by using the auto regressive distributed lag model, bound test approach and error correlation model. Rajakaruna, H. (2017) has conducted a research on investigation of factors affecting exchange rate fluctuations in Sri Lanka and the researcher has stated that there is a positive relationship between exchange rate and foreign purchases as well as a negative relationship with the inflation and the interest rate. by using vector auto regression model. Jayasuriya, D. P. S. H., & Perera, S. S. N. (2016) is another research on analysis of factors affecting USD/LKR exchange rate, and the study has confirmed that increasing net foreign assets and trade balance and decreasing exchange rate has a significant influence on short run appreciation of exchange rate by using Johanson and Juselius cointegration and vector auto regressive model. Wimalasuriya S. (2009) conducted a study on exchange rate pass through: to what extent prices changes in Sri Lanka and the study has investigated the extent to which price changes in Sri Lanka and exchange rate had significant implications on trade by using vector auto regressive approach. Accordingly, it can be derived the fact that the factors affecting exchange variability is still arguable and it is a contradictory area to conduct research on by considering the time period of 1991-2020 by using GDP growth, inflation, FDI, balance of payment and merchandise trade as the determinants of exchange rate and investigat the relationship between the variables and exchange rate. Consequently, the purpose of this study was to investigate the factors affecting the Sri Lankan exchange rate variability and to identify the relationship between those factors. Methods employed to analyse the study were augmented dickey fuller test (ADF) which was adopted to test the stationary property of data, the bound test approach to examine the existence of a long-run relationship among the variables, the unrestricted error correction model (ECM) to test the short-run dynamics of the autoregressive distributed lag model (ARDL) to check the causality relationship between the considered variables. The findings of the study will be beneficial to fill gaps in the exiting literature in exchange rate variability in developing contexts and also will be useful to academicians, new-knowledge seekers, scholars who conduct research on factors affecting fluctuations in Sri

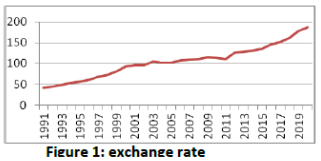

Figure 1: exchange rate

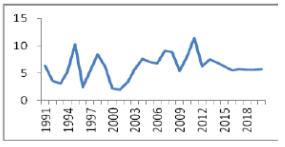

Figure 2: Inflation

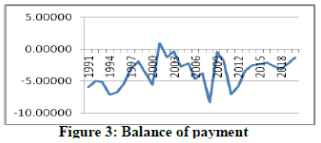

Figure 3: Balance of payment

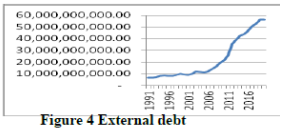

Figure 4 External debt

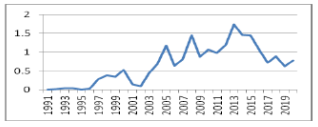

Figure 5: foreign direct investment

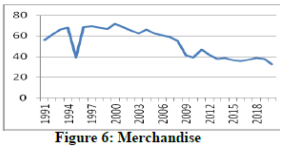

Figure 6: Merchandise

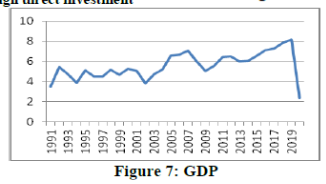

Figure 7: GDP

Lankan exchange rate. Also, the findings of this study will help to originate the awareness regarding the exchange rate variability among the fiscal and monetary policy makers to formulate and regulate strategies. The below graphs show the trends of the variables over the past 30 years. There is a definite theoretical connection between exchange rate variability and each of the independent variables have been examined. This indicates that there is a clear and logical correlation between these factors and changes in exchange rates. Exchange rates can be impacted by inflation, which can reduce a currency's purchasing power. Exchange rates and a nation's foreign exchange reserves can be impacted by trade imbalances. A nation's currency's supply and demand are frequently impacted by economic growth. Exchange rates may be impacted by capital flows that FDI brings into the nation. The balance of payments, which shows a nation's economic dealings with other nations, has an impact on exchange rates.

1.1 Research Hypothesis

H1: Inflation rate significantly impact to exchange rate variability in Sri Lanka.
H2: merchandise trade significantly impact to exchange rate variability in Sri Lanka.
H3: Gross Domestic Product (GDP) growth significantly impact to exchange rate variability in Sri Lanka.
H4: foreign direct investments significantly impact to exchange rate variability in Sri Lanka.
H5: balance of payments significantly impact to exchange rate variability in Sri Lanka.
H6: external debt significantly impact to exchange rate variability in Sri Lanka.

1.2 Objectives

To Evaluate the Effect of Exchange Rate Variability on Inflation: Assess the degree to which variations in Sri Lanka's inflation rate impact the country's currency rate volatility.

In order to examine the connection between exchange rate volatility and merchandise trade: Examine the effects of import/export operations and the trade balance on Sri Lanka's exchange rate changes.

In order to investigate how GDP growth affects exchange rate volatility: Examine the connection between GDP growth and exchange rate swings, determining if economic expansion reduces or increases the volatility of exchange rates.

2. LITERATURE REVIEW

2.1 Theoretical review

Many researchers have reviewed the topic of exchange rate and factors affecting the changes of Sri Lankan rupee because it is a comprehensive matter in local as well as international economic studies. Researchers have conducted their studies by using exchange rate as the dependent variable. An exchange rate is the price of one currency expressed in terms of another currency. An exchange rate thus has two components, which are domestic currency and foreign currency, and exchange rate determines how much of one currency has to be given up to buy a specific amount of another currency. The theory had begun to develop in the beginning of 1960.

There are two theories which have been identified under the Exchange trade theory.

1.) Purchasing power parity theory

Purchasing power parity is used to adjust real income per capita. PPP is an economic theory that compares differences between countries' currencies through a basket of goods approach.

2.) Interest rate parity theory

Interest rate parity theory is a theory that differentiates between two countries' interest rates using the exchange rate and local exchange rate system.

Most researchers have considered factors as public debt, interest rate, inflation, and economic performance of the economy. The researches have used the following factors on exchange rate determinants, direct investments, inflation rate, GDP Growth, balance of payment, merchandise trade and external debt which were not mentioned in the published research articles on that topic.

Rajakaruna, (2017) has conducted a study on investigation of Factors affecting exchange rate fluctuations in Sri Lanka which revealed that a negative relationship between the exchange rate and inflation in Sri Lanka.

2.1.1 Direct Investments

In the present study researchers have analysed the relationship between the direct investment and exchange rate variability of Sri Lankan rupee. Jayasekara. (2016) has conducted a study on exchange rate, exchange rate volatility and foreign direct investment in Sri Lanka and the study result has identified that stability of exchange rate and developed facilities were important and helpful to attract direct investment to the country. According to the study of Ranga, & Wijesinghe (2015) on the relationship between foreign direct investment and exchange rate, indicated that there was a beneficial effect to decide the short-term period but there is no high effect on long-term exchange rate to determine foreign direct investment and exchange rate.

2.1.2 Inflation

A country with a constantly lower inflation rate shows an increasing currency as its purchasing power rises relative to other currencies. The inflation rate in a country can have a major influence on the value of the country's money and the foreign exchange rate it has with the currencies of other nations.

2.1.3. GDP Growth Rate

The GDP growth rate measures the yearly (quarterly) change in a country's economic growth efficiency. Lubis, et al (2017) has found that exchange rate depreciation would cause an increase in the country's level of gross domestic production in the research of exchange rate effect on gross product in the case of the five founding members of the Association of Southeast Asian Nations.

2.1.4. Balance of payments

Balance of payments also called as balance of international payments. It consists of current account which is a nation's net trade in goods and services and capital account which is a country's transactions in financial instruments and central bank reserves. Priyatharsiny, (2017) has conducted a research on the impact of exchange rate on balance of payment: an econometric investigation on Sri Lanka, and it has found devaluation under fixed exchange rate regime or allowing depreciation under freely floating exchange rate regime of the domestic currency against foreign currencies can use as a short term and long-term policy measurement to correct the balance of payment imbalance situation. According to the Shabana Parveen et al (2012), it is revealed that inflation is the main factor affecting exchange rate. The study recommends that fiscal policies should be harmonized with monetary policy first and then effective links of both these policies should be made with trade policy. Inflation, growth rate, imports and exports on exchange rate volatility, and growth rate are the primary indicators used to assess variability. The results are analysed using an ordinary least squares (OLS) model of simple linear regression. According to the study, the primary factor influencing Pakistan's exchange rate is inflation. The

study also reveals that economic growth is the second significant factor that affects exchange rate variance, with export and import ranking third and fourth in terms of variation.

The paper titled "Exchange Rate Variability and the Level of International Trade" by Joseph E. Gagnon, published in December 1989 as an International Finance Discussion Paper from the Board of Governors of the Federal Reserve System tackles the effect of the exchange rate variability on international trade, building a theoretical model and calibrating it to observed trade flows and real exchange rates.

Research paper by Juraj Stančík titled "Determinants of Exchange Rate Volatility: The Case of the New EU Members" investigates the factors causing euro exchange rate volatility in six central and eastern European countries that joined the EU in May 2004. The paper analyses the openness of an economy, the "news" factor, and the exchange rate regime for their contributions to exchange rate movements. The TARCH model is used to model the volatility of exchange rates. The study aims to identify possible sources of the new member countries' failure to maintain stable exchange rates, which is a criterion for joining the EMU. The results suggest that the openness of an economy has a negative effect on exchange rate volatility, and there is a significant effect of "news" on exchange rate volatility.

2. 2 Empirical review

A study on the impacts of exchange rate volatility on Sri Lanka's exports to six developed countries during the flexible exchange rate regime has been conducted by Ekanayake, A. W., & Tsujii, H. (1999), and the estimation has been carried out for the quarterly data, the period of 1978 I, 96II. The study has been focused on six major trading countries with the nominal data on Sri Lanka's exports. The major findings indicated that during the sample period, real exchange rate volatility adversely affected Sri Lanka's exports to the countries under investigation. To test the presence of long run equilibrium relationships between the real exports and the determinants, researchers have used the Johansen-Juselius multivariate co-integration technique and to inspect the short run dynamics underlying the long run relationships considered the researchers have used the error correction modelling technique. The research about the factors affecting fluctuations in the exchange rate of Polish zloty against the euro in Poland by Twarowska, K., & Kakol, M. (2014) identified financial account balance and inflation rate as the most important factors determining the level of exchange rate. The study suggests that Poland's financial account surplus shows a positive relationship with the country's currency, and that an increase in the inflation rate has a negative effect and reduces the value of Polish currency, and it indicates the market interest rate as the third most important factor explaining that the rises of interest rates contribute to appreciation of Polish currency. Moreover, the study suggests that the government deficit makes a major impact as another variable affecting zloty exchange rate, but the economic growth and the current account are less significant. The above results were found based on the literature review, comparison of statistical data and regression analysis.

The study by Rajakaruna, H. (2017) on "An investigation of factors affecting exchange rate fluctuations in Sri Lanka" has used different econometrics models as Multiple Regression Model (OLS Method), Vector Auto Regression Model (VAR), Impulse Response and Variance decomposition test and diagnostic techniques (Unit-root test, lag selection criteria, AR Roots test) to achieve the objective of the study, and it has found a positive relationship between net foreign purchases and exchange rate and a negative relationship between the exchange rate and inflation, worker remittances respectively according to the empirical results. The study emphasizes the significant impact of most of the variables on the exchange rate by showing a peak effect within a two-month lag and 1.60 from the Durbin Watson Statistic which suggested that the relevant variables have been included in this study. The research related to the relationship between exchange rate and trade balance: empirical evidence from Sri Lanka by Thahara, A. F., Rinosha, K. F., & Shifaniya, A. J. F. (2021) demonstrates the correlation between exchange rate and trade balance using exchange rate

as the main independent variable and gross domestic product, inflation as control variables from the year 1977 to 2019. Methods employed to analyse the study were ADF unit root tests adopted to test the stationary property of data, the Bound test approach to examine the existence of a long-run relationship among the variables, the unrestricted Error Correction Model (ECM) to test the short run dynamics of the ARDL model and the Granger Causality Test to check the causality relationship between the considering variables. The study illustrated that the inflation has a positive impact on the trade balance in the short run and the exchange rate has a negative impact on trade balance in the long run. Moreover, it was found that the exchange rate is higher than one which is consistent with the Marshal Lerner Condition (MLC) and also that there is an adverse effect on the trade balance by GDP in the long run while having an import dependent economy in Sri Lanka which creates a trade deficit. The coefficient of trade balance and exchange rate (at lag 1) were positive – significant and negative respectively in the previous year.

3. METHODS

This study analyses the factors affecting the exchange rate variability of Sri Lanka. The authors have found that there was an upward trend in the exchange rate of Sri Lanka in the past few years (Figure 01). The researchers conducted this study to figure out the main reason for factors affecting exchange rate variability by analysing exchange rate and variables together. This Research is mainly based on the deductive research approach. Researches adopted a quantitative approach for this study. This research is based on secondary data series from 1991 to 2022. The authors have considered yearly data of each dependent and independent variable from 1991 to 2022. As a dependent variable, Sri Lanka's exchange rate data collected from world development indicators and other independent variables as Sri Lanka's GDP, external debt, inflation rate, foreign direct investments, the balance of payment, merchandise trade data collected from the central bank of Sri Lanka and world development indicator. Furthermore, researchers have added a graphical representation of each variable for the study. The authors have applied the ADF test for the research to measure the stationary of the data set. Then, the optimal lag length selection method was applied to select the optimal lag value for the next steps of the analysis. Logarithms were used to analyse the data because there may be some variables having skewed distribution which may be either positive or negative. The balance of payment recorded a negative value in several years. It will occur as an error in the model. Logarithms were used to reduce errors and to make the distribution a normal one. ARDL model was applied for the study to find out the long-run relationship between variables. Then, the Error correction model was used to estimate the short-run relationship of the exchange rate with inflation, GDP, external debt, merchandise trade, FDI, and balance of payment.

3.1 Conceptual Diagram

The Researchers developed the conceptual diagram below according to the empirical findings.

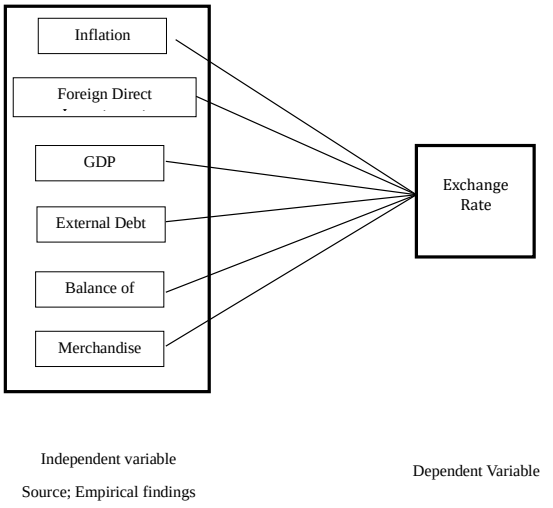

Figure 8: Conceptual Model (Source; Empirical findings)

3.2 Log-log model

The empirical model reflecting the effect of the independent variables on the exchange rate can be demarcated as follows.

$\ln(ER)t = \beta0 + \beta1 \ln BOPt + \beta2 \ln EDt + \beta3 \ln FDIt + \beta4 \ln GDPt + \beta5 \ln INFt + \beta6 \ln MTt + \varepsilon$

Where:
ER = Exchange rate fluctuation
β0 = Constant
BOP = Balance of payment
ED = External debt
FDI = Foreign direct investments
GDP = Gross Domestic Production
INF = Inflation
MT = Merchandise trade
Σ = Error term

4. DATA ANALYSIS AND RESULTS

According to the secondary data collected (Figure 01 - 06), the Balance of payments of Sri Lanka has recorded negative values in the past 30 years. Only 2001 has recorded a positive value for the balance of payments, and all the other years have recorded negative values. The GDP shows an increasing trend from 1991 to 2019, and after 2019 GDP growth rate has rapidly dropped from 8.15 to 2.37. The main reason for this dropdown is the COVID-19 pandemic situation. It has had an impact on all economies of the world. Economies have had to stop their production for a while, and thus it has impacted on all economies. The external debt also recorded an increasing trend year by year as Sri Lanka has borrowed more and more from foreign lenders. The merchandise Trade has recorded a decreasing trend through the past 30 years. The dependent variable, the exchange rate has recorded a continuously increasing trend in the past 30 years.

4.1 Unit Root Test Analysis

Augmented dickey fuller test and Phillips's person unit root tests were used to prove whether the data series is stationary or not. For this study, the authors have been used the ADF test to measure the stationary of data series. Below the table 1 shows the ADF statistic and probability result of the selected data series. According to table 1, the data series shows the different results of stationary and non-stationary data. Authors have been taken ADF test results at level series and first difference. The probability value of each and every variable determines whether each variable is stationary or nor, with each variable under a 5% significance level. As the decision row of Table 1, the *ln*ED variable is not showed any stationary value at level series and first difference under 5% significance level. *ln*ED probability value is higher than 0.05 significance value. Other variables, lnFDI, *ln*ER, *ln*GDP and *ln*MT stationary at the first difference series under a 5% significance level. Under 5% significance level, *ln*BOP and *ln*INF variables are stationary at both level series and first difference. Therefore, the results show mixed integration order of data series. As a result of that authors has been decided to use ARDL co-integration model for this research.

Table 1. Augmented Dickey Fuller (Source: Calculated by author using EViews.)

Variable	Level series		First difference Series		Decision
	ADF Statics	Pob Value	ADF Statics	Prob Value	
***ln*ER**	1.1968	0.9973	-4.5673	0.0011	stationary at 1st difference
***ln*BOP**	-3.8620	0.0064	-5.2116	0.0003	stationary at 1st difference and level series
***ln*ED**	0.5084	0.9840	-2.8061	0.0702	not stationary at any level
***ln*FDI**	-1.8733	0.3395	-6.5454	0.0000	stationary at 1st difference
***ln*GDP**	-2.9268	0.0545	-3.5664	0.0134	Stationary at 1st difference
***ln*INF**	-3.8884	0.0060	-7.2579	0.0000	stationary at 1st difference and level series
***ln*MT**	-1.4376	0.5501	-5.9996	0.0000	stationary at 1st difference

4.2 Optimal lag length selection

The first step of the ARDL bound test is selecting an optimal number of lags. Optimal lag selection is important to continue the accuracy of the model and generate correct estimated results. The study has been considered five criteria named as, sequentially modified LR test statistic (LR) (each test at 5% level), final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC), and Hannan-Quinn information criterion (HQ). According to Table 2, all five criteria recommended

Table 2 optimal lag length

Lag	LogL	LR	FPE	AIC	SC	HQ
0.00E+00	-110.1049	NA	235.5866	8.293209	8.578682	8.380481
1	-75.14745	52.43622*	20.91828*	5.867675*	6.200726*	5.969492*
2	-74.82799	0.456375	22.08207	5.916285	6.296915	6.032647

one (1) lag as optimal lag length according to VAR calculated data. Authors applied Lag 01 for *ln*ER, *ln*BOP, *ln*ED, *ln*FDI, *ln*GDP, *ln*INF and *ln*MT variables.

4.3 ARDL Bound Test

Authors have used ARDL model for the study to estimate co-integration between the variables. For this study, exchange rate (lnER) has been considered as the dependent variable and balance of payment (*ln*BOP), external debt (*ln*ED), foreign direct investments (lnFDI), gross domestic product (lnGDP), inflation rate (*ln*INF) and merchandise trade (lnMT) have been considered as the independent variables.

Although ARDL models have been used in econometrics for decades, they have gained popularity in recent years as a method of examining co-integrating relationships between variables through the work of persaran and shin (PS and Persaran1998, shin and smith 2001).

The Table 3 shows the ARDL (1, 1, 1, 1, 1, 1, 1) bound test results. I (0) indicates lower bound regression results and I (1) indicates upper bound regression results. If the F-statistic value or T-statistic value is higher than the lower bound value (I (0)). It means there is co-integration among variables. If F-statistic value or T- statistic values are higher than the upper bound test value (I (1)) it confirms that there is co-integration between variables. According to the calculated data of the study, the F-statistic value takes 7.365and it is higher than lower bound 3.15 and upper bound 4.43 at a 1% significance level. Furthermore, T- statistic value takes -9.498, which is higher than the lower bound value and upper bound value at a 1% significance level. These results verify that there is co-integration between variables. It exists there is a long-run equilibrium relationship among variables.

Table 3. Results of ARDL bound tests

Selected model: ARDL (1,1,1,1,1,1,1)				
F-bounds test		**Null hypothesis: no levels relationship**		
Test statistic	**Value**	**Significance**	**i(0)**	**i(1)**
F-statistic	7.365	10%	2.12	3.23
K = 6		5%	2.45	3.61
		2.50%	2.75	3.99
		1%	3.15	4.43
T-bounds test		**Null hypothesis: no levels relationship**		
Test statistic	Value	Significance	i(0)	i(1)
T-statistic	-9.498	10%	-2.57	-4.04
		5%	-2.86	-4.38
		2.50%	-3.13	-4.66
		1%	-3.43	-4.99

(Sources: Calculated by author using EViews).

Table 4 Estimated long run coefficient using the ARDL model

Selected Model: ARDL (1, 1, 1, 1, 1, 1, 1) ; Dependent Variable is Exchange rate				
Variable	**Coefficient (5% Significant level)**	**Std. Error**	**T-Statistic**	**Probability**
*Ln*BOP	-0.409***	0.320	--1.277	0.237
*Ln*ED	0.000***	0.000	5.669	0.000
*Ln*FDI	-12.48***	2.850	-4.378	0.002
*Ln*GDP	-2.817***	1.307	-2.155	0.063
*Ln*INF	2.835***	0.915	3.097	0.014
*Ln*MT	1.053***	0.233	4.518	0.002

Sources: Calculated by author using EViews.

4.4 Long Run Estimation

Table 4 shows the results of the estimated long-run coefficient of variables. According to the below table 4, it demarcates the results of the estimated long-run coefficient of variables. And as well, the Balance of payment (*ln*BOP) probability value takes 0.23 which is higher than the 5% significance level in long run. It means the change of balance of payment is not impacted by the changes in the exchange rates in Sri Lanka within the past 30 years. It seems that the most of the economic transactions of Sri Lanka have not impacted by the changes in the exchange rate. As per the calculated data, external debt (*ln*ED), inflation rate (*ln*INF) and merchandise trade (*ln*MT) recorded positive coefficient values. It means that the exchange rate and external debt (*ln*ED), inflation rate (*ln*INF), and merchandise trade correspondent to each other in long run. If Sri Lanka increases the portion of debt borrowed from foreign parties, it will lead to an increase in all the prices of the economy with respect to all imports and exports of the country, then the exchange rate has been impacted. It has been increased. In addition to that, if the exchange rate getting decrease, as a result of that, external debt (*ln*ED), inflation rate (*ln*INF) and merchandise trade (*ln*MT) show a decreasing trend. Moreover, foreign direct investments (*ln*FDI) and GDP (*ln*GDP) Long-run coefficients show a negative relationship with the exchange rate. It means, there is an inverse relationship in between exchange rate and foreign direct investments (*ln*FDI), GDP (*ln*GDP). When increasing foreign investors' investments in Sri Lanka by 2.817%, the exchange rate decreased by 1% through the past 30 years of Sri Lanka. Moreover, when increasing the gross domestic products of Sri Lanka by 12.48%, leads to a decrease of exchange rate by 1%.

4.5 Short run relationship

Authors estimate the relationship between the variables in the short run by using the Error Correction Model. Table 5 represents the variables' results of ECM. According to the below table, gross domestic product (change in *ln*GDP) value is 0.474 which is higher than the 5% significance level. It means in the short run, GDP is not impacted by the changes in the exchange rate. Furthermore, the balance of payment (Change in *ln*BOP) is not impacted by the changes in exchange rate either short run or long run (table 4 and 5). The changes of the other variables such as, external debt (change in *ln*ED), foreign direct investments (change in *ln*FDI), inflation rate (change in *ln*INF), and merchandise trade (change in *ln*MT) can impact to have changes in the exchange rate in Sri Lanka in the short run. External debt (change in *ln*ED), foreign direct investments (change in *ln*FDI), inflation rate (change in *ln*INF), and merchandise trade (change in *ln*MT) probability values are 0.001, 0.016, 0.000, and 0.000 respectively. The probability values of these variables are lower than 5% significance level. It means that in the short run, external debt (change in *ln*ED), foreign direct investments (change in *ln*FDI), inflation rate (change in *ln*INF), and merchandise trade (change in *ln*MT) varibles have been impacted

Table 5 - Error correction representation for the selected ARDL model

Selected Model: ARDL(1,1,1,1,1,1,1) ; Dependent Variable is *ln*ER				
Variable	**Coefficient 5% Significant level**	**Std. Error**	**t-Statistic**	**Probability**
*Dln*ER	-0.503***	0.134	-3.752	0.005
*Dln*ED	-0.000***	0.000	-4.594	0.001
*Dln*FDI	4.910***	1.630	3.011	0.016
*Dln*GDP	-0.225***	0.300	-0.749	0.474
*Dln*INF	-2.530***	0.375	-6.732	0.000
*Dln*MT	-0.603***	0.117	-5.149	0.000
R-squared	0.946	Mean dependent variables		5.069
Adjusted R-squared	0.900	S.D. dependent variables		5.098
S.E. of regression	1.610	Akaike info criterion		4.096
Sum squared residuals	36.304	Schwarz criterion		4.720
Long likelihood	-42.308	Hannan-Quinn criterion.		4.282
		Durbin-Watson statistic		2.798

on changes in the exchange rate. The authors have found that the foreign direct investments (change in *ln*FDI) show a positive coefficient value in the short run. It means in the short run when increasing the investments from foreign investors to the Sri Lanka, it will lead to increase exchange rate.

On the other hand, inflation rate (change in *ln*INF) merchandise Trade (change in *ln*MT) , external debt (change in *ln*ED) variables have recorded negative coefficient value in short run. It means when the inflation rate (change in *ln*INF) merchandise trade (change in *ln*MT), external debt (change in *ln*ED) increase, it leads to a decreased exchange rate in the short run.

5. DISCUSSION

Rajakaruna, H. (2017) has conducted a research on factors affecting exchange rate fluctuations in Sri Lanka by using a multiple regression model and VAR model. The study resulted that there was a negative relationship between inflation and the exchange rate. These results are similar to the authors' results because the authors' found that there has a negative relationship between the exchange rate and inflation rate in the short run. In the long run, foreign direct investment shows a negative relationship with the exchange rate. An increase in FDI leads to an increase in the exchange rate. Furthermore, in the short run, FDI showed a positive relationship with the exchange rate.

The authors' results are similar to the previous finding of researcher Jayasekara S. G. S. D. (2016). The researcher Jayasekara S. G. S. D. (2016) has conducted the study by using Zellner's seemingly unrelated regression model. The calculated results of the authors' are similar to the researcher's results in the short-run and long-run. The study found that there is a positive relationship between FDI and exchange rate in short run. This result is similar to the authors' results. Another researcher Rajakaruna, H. (2017) conducted a research "An investigation of factors affecting exchange rate fluctuations in Sri Lanka Journal of South Asian Studies, 5(2), 101-115". The researcher found that there is a negative relationship between inflation and exchange rate. These results are similar to the authors' results. Because the authors' found that there is a negative relationship between exchange rate and inflation rate in short run. According to the previous studies, Priyatharsiny, S. (2017) has conducted a research on the impact of the exchange rate on the balance of payment (BOP) by using Johansen co-integration, study found that there was a co-integration relationship in long run. According to the calculated results, the authors have found that the balance of payment has not impacted exchange rate volatility in either the short run or long run.

There was a contradiction between the Authors' study results and Priyatharsiny, S.'s (2017) study results. Aslam, A. M. (2016) has conducted research to examine the impact of exchange rate on economic growth in Sri Lanka by using a multiple regression model. This researcher found that there was a positive relationship between GDP and exchange rate. But, according to the authors' calculated results, there was no relationship between GDP and exchange rate in the long run. In the short run, there was no relationship because the probability exceeds the 5% significance level. There is a contravention between these two studies' results. There was no previous study that examined the relationship between exchange rate and external debt as well as relationship between exchange rate and merchandise trade in Sri Lanka. According to the Authors' results, the external debt and exchange rate have a positive relationship in the long. In the long run, the increase in Sri Lanka's borrowings from external parties leads to an increase in the exchange rate. After 2006 the external debt of Sri Lanka rapidly increased. It leads to an increase in the exchange rate also. And in the short run, it showed a negative relationship.

Merchandise trade and exchange rate showed positive co-integration in long run. It means an increase in merchandise trade imports and exports leads to increase the exchange rate in Sri Lanka. In the short run, it showed negative co-integration It means an increase in merchandise trade imports and exports leads to decrease the exchange rate in Sri Lanka. There were variations in Sri Lanka's inflation

rate during the COVID-19 period. At first, we saw an increase in inflation, especially for necessities, as demand patterns and supply chains were altered. However, inflation rates stabilised as the government put policies in place to limit inflation, such as supply chain management and price restrictions. Data on Sri Lanka's merchandise commerce during the epidemic revealed difficulties brought on by interruptions in the world's supply chains. There were obstacles to exports, particularly in the textile and clothing sector, which accounts for a sizable portion of the nation's exports. In the meantime, imports of necessities like medical supplies and pharmaceuticals rose to keep up with the pandemic's demands. A trade imbalance resulted from these trade dynamics. The rate of GDP growth in Sri Lanka was considerably impacted by the COVID-19 pandemic. Early in the epidemic, the economy contracted as a result of lockdowns and disruptions to business operations. But when the constraints loosened, several industries gradually recovered. The data illustrates how resilient and flexible the nation has become in the face of adversity.

FDI inflows to Sri Lanka fluctuated throughout the COVID-19 pandemic. In the early months of the crisis, FDI decreased as a result of the pandemic's uncertainty. FDI showed indications of revival as the world economy steadied and Sri Lanka took steps to entice investment. The balance of payments statistics exposed weaknesses in the foreign sector of Sri Lanka. Throughout the epidemic, the trade deficit and falling tourism income made it difficult for the nation to maintain a steady balance of payments. Data on Sri Lanka's external debt levels showed that the nation was dependent on outside funding to lessen the pandemic's economic effects. Taking on more debt increased worries about the sustainability of debt levels even if it was necessary to support the economy. currency Rate: The dynamics of the independent variables were closely associated with the behavior of Sri Lanka's currency rate. The Sri Lankan Rupee was initially under pressure to depreciate due to currency rate fluctuations brought on by trade imbalances, economic contractions, and pandemic fears. However, the central bank put in place a number of measures to keep the exchange rate stable, such as capital controls and forex market interventions, which over time helped to stabilize the exchange rate to some extent.

6. CONCLUSION AND IMPLICATIONS

This study analyzes the factors affecting the exchange rate variability of Sri Lanka. The authors have considered exchange rate as the dependent variable, and inflation, foreign direct investments, GDP, inflation rate, merchandise trade, and external debt as independent variables. The authors have been taken secondary data for the study from 1991 to 2020. The study has applied the ARDL model for the calculations. ADF test confirms that the variables are stationary or non-stationary. According to the lag selection criteria, for the study authors have used one lag as optimal lag selection. Then authors applied long run bound test to measure the long-run co-integration and the error correction model to measure short-run co-integration. According to results, in the long run, the balance of payment has impacted changes in the exchange rate in Sri Lanka. External debt a positive impact on the exchange rate. When external borrowing increases, the exchange rate also increases in Sri Lanka in the long run. Foreign direct investments made a negative impact on the exchange rate. An increase in foreign direct investment leads to a decrease in the exchange rate in Sri Lanka. In the long run, there was a negative relationship between gross domestic products and the exchange rate in Sri Lanka. This result was not similar to one of the previous findings. The inflation rate made a positive impact on the exchange rate in Sri Lanka in past years. When the inflation rate increase, the exchange rate also increases. The merchandise trade also made a positive impact on the exchange rate. When increasing imports and exports in Sri Lanka the global, the exchange rate also increases.

In the short run, the authors found that the balance of payment significantly has an impact on the change in the exchange rate. External debt made a negative impact on the exchange rate in the short run. It means, that in the short run when foreign borrowing increases the exchange rate decrease. The foreign

direct investments made a positive impact on the exchange rate in the short run. This result was similar to one of the previous findings result of Jayasekara S. G. S. D. (2016). Also, the author found that in the short-run gross domestic product was not impacted by changes in the exchange rate in Sri Lanka. The inflation rate made a negative impact on the exchange rate in Sri Lanka. Merchandise trade also made a negative impact on the exchange rate in Sri Lanka. Authors majorly found that the balance of payment has not impacted changes in Sri Lanka in either the short run or the long run. Also, external debt and merchandise trade positively impacted to exchange rate in the long and negatively impact on the exchange rate in the short run.

Policy implications of Finding

This research finding will be helpful for the academicians, new knowledgeable scholars, and government policy makers to efficient and effective decisions. And also the findings will be beneficial to fulfill the dearth in the exiting literature gap in exchange rate variability in developing context. First, the findings suggest that the Sri Lankan exchange rate is sensitive to a number of macroeconomic factors, including inflation, the trade balance, and interest rates. This suggests that policymakers should carefully monitor these factors and take steps to address them if they are a source of exchange rate instability.

Second, the findings suggest that exchange rate variability can have a significant impact on economic growth. This is because exchange rate variability can make it difficult for businesses to plan and invest, and it can also lead to uncertainty and risk aversion among consumers. Therefore, policymakers should take steps to reduce exchange rate variability whenever possible.

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