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EXCHANGE RATE VOLATILITY ON EXPORTS: A COMPARATIVE STUDY OF SRI LANKA AND BANGLADESH

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Abstract
This study examines the impact of exchange rate volatility on exports in Sri Lanka and Bangladesh using quarterly data from 2000Q1 to 2023Q4. The Autoregressive Distributed Lag (ARDL) model is used to examine both long-run and short-run relationships, and exchange rate volatility is calculated using the moving average standard deviation method. Data were collected from the Central Bank of Sri Lanka, Bangladesh Bank, and the International Monetary Fund. The findings show that in the long run, higher exchange rate volatility has a significant negative effect on exports in Sri Lanka. In Bangladesh, the effect is also negative but not statistically significant. Real foreign income positively and significantly influences exports in both countries, emphasizing its role in driving export. In Sri Lanka, the real effective exchange rate has a negative and significant effect on exports, while relative prices show a positive and significant impact. In Bangladesh, relative prices also have a positive effect, but it is not significant. In the short run, exchange rate volatility significantly reduces exports in Bangladesh. Real foreign income continues to have a positive and significant effect on exports in both countries. Relative prices increase exports in Sri Lanka but reduce them in Bangladesh. In Bangladesh, the real effective exchange rate positively affects exports in the short run. The results indicate that the models used are robust, reliable and stable over the study period. These findings suggest some policy implications for effectively managing the exchange rate system and sustainably promoting exports of both Sri Lanka and Bangladesh.

Keywords: Exchange rate, Volatility, ARDL Bounds testing, Export

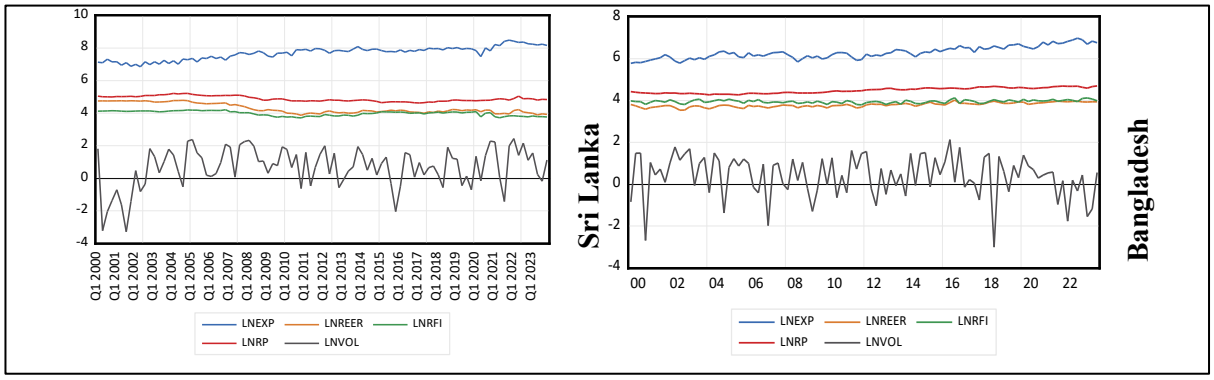
1. Background of the Study

Exchange rate volatility refers to fluctuations in the value of one currency relative to another, leading to appreciation or depreciation over time (World Bank, 2024). Such fluctuations affect the prices of goods and services in international trade and can either enhance or hinder export performance, particularly in developing countries. Since the collapse of the Bretton Woods system in 1973 and the shift to floating exchange rates, global currency markets have experienced increased uncertainty (Doganlar, 2002). High volatility is often seen as a risk by exporters, increasing transaction costs, reducing trade competitiveness, and discouraging participation in international markets (Ethier, 1973). A

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crucial measure in evaluating export competitiveness is the Real Effective Exchange Rate (REER), which adjusts the exchange rate relative to trading partners and domestic inflation. A depreciation in REER lowers production costs for domestic firms relative to foreign competitors, enhancing the competitiveness of a country's exports in global markets. In recent years, over 30 low- and middle-income countries have experienced significant currency depreciations (World Bank, 2024), often driven by financial crises, inflation, or external shocks. For small developing economies like Sri Lanka and Bangladesh, maintaining exchange rate stability is critical. Exchange rate fluctuations can lead to inflationary pressures, rising import costs, and increased foreign debt burdens. These challenges are particularly severe during periods of financial or economic crises, when capital flight, reduced credit availability, and declining investor confidence weaken macroeconomic stability.

Figure 1: Trend of Sri Lanka's and Bangladesh's Exports and Exchange Rate Volatility



Source: Author's Calculation using EViews 12 Software, 2025

In Sri Lanka, the exchange rate regime has evolved, transitioning from a fixed system to a managed float in 1978, and then to an independently floating system in 2001. From 1977 to 2023, the exchange rate system experienced notable changes, characterized by severe depreciation and repeated impacts on exports. Change of exchange rate regime in 1977 was followed by devaluation of the rupee against the U.S. dollar in 1978 resulting in an 85 percent depreciation within a single year. Between 1980 and 2007, the rupee depreciated by 555.7 percent against the U.S. dollar, while real exports increased by 69.2 percent (Ekanayake and Chatrna, 2010). From 2007 to 2009, the global financial crisis and the effects of the civil war contributed to further depreciation of the rupee from to 114.9 rupees per dollar, which represents a 4 percent decline. However, this move fails to improve exports during the same period. Between 2019 and 2020, the rupee further depreciated by 3.8

percent against the dollar due to Easter attacks and the COVID-19 pandemic, when exports declining by 19 percent during this timeframe. Following the economic crisis in 2022, the rupee fell from 198.8 rupees per dollar in 2021 to 324.6 rupees per dollar in 2022, indicating a dramatic 63 percent depreciation in a single year, primarily due to foreign exchange deficits and inflationary pressures. However, exports grew moderately by 30.45 percent from 2020 to 2022.

Similarly, Bangladesh has shifted from fixed exchange rates to a floating system since 2003. Since gaining independence in 1971, the country has gradually liberalized its exchange rate policy. The readymade garment sector, which accounts for over 75% of exports, has benefited from a competitive exchange rate. Nonetheless, global events, such as the Asian financial crisis and the COVID-19 pandemic, disrupted trade and exposed vulnerabilities. For instance, between 1990 and 2000, the taka depreciated by about 51%, coinciding with the rapid growth of garment exports. While currency depreciation has improved competitiveness, periods of global uncertainty and inflation have created challenges for exports.

Exchange rate volatility remains a critical constraint on export performance in lower-middle-income, export-dependent economies, where fluctuations driven by global shocks, inflationary pressures, and domestic policy adjustments generate uncertainty and undermine competitiveness. Although a substantial body of literature has examined the relationship between exchange rate volatility and exports, important limitations persist. Existing studies are largely based on single-country analyses, restricting comparative inference across structurally similar economies. Moreover, the export impacts of recent global and domestic shocks—most notably the COVID-19 pandemic and the 2022 economic crisis in Sri Lanka—remain insufficiently examined within high-frequency (quarterly) empirical frameworks.

These gaps are particularly evident in the case of Sri Lanka and Bangladesh. Despite their similarities as lower-middle-income, export-reliant economies, the two countries differ markedly in exchange rate regimes, inflation dynamics, and export composition. Sri Lanka's relatively diversified export base has been weakened by recurrent inflationary pressures and macroeconomic instability, whereas Bangladesh's garment-dominated export sector has

operated within a comparatively stable macroeconomic environment. The absence of systematic comparative evidence on how exchange rate volatility affects exports under these contrasting conditions limits the development of context-specific exchange rate and trade policies.

Addressing these shortcomings, the present study undertakes a comparative analysis of the export effects of exchange rate volatility in Sri Lanka and Bangladesh using an Autoregressive Distributed Lag (ARDL) framework applied to quarterly data from 2000Q1 to 2023Q4. By incorporating recent crisis periods and adopting a comparative perspective, the study seeks to provide robust empirical evidence to inform export-oriented and macroeconomic stabilization policies amid heightened global uncertainty.

The objective of this study is to investigate the impact of exchange rate volatility on exports in Sri Lanka and Bangladesh. Specifically, it aims to estimate the size of exchange rate volatility in both countries, analyze its long-run and short-run effects on exports, and assess the causality relationship between exchange rate volatility and exports.

The rest of the paper is structured as follows: Section 2 presents the literature review; Section 3 outlines the methodology; Section 4 discusses the results; and Section 5 provides the conclusion and policy implications.

2. Literature Review

Drawing on established theories of exchange rate dynamics and international trade, this study found the research gap and formulated hypotheses regarding the impact of exchange rate movements on the trade balance.

Based on the J-Curve theory, currency depreciation is expected to have a negative effect on the trade balance in the short run, as import prices rise immediately while export volumes adjust slowly due to contractual rigidities and low short-term demand elasticities. Over time, improved export competitiveness and quantity adjustments, lead to a positive impact on trade balance, particularly when exchange rate movements are captured using the Real Effective Exchange Rate (REER). Similarly, the Mundell–Fleming model, predicts that under a flexible exchange rate regime, currency depreciation improves export performance and the trade balance by lowering the relative price of domestic goods in international

markets. This effect is stronger in small open economies, implying a positive long-run relationship between depreciation and trade balance.

The Purchasing Power Parity (PPP) theory suggests that higher domestic prices relative to foreign prices lead to currency depreciation in the long run. Thus, domestic inflation is expected to be positively related with exchange rate depreciation. While PPP does not directly predict trade balance outcomes, persistent deviations from parity may indirectly affect trade performance through exchange rate misalignment. Another theory, which highlights Trade Elasticity Approach and incorporate the Marshall–Lerner Condition. It posits that currency depreciation improves the trade balance only if the sum of export and import price elasticities exceeds unity. Consequently, depreciation may have a negative or insignificant effect in the short run, but a positive effect in the long run, once trade volumes adjust.

Conversely, empirical literature provides mixed evidences. Several international studies support the negative impact of exchange rate volatility on exports. Thuy and Thuy (2019) revealed that in Vietnam, exchange rate volatility reduced export volumes in the long run; Ahmed et al. (2017) found a negative but statistically insignificant impact on Pakistan's exports. Studies from the United States by Byrne et al. (2008) and Choudhry (2005) also highlight sector-specific negative effects. Ekanayake et al. (2010), using GARCH models, concluded that volatility negatively influenced most U.S. export sectors. Findings from India (Panda et al., 2015), South Africa (Ngondo et al., 2018), Malaysia (Hakim, 2024), and other emerging economies confirm that volatility often reduces trade volumes and revenue.

Contrastingly, there are some international studies identify a positive or insignificant relationship. Todani and Munyama (2006) found a weak but positive correlation in South Africa. Kikuchi (2004) also reported positive effects across five East Asian countries. Additionally, theoretical insights from Broll and Eckwert (1999) and Viane and de Vries (1992) argue that volatility may increase potential returns and encourage trade. These perspectives suggest that under certain conditions, such as the availability of hedging tools or elastic demand, volatility might enhance export activity.

In addition, some research finds mixed or insignificant effects. Antintas et al. (2011) showed both positive and negative effects of volatility on Turkish exports. The IMF (1984) found

that, among G7 countries, exchange rate volatility had varying impacts depending on the specific bilateral trade relationship. Gallo et al. (2014) found negative impacts on manufacturing exporters but not on commodity exporters. Similarly, Nyeadi et al. (2014) observed no significant impact in Ghana, and Serenis and Tsounis (2015) reported country-specific outcomes in Europe.

To establish our claim, country-specific literature is also added. For instance, In Sri Lanka, most studies suggest that exchange rate volatility adversely affects exports. Ekanayake and Chatna (2010) found negative effects using GARCH models for the period 1980–2007. Vinayagathasan and Shiyalini (2023) reported that volatility negatively impacts exports in both the short and long run, though long-term depreciation of the REER can improve competitiveness. While, Francis and Ganeshamoorthy (2017), Rathnayaka and Dunasinghe (2022) identified a positive correlation between volatility and export earnings, Weliwita et al. (1999) provided evidence that exchange rate fluctuations harmed exports.

On the other hand, research on Bangladesh shows a combination of negative and insignificant effects. Rahman et al. (2020), using ARCH, GARCH, and EGARCH models, found that exchange rate volatility negatively affected trade. Hassan et al. (2016) noted that the REER had a significant long-term impact but not in the short term. In contrast, Chaiti (2022) found that exchange rate volatility had minimal influence on exports and imports. These mixed results indicate the need for further analysis, particularly using updated data and comparative methods.

While a growing literature examines the relationship between exchange rate volatility and export performance, notable gaps persist. Comparative evidence on Sri Lanka and Bangladesh remains limited despite their similarities as lower-middle-income, export-dependent economies; few studies account for the post-2020 period marked by major shocks such as the COVID-19 pandemic and global inflationary pressures. Although empirical techniques such as ARDL and GARCH models are widely applied, studies that combine a comparative framework with recent quarterly data extending to 2023 are scarce. The mixed findings in the literature suggest that the export effects of exchange rate volatility are context-specific, influenced by factors including trading partners and their income, inflation persistence, relative price and trade invoicing currency—dimensions. Addressing these gaps, this study conducts a comparative ARDL-based analysis using quarterly data from

2000Q1 to 2023Q4, employing the standard deviation method to measure exchange rate volatility and assess both short-run and long-run export effects. Guided by trade elasticity and J-curve perspectives, the study anticipates a negative short-run impact of exchange rate volatility due to heightened uncertainty, with potentially weaker long-run effects as firms adjust contracts and production structures.

3. Methodology

The data for this study were obtained from IMF's Direction of Trade Statistics Database, the International Financial Statistics Database, the Central Bank of Sri Lanka, and the Bangladesh Bank. This study focuses on the five major trading partners (United States, the United Kingdom, Germany, Italy, and India) of Sri Lanka and Bangladesh (United States, Germany, Italy, France, and Spain). The suggested variables from literature review are given in Table 1.

Table 1: Data Sources and Definition of Variables

Variables	Definition	Data Sources
Export (EXP)	Value of Export, free on board (FOB), US dollar	International Monetary Fund's Direction of Trade Statistics. [IMF(DOTS)]
Real Effective Exchange Rate (REER)	$REER_t = \sum_{j=1}^{5} EX_{jt}^{w} \times \left[\frac{ER_{jt} \times P_{jt}}{P_t^{SB}}\right]$	Consumer Price Index & Exchange Rate – International Monetary Fund's Direction of Trade Statistics; Exchange Rate – Central Bank of Sri Lanka & Bangladesh Bank; REER- Calculated by Author.
Real Foreign Income (RFI)	$RFI_t = \sum_{j=1}^{5} EX_{jt}^{w} \times Y_{jt}$	Industrial Production Index - International Monetary Fund's International Financial Statistics. [IMF(IFS)]; RFI- Calculated by Author.
Relative Price (RP)	$RP_t = \sum_{j=1}^{5} ER_t \times \frac{CPI_{jt}}{CPI_{SBt}}$	CPI - IMF(IFS); ER - CBSL, Bangladesh Bank; RP - Calculated by Author
Exchange Rate Volatility (VOL)	$VOL_t = \left[\frac{1}{m}\sum_{i=1}^{m}(REER_{it+i-1} - REER_{it+i-2})^2\right]^{\frac{1}{2}}$	VOL - Calculated by Author

- **Export**

The export *(EXP)* is identified as a dependent variable in this study. Moreover, it includes the total exports of Sri Lanka and Bangladesh. This is influenced by exchange rate volatility, real effective exchange rate, real foreign income and relative price.

- **Real Effective Exchange Rate**

The real effective exchange rate *(REER)*, which measures a currency's inflation-adjusted value against a basket of trading partners, indicating international competitiveness, is calculated as predicted by Ekanayake & Chatrna (2010), Ekanayake & Dsouza (2010) and Vinayagathasan & Shiyalini (2023).

$$REER_t = \sum_{j=1}^{5} EX_{jt}^{w} \times \left[\frac{ER_{jt} \times P_{jt}}{P_t^{SB}}\right] \quad (1)$$

While, $REER_t$ is the real effective exchange rate, EX_{jt}^{w} is the weight of Sri Lankan exports (or export share) to the j^{th} country at time t, P_{jt} is the Consumer Price Index of j^{th} country during period t, P_t^{SB} is the Consumer Price Index of Sri Lanka or Bangladesh at time t and ER_{jt} is the bilateral nominal exchange rate (it is the direct, unadjusted market price of one currency against another, or the domestic currency price of a unit of foreign currency, for example, the number of Sri Lankan rupees per US dollar) with country j at time t. *REER* shows competitiveness; ER_{jt} shows immediate transactional value.

Quarterly average bilateral exchange rates were taken from the IMF's International Financial Statistics and the annual reports of the Central Bank of Sri Lanka. Euro is used as the main currency indicator for Germany, Italy, France and Spain; US dollar is used as the main currency indicator of the United States; Indian Rupees is used as the main currency indicator of India and British Sterling Pound is used as the main currency indicator of the United Kingdom. The quarterly consumer price index data for Sri Lanka, Bangladesh, and their five largest export partners were sourced from the International Financial Statistics database of the IMF.

- **Real Foreign Income**

According to Ekanayake and Chatrna (2010), Ekanayake and Dsouza (2010) and Vinayagathasan and Shiyalini (2023), the trade-weighted average of the industrial production index of Sri Lanka's and Bangladesh's 5 major export partners was calculated as below:

$$RFI_t = \sum_{j=1}^{5} EX_{jt}^{w} \times Y_{jt} \quad (2)$$

Where, RFI_t is real foreign income; EX_{jt}^{w} represents weight of Sri Lankan exports (export share) to trading partner *j* at time *t*; and Y_{jt} is the Industrial Production Index (2010=100) for country *j* at time *t*.

- **Relative Price**

Following Ekanayake & Chatrna (2010), Ekanayake & Dsouza (2010), Vinayagathasan & Shiyalini (2023), the trade-weighted average of the industrial production index of Sri Lanka's and Bangladesh's 5 major export partners was calculated as below:

$$RP_t = \sum_{j=1}^{5} ER_t \times \frac{CPI_{jt}}{CPI_{SBt}} \tag{3}$$

Where, RP_t is the relative price, ER_t is a bilateral nominal exchange rate, CPI_{jt} is the Consumer Price Index of country j at time t : and CPI_{SBt} is the Consumer Price Index of Sri Lanka or Bangladesh at time t.

Exchange Rate Volatility

The exchange rate volatility is calculated using the standard deviation method as considered by Vinayagathasan and Shiyalini (2023) and Thuy and Thuy (2019) as follow:

$$VOL_t = \left[\frac{1}{m}\sum_{i=1}^{m}(REER_{it+i-1} - REER_{it+i-2})^2\right]^{\frac{1}{2}} \tag{4}$$

Where, $REER_{it}$ is the real effective exchange rate at time *t*, and *m* is the order for the moving average. Exchange rate volatility is measured using the moving average standard deviation of the exchange rate series. A two-period moving average is used to capture short-term fluctuations in exchange rates that may influence exporters' decisions. This approach reflects the immediate uncertainty faced by exporters in Sri Lanka and Bangladesh, where export activities often respond to recent exchange rate movements. While smoothen the short-term fluctuations and reduce noise in the volatility series, moving average of order two, retain the underlying pattern of exchange uncertainty, without over smoothing the data.

4. Model Specification

This study aims to investigate the impact of exchange rate volatility on exports. To achieve this objective, exports (EXP) are used as the dependent variable, while the real effective exchange rate (REER), real foreign income (RFI), relative price (RP), and exchange rate volatility (VOL) are employed as independent variables. Following the some of the previous studies such as Backman, 2006; Ekanayake and Chatrna, 2010; Todani and Munyama, 2006, the export demand function presented as below:

$$\boldsymbol{lnEXP_t = \beta_0 + \beta_1 lnREER_t + \beta_2 lnRFI_t + \beta_3 lnRP_t + \beta_4 lnVOL_t + \varepsilon_t} \quad (5)$$

In equation (5), β_0 is constant term, $\beta_1, \beta_2, \beta_3, \beta_4$ are the coefficients of the independent variable. EXP is export; $REER\ is$ real effective exchange rate; RFI is the foreign real income; $RP$is the relative price and VOL is the exchange rate volatility. The above model (5) was applied for both Sri Lanka and Bangladesh, where all variables are used in logarithmic form, because economic relationships are often proportional rather than absolute.

Analytical Tools

Augmented Dickey Fuller (ADF) test was utilized to check stationarity of the variables, and if the unit root tests reveal a mix of integration orders, specifically I(0) and I(1), the Bounds Test for cointegration is employed. Autoregressive Distributed Lag (ARDL) model, along with the Bounds Test approach developed by Pesaran et al. (2001), helped to find out the impact of time. The long-run cointegration relationship among the variables is represented by the following equation:

$$\begin{aligned}\boldsymbol{\Delta LnEXP_t = \delta_0 + \delta_1 LnEXP_{t-1} + \delta_2 LnREER_{t-1} + \delta_3 LnRFI_{t-1} + \delta_4 LnRP_{t-1} +} \\ \boldsymbol{\delta_5 LnVol_{t-1} + \sum_{i=1}^{q1} \alpha_{1i} \Delta LnEXP_{t-i} + \sum_{i=0}^{q2} \alpha_{2i} \Delta LnREER_{t-i} +} \\ \boldsymbol{\sum_{i=0}^{q3} \alpha_{3i} \Delta LnRFI_{t-i} + \sum_{i=0}^{q4} \alpha_{4i} \Delta LnRP_{t-i} + \sum_{i=0}^{q5} \alpha_{5i} \Delta LnVOL_{t-i} + \varepsilon_t} \quad (6)\end{aligned}$$

In equation (06), $\alpha_1,..\alpha_5$ represent the short-run dynamic coefficients, while $\delta_1,...\delta_5$ denote the long-run coefficients. The parameters $q_1,..q_5$ represent the optimal lag lengths for each variable, and ε_t is the white noise error term. To investigate the existence of cointegrating relationships among the variables, the Bounds Testing procedure is applied, which is based on the F-test. The F-test evaluates the null hypothesis of no cointegration among the variables (H_0: $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$). Once a cointegrating relationship among the variables is established, the long-run and short-run dynamics can be estimated using the ARDL model.

For this study, the ECM is represented as follows:

$$\begin{aligned}\boldsymbol{\Delta LnEXP_t = \alpha_0 + \sum_{i=1}^{q1} \alpha_{1i} \Delta LnEXP_{t-i} + \sum_{i=0}^{q2} \alpha_{2i} \Delta LnREER_{t-i} +} \\ \boldsymbol{\sum_{i=0}^{q3} \alpha_{3i} \Delta LnRFI_{t-i} + \sum_{i=0}^{q4} \alpha_{4i} \Delta LnRP_{t-i} + \sum_{i=0}^{q5} \alpha_{5i} \Delta LnVol_{t-i} + \emptyset ECT_{t-1} + \varepsilon_t} \quad (7)\end{aligned}$$

In equation (7), ECT represents the error correction term that indicates how quickly deviations from long-run equilibrium are corrected. If it is negative and statistically significant, that suggests a stable long-run relationship between the variables. The model also includes a pure random error term. In addition, Diagnostic tests, stability tests and causality test are performed to evaluate the model's export behavior.

5. Results and Discussion

Table 2: Results of ADF TEST for Sri Lanka

	ADF Test (Intercept Only)		
Variables	Level I (0)	1st difference I (1)	Order of Integration
LNEXP	0.6949	0.0000***	I (1)
LNREER	0.6309	0.0000***	I (1)
LNRFI	0.3464	0.0000***	I (1)
LNRP	0.5667	0.0000***	I (1)
LNVOL	0.0000***	0.0000***	I (0)

Source: Author's Calculation, 2025

Table 3: Results of ADF TEST for Bangladesh

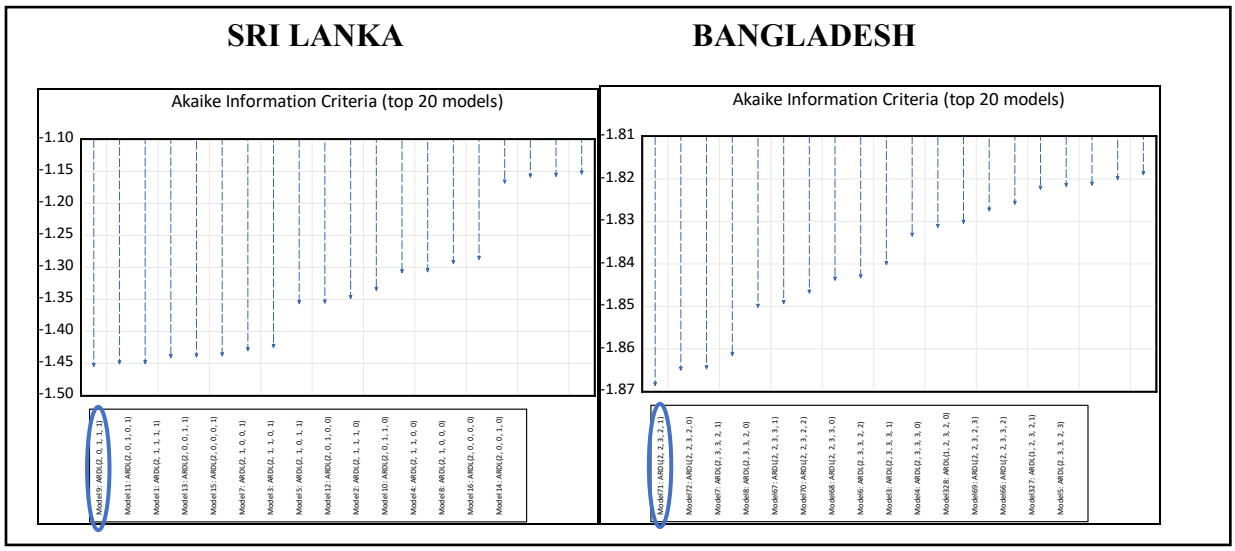
	ADF Test (Intercept Only)		
Variables	Level I (0)	1st difference I (1)	Order of Integration
LNEXP	0.2299	0.0175**	I (1)
LNREER	0.9237	0.0000***	I (1)
LNRFI	0.9532	0.0174**	I (1)
LNRP	0.9230	0.0000***	I (1)
LNVOL	0.0000***	0.0001***	I (0)

Source: Author's Calculation, 2025

Note: Probability values are given in the tables. *, ** and * implies that variables are significant at 1%, 5% and 10% levels respectively.**

The results of ADF tests in Table 2 and Table 3, indicate a combination of integration orders among the variables. Since the P-value for the variables are found to be less than the alpha value (0.05), the null hypothesis is rejected, leading to the conclusion that the variables are stationary. For Sri Lanka, LNEXP, LNREER, LNRFI and LNRP are non-stationary at level but become stationary after first differencing (I(1)), while LNVOL is already stationary at level (I(0)). In Bangladesh, LNVOL is found to be stationary at level (I(0)), whereas LNEXP, LNREER, LNRFI, and LNRP, became stationary only after taking the first difference (I(1)). This mixed order of I(0) and I(1) variables suggests that the Autoregressive Distributed Lag (ARDL) Bounds Test an appropriate methodological choice for the analysis.

Figure 2: The AIC values for the top 20 ARDL models for Sri Lanka and Bangladesh.



Source: Author's Calculation using EViews 12 software, 2025

The ARDL (2,0,1,1,1) model was selected for Sri Lanka as the optimal specification based on the AIC criterion. For Bangladesh, the AIC criterion pointed towards the ARDL (2,2,3,2,1) model as the optimal specification, thus provided the best balance between explaining the data and avoiding overfitting.

ARDL Bounds Test

The presence of a long-run cointegrating relationship among the variables is tested using the ARDL Bounds tests. The findings are presented below:

Table 4: Results of ARDL Bounds Test for Sri Lanka

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Significance Level	Lower Bound I(0)	Upper Bound I(1)
F-statistic	7.752523	10%	2.2	3.09
K	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Source: Author's Calculation, 2025

Tables 4 and 5 depict long-run relationship among the variables in both Sri Lanka and Bangladesh. The F-statistics of Sri Lanka and Bangladesh exceed the upper bound critical values at the 1% significance level, and confirms the presence of a long-run equilibrium relationship among the variables in both Sri Lanka and Bangladesh.

Table 5: Results of ARDL Bounds Test for Bangladesh

F-Bounds Test	Null Hypothesis: No levels relationship			
Test Statistic	Value	Significance Level	Lower Bound I(0)	Upper Bound I(1)
F-statistic	4.975093	10%	2.2	3.09
K	4	5%	2.56	3.49
		2.50%	2.88	3.87
		1%	3.29	4.37

Source: Author's Calculation, 2025

6. Long Run Results

The mix of I(0) and I(1) variables, optimal lag structures, model adequacy and stability, provide a solid foundation for performing the ARDL Bounds Test. This test can examine whether a long-run relationship exists between the variables in Sri Lanka and Bangladesh.

Table 6: Results of ARDL (2,0,1,1,1) Model – Sri Lanka

Constant	LNREER	LNRFI	LNRP	LNVOL
-0.2638	-3.6370	1.9044	3.2820	-0.0997
(0.9252)	(0.0000***)	(0.0005***)	(0.0000***)	(0.0191**)

Source: Author's Calculation, 2025

Note: Probability values are given in the parentheses. *, ** and * implies that variables are significant at 1%, 5% and 10% levels respectively.**

Therefore, the long-run relationship equation for the conditional ARDL (2,0,1,1,1) model is given by:

$$LnEXP = -0.2638 - 3.637LnREER + 1.9044LnRFI + 3.2820LnRP - 0.0997LnVOL \quad (08)$$

Equation (08) portrays the long-run negative impact of exchange rate volatility on exports demand in Sri Lanka., which is statistically significant at 5 percent significance level. The estimated coefficient of the exchange rate volatility implies that a one percent increase in the exchange rate volatility reduces Sri Lanka's export by 0.0997 percent. This relationship makes sense because increased volatility in exchange rates introduces uncertainty in international trade. This increased risk tends to discourage exporters from committing to long-term contracts Results of this study align with previous studies, suggesting that an increase in exchange rate risk results in a decline in export levels, consistent with the findings of Hooper and Kohlhagen (1978), Vinayagathasan and Shiyalini (2023), and Thuy and Thuy (2019).

The impact of *REER* on exports is negative and statistically significant at 1 percent significance level in the long-run, implying that the one percent appreciation of currency reduces Sri Lanka's exports by 3.6370 percent. This result reveal that, after the end of the civil war in 2009, Sri Lanka's economy grew rapidly, which led to an appreciation of the rupee against its trading partners and reducing export competitiveness. While the stronger rupee lowered the cost of imported raw materials, it also raised the price of exported goods. Inflationary pressures and the country's rising external debt also affect export sectors. As a result, the appreciation of the rupee had a negative impact on Sri Lanka's export performance.

Furthermore, the impact of *RFI* on export is positive and statistically significant at 1 percent significance level in the long-run, implying that the one percent increase of real foreign income rises Sri Lanka's export by 1.9044 percent. This suggests that Sri Lanka's export sector has been strongly influenced by the economic growth of its major trading partners, particularly countries like the United States, the European Union, and neighboring Asian economies such as India and China. The positive relationship between Real Foreign Income (RFI) and Sri Lanka's exports reflects the impact of these growth trends, where increases in the income levels of trading partners results in higher export demand from Sri Lanka. This results align with the findings of Vinayagathasan and Shiyalini (2023), and Todani and Munyama (2006).

Additionally, the impact of *RP* on export is positive and statistically significant at 5 percent significance level in the long-run, implying that the one percent increase of relative price increases Sri Lanka's export by 3.2820 percent. This result shows that, Sri Lanka's export sectors, particularly tea and garments, benefited from improved quality and branding, allowing for higher price premiums. Ceylon tea, known for its quality, commands higher prices, while the apparel sector, after the 2000s, saw price increases due to better quality and design, catering to niche markets that valued Sri Lankan products.

The conclusions drawn from the long-run relationship can be summarized as follows: Sri Lanka's exports are positively affected by an increase in relative prices and real foreign income, while a decrease in the real effective exchange rate and exchange rate volatility negatively affects exports.

Table 7: Results of ARDL (2,2,3,2,1) Model - Bangladesh

Constant	LNREER	LNRFI	LNRP	LNVOL
-10.2522	0.3095	2.4543	1.2837	-0.0719
(0.0000***)	(0.7612)	(0.0012***)	(0.0510*)	(0.0508*)

Source: Author's Calculation, 2025

Note: Probability values are given in the parentheses. *, ** and * implies that variables are significant at 1%, 5% and 10% levels respectively.**

The table 7 indicates the long-run coefficient from the ARDL (2,2,3,2,1) model for Bangladesh. Therefore, the long-run relationship equation for the conditional ARDL model is given by:

$$LnEXP = -10.2522 - 0.3095LnREER + 2.4543LnRFI + 1.2837LnRP - 0.0719LnVOL \quad (09)$$

Table 7 indicates the impact of exchange rate volatility on exports is negative and statistically and marginally significant, which suggests that higher exchange rate fluctuation tends to reduce the export demand in Bangladesh in the long-run. The estimated coefficient of the exchange rate volatility implies that a one percent increase in the exchange rate volatility reduces Bangladesh's export by 0.0719 percent. This result reveals that, Bangladesh's export sector, particularly the Ready-Made Garments (RMG) industry, which accounts for over 80% of total exports, relies on stable exchange rates to maintain competitiveness. These results align with previous studies, suggesting that an increase in exchange rate risk results in a decline in export levels, consistent with the findings of Hooper and Kohlhagen (1978), Arize (1995), and Thuy and Thuy (2019).

The impact of *REER* on export is positive and statistically insignificant in the long-run. Furthermore, the impact of *RFI* on export is positive and statistically significant at 1 percent significance level in the long-run, implying that the one percent increase in *RFI* rises Bangladesh's export by 2.4543 percent. This suggests that, Bangladesh's exports, especially RMG, have closely followed global income trends.

The impact of *RP* on Bangladesh exports is positive, but has a statistically marginal significance; it has weaker influence in the long-run, implying that the one percent increase of relative price could rise Bangladesh's export by 1.2837 percent. This result shows that, trade agreements, duty-free access to key markets, and stronger backward linkages in textiles helped sustain exports despite rising prices. Additionally, investments in better labor standards and compliance ,further supported demand and allowing Bangladesh to maintain export growth even though relative prices increased.

The conclusions drawn from the long-run relationship can be summarized as follows: Bangladesh's exports are positively affected by an increase in relative prices and real foreign income, while a decrease in the real effective exchange rate and exchange rate volatility negatively affects exports. But relative prices and exchange rate volatility have no significant impact on exports. And long-run results show that, real effective exchange rate has not significantly impact on exports.

7. Error Correction Model (Short-run relationship between variables and long-run adjustment)

Findings presented Table 8, show that first difference of *EXP* is negative (-0.4407) with a significant p-value (0.0000***), at the first lag and *REER* has no significant short-run impact on exports. The current value of RFI has positive (1.0815) and statistically significant (0.0000***) impact on export in short-run, which is relevant to theoretical

findings, that suggest that, the positive relationship between RFI and exports has been evident in global economic trends. During periods of economic growth, particularly in developed nations like the U.S. and EU, higher RFI lead to increased demand for imported goods, benefiting export-driven economies like Sri Lanka. Economic theory, i.e. the income elasticity of demand for exports, supports this trend. Past global economic booms, such as the post- World War II expansion or the recovery after the 2008 financial crisis, validate this claim of RFI on exports.

Dependent Variable: Export		
Variables	Lag Order	
	Current value (0)	Lag Value (1)
ΔD(LNEXP)	-	-0.4407 (0.0000***)
ΔD(LNREER)	-	-
ΔD(LNRFI)	1.0815 (0.0000***)	-
ΔD(LNRP)	1.6894 (0.0000***)	-
ΔD(LNVOL)	0.0047 (0.6331)	-
ECT (-1) *	-0.3843 (0.0000***)	-
R-squared	0.563082	Adjusted R-squared 0.543445

Table 8: Results of Short-Run - Sri Lanka

Source: Author's Calculation, 2025

Note: Probability values are given in the parentheses. *, ** and * implies that variables are significant at 1%, 5% and 10% levels respectively.**

The current value of RP in Table 8, has positive (1.6894) and statistically significant (0.0000***) impact on Sri Lankan exports in short-run, which is like the findings Vinayagathasan and Shiyalini (2023) and Arize et al. (2000). One percent increase in the relative price increases Sri Lanka's export by 1.6894 percent and suggests that, higher relative prices make Sri Lankan goods more competitive compared to other countries, leading to increased demand for exports in the short run. This is a well-documented economic trend and is indicating a robust short-run relationship. The current value of VOL has insignificant (0.6331) impact on export in short-run. The error correction term, negative and statistically significant, indicates that 38.43% of the deviations from the long-run equilibrium are corrected in the following period.

As shown in Table 9, Current and lag value of REER of Bangladesh has positive and statistically significant impact on Bangladesh export. This indicates that an increase in the REER significantly boosts exports in the short run. This suggests that, REER plays a critical role in influencing export sector via its competitiveness, i.e. when goods become cheaper for foreign buyers, exports generally rise. This claim is well supported by the empirical studies.

RFI shows a significant positive relationship with exports, especially in the two-period lag value (0.6011, p-value = 0.0000), and in one period lag value (1.3656, p-value = 0.0000). This implies that rising foreign income leads to higher exports from Bangladesh in the short run, with stronger effects in the longer lag periods. one percent increase in RFI two periods ago increases EXP today by 0.6011 units. The current value has an insignificant impact (0.2965, p-value = 0.0994), showing that the influence of foreign income takes time to fully manifest. These results show that, the economies of Bangladesh's major trading partners, such as the United States and Germany, grow, their demand for imports, including Bangladesh garments, textiles, and other goods, increases.

Table 9: Results of Short-Run - Bangladesh

Dependent Variable: Export			
Variables	Lag Order		
	Current value (0)	Lag Value (1)	Second Lag Value(2)
ΔD(LNEXP)	-	-0.2413 (0.0151**)	-
ΔD(LNREER)	1.4087 (0.0000***)	1.1741 (0.0000***)	-
ΔD(LNRFI)	0.2965 (0.0994)	1.3656 (0.0000***)	0.6011 (0.0000***)
ΔD(LNRP)	-0.1769 (0.7201)	-1.1834 (0.0139**)	-
ΔD(LNVOL)	-0.0196 (0.0045***)	-	-
ECT (-1) *	-0.4652 (0.0000***)	-	
R-squared	0.550025	Adjusted R-squared	0.501233

Source: Author's Calculation, 2025

Note: Probability values are given in the parentheses. *, ** and * implies that variables are significant at 1%, 5% and 10% levels respectively.**

Furthermore, RP (-1.1834, p-value = 0.0139) in the lag indicates a negative and statistically significant relationship with exports, suggesting that higher relative prices reduce the competitiveness of Bangladesh's exports in the short run. This implies that when the relative price of Bangladeshi goods increases compared to those of trading partners, exports tend to decrease. In periods when Bangladesh's goods became relatively more expensive, export performance is weakened.

Moreover, the coefficient for VOL (-0.0196, p-value = 0.0045) suggests a negative and statistically significant relationship between exchange rate volatility and exports in the short run. This means that higher exchange rate volatility may reduce exports in the short term. The negative sign suggests that increased uncertainty in the exchange rate tends to discourage exporters. Because it becomes harder for exporters to set prices, plan future, or manage their costs when the exchange rate keeps changing. This might be because not all exporters can use hedging tools or adjust their strategies quickly enough to deal with the volatility.

The error correction term (-0.4652, p-value = 0.0000) is negative and statistically significant, indicating that 46.52% of the deviations from long-run equilibrium are corrected in each period. And it's indicating that Bangladesh's export sector returns to long-term equilibrium after short-term disturbances. This suggests a robust mechanism for returning to equilibrium, confirming the presence of a long-run relationship between exports and the independent variables. Results of diagnostic tests that examine the validity and robustness of the estimated ARDL models for both Sri Lanka and Bangladesh, are summarized in Table 10.

Diagnostic tests

Table 10: Results of Diagnostics Test for Sri Lanka and Bangladesh

Test	P-Value (Sri Lanka)	P-Value (Bangladesh)
Serial Correlation (LM Test)	0.0597	0.1988
Heteroskedasticity Test: BPG Test	0.1852	0.2367
Normality Test (Jarque- Bera)	0.2809	0.2596
Ramsey Reset Test	0.6789	0.2858

Source: Author's Calculation,2025

The diagnostic test results confirm that the selected ARDL (2,0,1,1,1 & 2,2,3,2,1) models of both countries satisfy necessary econometric assumptions. The Breusch-Godfrey Serial Correlation LM test indicates that the residuals are not serially correlated. Both the ARCH test and the Breusch-Pagan-Godfrey test for heteroscedasticity reveal that the residuals are homoscedastic and uncorrelated with the regressors. Results of Ramsey's RESET test indicate that the model is correctly specified, with no evidence of omitted variable bias or functional form misspecification.

Stability Test

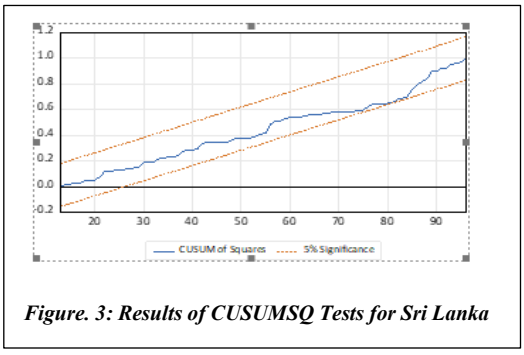


Figure. 3: Results of CUSUMSQ Tests for Sri Lanka

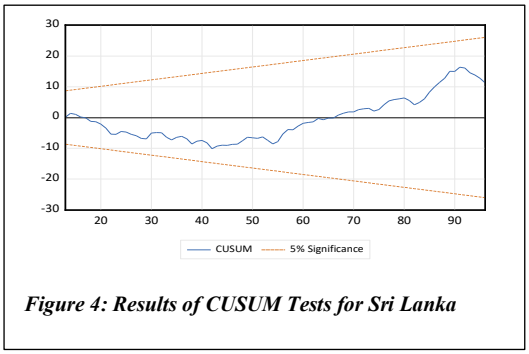


Figure 4: Results of CUSUM Tests for Sri Lanka

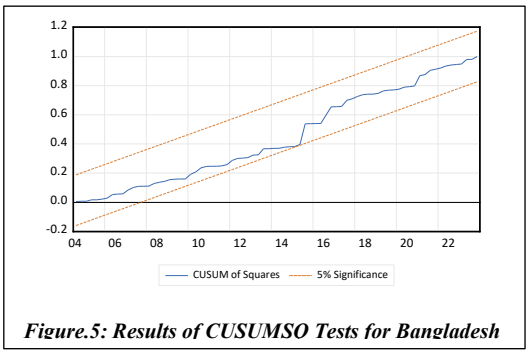


Figure.5: Results of CUSUMSO Tests for Bangladesh

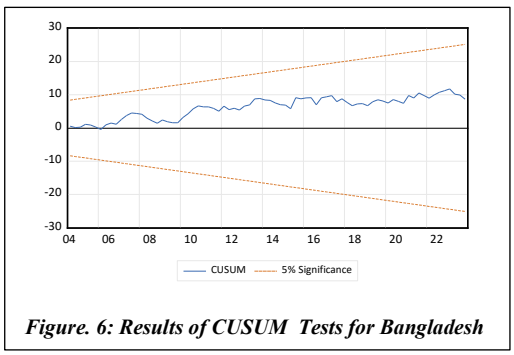


Figure. 6: Results of CUSUM Tests for Bangladesh

Source: Author's Calculation using EViews 12 Software

As presented in the Figures 3,4, 5 and 6, both the cumulative sum (CUSUM) of recursive residuals and CUSUM of square (CUSUMSQ) tests were applied and plots remain within the critical bands of the 5 percent significance level. These results suggest that there is no evidence of significant instability, confirming that the estimated findings remain stable throughout the sample period for both countries. Finally, The Granger causality test was conducted to explore the direction of causality and the results revealed that the real effective exchange rate (REER) and real foreign income (RFI) Granger-cause exports (EXP) at the 1% level of significance, indicating a unidirectional causality from REER and RFI to exports. Exchange rate volatility (VOL) was found to Granger-cause exports at the 5% significance level, suggesting that volatility in the exchange rate significantly influences export performance. However, exports did not Granger-cause REER, RFI, or VOL, highlighting the absence of feedback effects. Furthermore, REER was found to Granger-cause relative prices (RP), and VOL was found to Granger-cause RFI at a 5% significance level. In contrast, exports in Bangladesh were found to Granger-cause REER, RFI, and VOL, indicating that past values of exports can help predict movements in these variables. Notably, bidirectional causality was observed between exports and RFI, signifying a mutually influential relationship. Additionally, RP was found to Granger-cause exports at the 5% level, while REER was significantly influenced by both RFI and RP. Interestingly, VOL did not show any significant causal effect on exports, suggesting that exchange rate volatility does not play a major predictive role in Bangladesh's export behavior. However, a weak unidirectional causality was found from exports to VOL at the 10% level.

Table 11: Summary of the Findings

Variables	Sri Lanka	Bangladesh
Exchange Rate Volatility	Negative and significant impact in long-run but positive and insignificant in short-run. Long-run volatility reduces Exports.	Negative and insignificant impact in long-run but negative and significant in short-run.
Real Effective Exchange Rate	Negative and significant effect in the long-run. Long-term currency appreciation reduces Exports.	Positive and significant impact in short-run but positive and insignificant in long-run.
Real Foreign Income	Positive and significant impact in both long-tun and short-run. Increase in RFI rises Exports.	Positive and significant impact in both long-tun and short-run.
Relative Price	Positive and significant impact in both long-tun and short-run.	Negative and significant impact in short-run but positive and insignificant in long-run.

8. Conclusion and Policy Implication

With an objective to identify the impact of exchange rate volatility on exports in Sri Lanka and Bangladesh and to provide robust empirical evidence to inform export-oriented and macroeconomic stabilization policies, this study used time series quarterly data from 2000Q1 to 2023Q4, using an ARDL model. Based on previous research, Real Effective Exchange Rate, Real Foreign Income and Relative Prices were also considered as influential; the findings reveal that in the long run, exchange rate volatility significantly reduces exports in Sri Lanka, while the impact is though negative, insignificant in Bangladesh. In the short run, however, volatility negatively and significantly affects exports in Bangladesh. REER has a long-run negative impact on Sri Lanka's exports but shows a short-run positive effect in Bangladesh. Real foreign income positively influences exports in both countries across both time horizons. Relative prices significantly enhance exports in Sri Lanka in the long run, while their impact is insignificant in Bangladesh. In the short-run relative price negatively and significantly impacts exports in Bangladesh, while for Sri Lanka, RP has positive and significant impacts on exports. The speed of adjustment toward long-run equilibrium is 38.43% per quarter for Sri Lanka and 46.52% for Bangladesh.

Policy Recommendations

To mitigate the adverse effects of exchange rate volatility on exports, both Sri Lanka and Bangladesh should implement policy measures that directly address the empirical findings of this study. The results indicate that greater exchange rate stability is essential for sustaining export growth. Sri Lanka should adopt a managed floating exchange rate regime that allows flexibility while preventing excessive fluctuations that could disrupt export competitiveness and affect exporter confidence. In addition, strengthening export resilience through diversifying export products and markets, simplifying foreign trade procedures, and strengthening trade agreements can reduce vulnerability to exchange rate shocks. Promoting foreign direct investment (FDI) in export-oriented sectors and encouraging the use of currency risk-management tools such as forward contracts can further help firms manage the volatility identified in the empirical analysis.

For Bangladesh, the statistical results similarly highlight the importance of macroeconomic stability in maintaining export performance. Improving export capacity and technological

advancement becomes important, as it can offset the negative effects of exchange rate uncertainty. Strengthening macroeconomic coordination and adopting market-based exchange rate adjustments can also help reduce persistent volatility. Revising monetary policy instruments, may assist in managing inflationary pressures that contribute to exchange rate instability.

Since the study highlights the risks associated with currency fluctuations, both countries should invest in regional cooperation, such as early warning systems for exchange rate volatility and regional currency settlements, via platforms such as SAARC, to monitor external shocks and respond proactively. This can help to mitigate and adapt to exchange rate fluctuations.

Finally, this study accept few limitations due to the data: as it is a high frequency data that consists of major crisis periods, studies that involve structural breaks with causative accuracy could bring more nuances of exchange rate movements; which is beyond the scope of this study and remains an avenue for future research.

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