The Impact of Exchange Rate Volatility on Export Earnings: Evidence from Sri Lanka

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Abstract

In Sri Lanka, the relationship between exchange volatility and exports is a persistent issue in economic growth and development. Through uncertainty and adjustment costs, exchange rate volatility can have a direct impact on trade. The objective of this study is to analyze the exchange rate volatility on exports in Sri Lanka from 2001 to 2019. The motivation of this study is to investigate the relationship between exchange rate volatility on real export earnings in SriLanka after the implementing floating exchange rate policy. The study found a positive relationship between exchange rate volatility and export earnings in Sri Lanka.

Keywords: Exchange Rate, Exports, Earnings, Bilateral Trade, Volatility

Introduction

Exchange rates have fluctuated enormously leading to instability and a lack of confidence (Bartolini and Bodnar,1996). Traditionally, the volatility of exchange rates has influenced the majority of all market participants either in a positive or negative way. Therefore, with the increasing instability of international economies, it is highly important to achieve a further understanding of the effects that exchange rates pose. Only then, countries can become more proactive, explore possible benefits, and prevent potential economic threats. Based on the assumption that exporters and importers are likely to exhibit some degree of risk aversion associated with trade uncertainty, exchange rate fluctuations represent a potential concern. Ceylon was an open economy with a few commercial crops, among which tea dominated as the main source of foreign exchange earnings and generation of

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employment, albeit with a high concentration in the upcountry. Even after independence from British rule in 1948, the same economic structure continued until 1956 (Athukorala et al, 2017).

Sri Lanka experienced a new era in development strategy starting from late 1977 with a new political regime coming into power with a land slide victory, due mostly to the economic hardships that the nation was engulfed in, with the failure of the previous regime. Since 2001, Sri Lanka has had a floating exchange rate system that allows for independent adjustment of the exchange rate based on market forces of demand and supply. Despite the fact that it is called free-floating in theory, the central bank intervenes whenever it fluctuates rapidly.

The impact of exchange rate volatility on exports is divided into two categories as positive impacts and negative impacts. It is depending on the assumptions used in relation to the definition of exchange rate volatility, market structure, the flexibility of production capacity, the presence or absence of a forward exchange market, and the risk preferences of traders (Hooper and Kohlhagen, 1978; Ethier, 1973; De Grauwe, 1988; Viaene and Vries, 1992; Sercu and Vanhulle, 1992; and De Grauwe, 1994). Theories that rising volatility increases the value of exporting firms, thus encouraging exports. Viane and de Vries (1992) note the ambiguity of outcomes by observing that because importers and exporters are on opposite sides of a risky trading relationship; their respective roles are reversed, leading to a positive coefficient on the volatility variable for one partner. Broll and Eckwert (1999) also conclude that volatility increases the value of a trader's option to export; since this risk increases the potential gains from trade, the volume of trade increases accordingly. In the case of exports, it finds a negative effect of volatility in the short-run, but a positive impact in the long run. The positive impact on exports, in the long run, is particularly welcome, especially as many African countries have adopted the floating exchange rate regime as part of economic reforms.

The main objective of the study is to analyze the exchange rate volatility on export earnings in the Industrial sector in Sri Lanka from 2001 to 2019. The main proposition

of the study is that exchange rate volatility may produce a slight influence on export earnings in Sri Lanka.

If the volatility is excessive, it would generate uncertainty in the foreign exchange market and thereby would affect the value of foreign currency assets and liabilities of individual institutions. The frequent changes in the exchange rate appear to have been based on either artificial or biassed policy recommendations, and they have not eliminated the manufacturing sector's anti-export bias. This has resulted in exchange rate fluctuations, and the unpredictability of exchange rates has an impact on the country's industrial export earnings. Meanwhile, GDP contribution is decreasing year after year. Furthermore, in Sri Lanka, the relationship between exchange volatility and industrial export earnings is a continuing issue in the country's economic growth and development (Department of Commerce, 2017). Because exchange rate depreciation is favorable for exports, but the exchange rate fluctuations bring out uncertainty to both domestic and international traders which may influence the earnings of exports leading to the research question, what is the effect of exchange rate volatility on export earnings with reference to Sri Lanka’s industrial export earnings? As a result, an empirical analysis of the aforementioned phenomenon in Sri Lanka is required.

Literature Review

An increase in exchange rate volatility may indicate an increase or decrease in export volume. Hsing (2006) used and extended the Mundell-Fleming model to investigate movements in Venezuela's real effective exchange rate. The open macroeconomic model including three simultaneous equations is applied. The export earnings are defined as the earnings of a company or country that are generated through the trade. There are strong indications in literature which link a country’s export earnings to fluctuations in foreign exchange rates.

Clark (1973) analyses the relationship between exchange rate volatility and exports, in which a firm produces a homogenous commodity and exports its products entirely

to one foreign market. Broll and Eckwert (1999) also concluded that volatility increases the value of a trader's option to export; since this risk increases the potential gains from trade, the volume of trade increases accordingly. Tunc et al (2018) suggested that while bilateral exchange rate volatility depresses trade between two countries, external exchange rate volatility displays a significant positive contribution to the trade between them. However, the effect of the bilateral volatility is larger than the effect of the external volatility since the former has a direct effect while the latter has an indirect effect.

The real exchange rate volatility has a significant impact on exports to Sri Lanka's main export markets, the United States and the United Kingdom, both in the short and long run, according to the findings. Overall, the study's findings support the notion that Sri Lanka's export trading activities could be expanded by maintaining a stable competitive Real Exchange Rate (Francis and Ganeshamoorthy, 2017). Meantime AL Soos and Madurapperuma (2016) found that real exchange rate impact positively on export. Overall, the findings of these results show that trading activities of Sri Lanka can be improved by maintaining a stable competitive real exchange rate.

The short-run and long-run estimation results showed that exchange volatility has no significant effect in the short-run but has a positive and significant effect in the long-run on aggregate and sectoral exports. Senadza and Diaba (2017) found that the positive impact on exports, in the long run, is particularly welcome, especially as many African countries have adopted the floating exchange rate regime as part of economic reforms Meanwhile, employing the Johansen approach of co-integration and using Autoregressive Several theoretical studies such as Ethier (1973); Clark (1973); Baron (1976); Cushman (1986); Peree and Steinherr (1989) have shown that an increase in exchange rate volatility will have adverse effects on the volume of international trade. The study surveyed by the International Monitory Fund (1984) did not yield consistent results, with a large majority producing little or no support for a negative relationship between export earnings, while bilateral studies seem to establish a negative relationship between the two variables. Viaene and Vries (1992)

state that even in the occurrence of a forward market, exchange rate volatility can affect eventually the volume of trade. McKenzie and Brooks (1997) used the ARCH model to quantify variability in exchange rates in their study of U.S.-German bilateral trade over the monthly period 1973-1992. In their model, trade is viewed as a function of income, relative prices, exchange rates, and volatility. The estimation results indicated that a significantly positive relationship exists between volatility and trade flows. Senadza and Diaba (2017) studied the effects of exchange rate volatility on exports and imports based on a sample of 11 floating-exchange rates Sub-Saharan African economies. In the case of exports, it finds a negative effect of volatility in the short run, but a positive impact in the long run. Akhtar and Hilton (1984) suggest that exchange rate variability reduces the volume of international trade in manufactured goods. The results of the study indicated that exchange rate volatility has statistically significant effects on the export volumes for all countries. The signs and magnitudes of the volatility coefficients differ widely across the countries; negative for the U.S. and U.K. and positive for Germany, Japan, and France. Arize et al. (2000 and 2008) estimated export models to examine the effect of real exchange rate variability on export flows of 13 less developed countries and 8 Latin American countries, respectively. They used Johansen's multivariate cointegration and error correction techniques over the quarterly periods 1973-1996 and 1973-2004 to measure the long-run and short-run dynamic impacts of exchange rate volatility on exports. The major results showed that increases in exchange rate volatility impose significantly negative effects on exports both in the long-run and in the short-run in all countries. On the other hand, many researchers assumed that the higher exchange risk lowers the expected revenue from exports, and therefore, reduces the incentives to trade. The exchange rate is the only source of risk for the decision-maker without the availability of hedges (forward contracts, options and portfolios of options) (Gonzaga & Terra, 1997).

The IMF (1984) estimated bilateral export functions between G-7 countries over the quarterly period of 1969- 1982. Export is considered as functions of foreign income, capacity utilization, real exchange rate, and real exchange volatility, which was

measured as the standard deviation of percentage changes in the exchange rates over the preceding five quarters. From a total of 42 estimations made, only three provided negative and significant relationships, while eleven cases- provided positive and significant relationships between the exchange volatility and exports. This implies that the open capital markets of EMEs may have reduced the effects of exchange rate fluctuations on exports compared with those effects in the other developing countries. There are also studies that employ an augmented version of the gravity model1 to investigate the relationship between exchange rate volatility and trade flows. These studies also failed to establish any systematic relationship between the two variables. Frankel and Wei (1993) looked into the relationship between exchange rate volatility and bilateral trade flows between 63 industrial and developing countries by using cross-section data for 1980, 1985, and 1990. The empirical results found that exchange rate volatility has negative and significant effects on trade in 1980 and positive and significant effects in 1990. Dell' Ariccia (1999) investigated the impact of nominal and real exchange rate volatility on bilateral trade between 15 EU countries and Switzerland over the period 1975-1994. He used four different measures of volatility and found negative, but small (ranging between -0.10 to - 0.13) coefficients on the exchange rate volatility, implying that elimination of the exchange rate volatility would raise bilateral trade between Switzerland and the 15 EU countries by 10 to 13 percent. When fixed and random effects are incorporated in the estimation procedure to explain the simultaneity bias, however, the effect of exchange volatility was reduced significantly to 3-4 percent. As well as Oskooee and Hegerty (2007) have been that the increase in exchange-rate volatility has indeterminate effects on international trade flows. This simple model is also developed by a number of authors, for example, Baron (1976b); Hooper and Kohlhagen (1978), indicated the same conclusion that exchange rate volatility has a negative effect on exports. However, all of those conclusions result from several restrictive assumptions. One obvious criticism of the traditional models is that the exporter's risk exposure is attributed solely to the exchange rate volatility, whereas it may depend on the availability of hedging techniques, diversification possibilities, the existence of imported inputs, and other factors. The rationale of this assumption

is that forward exchange markets are just in infancy or even not appear in developing economies. In addition, transaction hedging may prove relatively expensive and challenging for some manufacturing firms with a long time between order and delivery. However, this is not the case with advanced countries, in which such markets are well- developed. For risk-adverse entrepreneurs who can hedge their contracts, a higher exchange rate volatility would not always deter exports, as noted by Ethier (1973) and Baron (1976).

According to the Mohsen Bahmani-Oskooee & Massomeh Hajilee in 2011 found that, the exchange rate volatility has significant short run effects on the trade flows between Sweden and the US in almost two-third of the industries while the long run effects are limited in one third of the cases. Both short run and long run coefficients go in either direction: negative or positive. Together with this conclusion, "the short-run effects last into long run, only in limited cases, though more in export commodities than import one", this statement is expressed by Bahmani-Oskooee & Wang (2008). On the other hand, Sercu & Uppal (2003) stated that, an increase in exchange rate volatility may associate with either an increase or a decrease in the volume of international trade depending on the source of volatility.

The real exchange rate has a positive impact on export, according to the study's findings. Overall, these findings indicate that maintaining a stable competitive real exchange rate can improve Sri Lanka's trading activities (Madurapperuma, 2018).

Data Collection

The methodology of the study is based on a quantitative-method approach by analyzing exchange volatility and exports earnings in Sri Lanka. The study was mainly based on quantitative data. Sri Lankans' aggregate export was collected for the period of 2001 to 2019. Because Sri Lanka adopts the floating exchange policy regime in 2001 onwards with the observations of the Central Bank the data set consisted of monthly observations for the interest variables used in the analysis. The study used real effective exchange rate statistics on a monthly basis from the Central

Bank of Sri Lanka. The data on exports, industrial exports value indexes, and GDP of each country are obtained from International Financial Statistics available on the internet site of the IMF. All real values are measured through the base the of year 2000. All these series will express in US dollar terms.

The Econometric Model Specification

To examine the impact of exchange rate volatility on exports, this study adds an exchange rate volatility variable to the traditional export demand function comprising consumers' income (or GDP) and relative price, which has been used in many previous studies such as Salas (1982); Gafar (1995); Matsubayashi and Hamori (2003); Ekanayake et al. (2010). Following Backman (2006) the relationship for export side is presented by the following equation:

$$EXPt = \beta 0 + \beta 1\ REER + \beta 2 IPI + \beta 3 EVOLt + Ut \qquad (1)$$

Where EXP represents natural logarithm of monthly Sri Lanka's export earnings to Sri Lanka Million USD; REER is the real effective exchange rate index; IPI is industrial production index and EVOL is the exchange rate volatility measured using the methodology discussed below.

With regard to the functional form, Khan and Ross (1977) suggest that a loglinear specification is better than a standard linear one on both empirical and theoretical grounds. That is, the former allows the dependent variable to react proportionally to an increase or decrease in the regressors and exhibits interaction between elasticities. As open-economic "macro-level" regressions rely on monadic export equations where a country's change in total exports is the dependent variable with the REER as the main variable export demand changes encountered by the country. Despite considerable progress in the econometric aspects, the fundamental specification of McGuirk (1986), which derives its regression specification from Armington (1969), has remained virtually unchanged over the past few decades. The supply-side situation mainly reflects the GDP. The reason for not utilizing GDP is, that it consists of agriculture and service sectors as well.

As stated by Rizov and Willenbockel in 2008, EWMA and SMA are the two methods of calculating Exchange Rate Volatility. Therefore, the following formula can be used to calculate the volatility of the exchange rate.

ERV = [1 $m \sum (eijt+i-1\ m\ i=1$ - $eijt+i-2)2]$ 1/2.....(5)

Where "eijt" means Log Bilateral Exchange Rate and "m" indicate the order of moving standard deviation for the time "t" with Sri Lanka to the "j"th country. A moving standard deviation over 12 months method has commonly been used in previous studies (Huchet-Bourdon, M. and J. Korinek, 2011). For each month, this measure is the standard deviation of the previous 12 observations ending that current month in the first case. Where m = 12 is the order of the moving average (Chowdhury 1993). Further, according to McKenzie (1999) study, the most widely used exchange rate volatility is the moving average of the standard deviation of the exchange rate. Therefore, empirical results are based on 1a 2-month standard deviation in the study.

Results and Discussion

The study sought to establish the effect of exchange rate volatility on export earnings with reference to the most used foreign currency the United States Dollar. The findings were as shown below. The regression analysis is related to the spreading of the average value of one random variable as the other variables which need not be random are allowed to take different values. A multivariate regression model was applied. The regression model mainly related the average values of the dependent variable to various values of the independent variables.

The unit root test: since the assumptions for the classical regression model require that both variables be stationary and that errors have a zero mean and finite variance. A type of stochastic process that has gained a great understanding of concentration and analysis by time series analysts is the so-called stationary stochastic process. The econometric consequences of nonstationary can be quite severe, leading to least squares estimators, test statistics, and predictors that are unreliable. The stationarity of a time series data can be tested with a unit root test (Hill et al. 2001).

$\Delta Yt = \theta Yt{-}1 + Vt$

where ΔYt = Yt − Yt−1 is the first difference of time series, Yt−1 is lag(first) of variable, Vt is a random disturbance with mean zero and constant variance $\sigma 2$.

Table 1: *Unit root test (ADF)*

Null Hypothesis: the variable has a unit root					
	At Level				
		INEX	IPI	REER	VOL
With Constant	t-Statistic	-0.7498	-2.8591	-1.1878	1.4408
	Prob.	***0.6991***	***0.0967***	***0.1857***	***0.9793***
		no	*	no	no
With Constant & Trend	t-Statistic	-3.1589	-3.9289	-1.9953	0.0746
	Prob.	***0.0712***	***0.0278***	***0.5963***	***0.7996***
		*	**	no	no
Without Constant & Trend	t-Statistic	1.5987	-1.0101	-0.0049	2.89631
	Prob.	***0.8521***	***0.1898***	***0.6853***	***09635***
		no	no	no	no
	At First Difference				
		d(INEX)	d(IPI)	d(REER)	d(VOL)
With Constant	t-Statistic	-2.9989	-16.0001	-12.8647	-11.8557
	Prob.	***0.0000***	***0.0000***	***0.0000***	***0.0000***
		***	***	***	***
With Constant & Trend	t-Statistic	-3.9799	-14.1286	-12.6547	-12.2654
	Prob.	***0.0014***	***0.0000***	***0.0000***	***0.0000***
		***	***	***	***
Without Constant & Trend	t-Statistic	-3.9534	-17.9543	-13.3554	-11.7577
	Prob.	***0.0000***	***0.0000***	***0.0000***	***0.0000***
		***	***	***	***
b: Lag Length based on SIC					
c: Probability-based on MacKinnon (1996) one-sided p-values.					
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Note: (*) Significant at the 10%; (**) Significant at the 5%; (***) Significant at the 1% and (no) Not Significant

The unit root test was utilized in case there was more than one trend in the series. The study employed Augmented Dickey-Fuller (ADF) to test the stationarity since it is the most commonly used test for each variable. The null hypothesis was that the variable contained a unit root, and the alternative hypothesis was that the variable was generated by a stationary process. According to the results, export earnings turn out to be time-series integrated of order zero. On the other hand, the rest of the variables are nonstationary time series. Then taking the first differences of nonstationary time series, all variables become stationary variables. The first differences between the real effective exchange rate, industrial production index, and exchange rate volatility made them stationary.

Then, this study applies the Johansen co-integration tests to investigate the long-run relationships among the selected determinants of real exports with the usage of lag length as lag 3.

Table 2: *Cointegration Test*

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.1854	44.4261	46.7485	0.0734
At most 1	0.0475	14.7986	28.9999	0.5996
At most 2	0.0309	9.4568	13.4586	0.3699
At most 3	0.0126	1.9963	2.9414	0.0896

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.1968	28.4698	26.9685	0.0401
At most 1	0.0396	7.9963	21.5698	0.8756
At most 2	0.0286	5.9685	13.9385	0.7001
At most 3	0.0136	2.5652	3.6854	0.0789

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.0 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

EXP	REER	IPI	VOL
-6.9896	0.0965	-0.0685	3.3568
1.6354	-0.0858	-0.0265	-3.4698
-2.5369	-0.0386	0.0168	2.7965
-0.4011	-0.0602	0.0221	7.1698

The results for both Trace statistic and Maximal Eigen statistic tests are reported in Table 2. Table 2, the above trace test, points that the existence of one co-integration relationship at a 0.05 level. The maximum Eigenvalue test confirms this result. Both trace and Eigenvalue tests confirm the result that there exists a long-run association among variables. Hence the null hypothesis of no co-integration has been rejected. Once the existence of one co-integrating relationship is established, the next step is to estimate the Error Correction Model to identify the normalized co-integrating coefficients.

Bounds testing for level relationships

An autoregressive distributed lag (ARDL) model is an ordinary least square (OLS) based model which is applicable for both non-stationary time series as well as for times series with mixed order of integration. The main assumption in the Bounds Testing methodology of Pesaran et al. (2001) is that the errors of the Equation employed must be serially independent. This requirement may also be influential in the choice of optimal lags for the variables in the model. The result indicates that at the 5 percent significance level, we cannot reject the null hypothesis. The study employed the LM test to test the null hypothesis of no serial correlation.

Table 3: *The LM test*

Breusch-Godfrey Serial Correlation LM Test: Pesaran et al. (2001)		
F-statistic	0.4698 Prob. F (2,205)	0.5698
Obs*R-squared	1.3685 Prob. Chi-Square (2)	0.5398
Pesaran et al. (2001)		

The selected model is suitable to test the cointegration relationship between the variables. As can be seen from the table, Since the null hypothesis is that the residuals are serially uncorrelated, the F-statistic p-value of 0.4698 indicates that the model will fail to reject this null. Then the study concludes that the residuals are serially uncorrelated.

Table 4: *F-statistics to test the existence of long-run relationships.*

Test Statistic	**Value**	**K**
F-statistic	5.015986	3
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.69	3.66
5%	3.13	3.89
2.5%	3.69	4.79
1%	3.99	4.93
Pesaran et al. (2001)		

According to the calculated F-statistic of 5.015986 is exceeds the upper bounds, this situation brings the existence of level relationships between exports, industrial production index, real effective exchange rate, and exchange rate volatility in the export equation.

To identify long-run and short-run relationships, the selected ARDL model is rewritten as a single error correction model.

Long-run and short-run relationships

The selected ARDL model is rewritten as a single error correction model to identify long-run and short-run relationships.

Table 5: ARDL Cointegrating and Long Run Form

ARDL Cointegrating And Long Run Form
Dependent Variable: LOG(INEX)
Selected Model: ARDL (3, 0, 1, 0)
Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG (EXP (-1))	-0.2985	0.0810	-3.6851	0.0211
DLOG (EXP (-2))	-0.2189	0.0498	-4.3955	0.0117
DLOG(REER)	0.1178	0.0298	3.9530	0.0167
DLOG(IPI)	0.0471	0.0233	5.0557	0.0072
DLOG(VOL)	0.1345	0.0468	2.8739	0.0638
CointEq(-1)	-0.3243	0.0631	-5.1394	0.01427
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
McKenzie and Brooks (1997)				
LOG(REER)	0.1598	0.0618	2.5857	0.0087
LOG(IPI)	-0.0885	0.0196	-4.5153	0.0107
LOG(VOL)	0.3987	0.1298	3.0716	0.0372
C	0.7845	0.3364	2.3320	0.0800
Pesaran et al (1996)				
R-squared	0.5489	Mean dependent var		0.0037
Adjusted R-squared	0.5209	S.D. dependent var		0.1724
S.E. of regression	0.1327	Akaike info criterion		-1.1598
Sum squared resid	3.5098	Schwarz criterion		-1.0190
Log likelihood	130.5334	Hannan-Quinn criter.		-1.1047
F-statistic	17.0937	Durbin-Watson stat		2.0162
Prob(F-statistic)	0.0000			

*Note: p-values and any subsequent tests do not account for model selection.

Note: *** are respectively significant of 1%, the standard errors are inparenthesis
Cointeq = LOG(EXP) - (0.1598*LOG(REER) -0.0885*LOG(IPI) + 0.3987 *LOG(VOL) + 0.7845)

The estimated coefficient of VOL is about +0.39 percent, pointing toward that the exchange rate volatility has a positive impact on exports earnings. A one percent rise in volatility increases Sri Lankas' exports by about 0.39 percent from 2001 to 2019. Further, a one percent change in exchange volatility results in a 0.15 percent decrease real effective exchange rate and a 0.088 percent decrease in the industrial Production Index.

Table 6: *The ECM for the selected ARDL model of output equation.*

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
D(EXP(-1))	-0.2320	0.1985	-1.1688	0.3269
D(IPI)	0.0047	0.0009	5.2222	0.0136
D(REER)	0.0075	0.0046	1.6304	0.2015
D(VOL)	-0.0698	0.2984	-0.2339	0.8316
ECM(-1)	-3.3415	1.2586	-2.655	0.0766
ECM(-2)	-1.2396	1.5698	-0.7897	0.4873
ECM(-3)	-0.0986	0.3694	-0.2669	0.8068
ECM(-4)	-1.3898	0.3914	-3.5508	0.0380
C	0.0047	0.0095	0.4947	0.6547
Pesaran and Shin (1999) and Pesaran et al (1996)				

The table above summarises the error correction representation of the estimated ARDL model. According to the empirical results, the error correction term has the correct sign (negative) and is statistically significant. This provides additional evidence of co-integration relationships among the model's variables. The estimated value of the error correction term denotes the rate at which the long-run equilibrium is restored in response to short-run shocks.

Table 7: *Causality Tests Results*

Null Hypothesis:	Obs	F-Statistic	Prob.
IPI does not Granger Cause EXP	228	5.2785	0.0038
EXP does not Granger Cause IPI		5.4863	0.0045
REER does not Granger Cause EXP	228	1.6842	0.2987
EXP does not Granger Cause REER		2.9845	0.0721

VOL does not Granger Cause EXP	228	5.1984	0.0048
EXP does not Granger Cause VOL		0.2398	0.7984
REER does not Granger Cause IPI	228	0.4593	0.4287
IPI does not Granger Cause REER		0.2936	0.6853
VOL does not Granger Cause IPI	228	2.1018	0.5698
IPI does not Granger Cause VOL		0.0339	0.9485
VOL does not Granger Cause REER	228	0.7864	0.3941
REER does not Granger Cause VOL		0.0042	0.9931

Granger, C. W. J. (1969)

According to the above results, the study cannot reject the hypothesis that IPI does not Granger cause, and EXP does not Granger cause IPI. REER does reject the hypothesis that REER does not Granger cause EXP, but EXP does not reject the hypothesis at a 10 percent significance level. Therefore, it appears that Granger causality runs one way from EX to REER and not the other way. VOL to EX also shows the same result respectively. Further, another combination of the variables rejects the hypothesis that does not have a Granger cause.

This is consistent with theoretical models. Because this risk raises the potential gains from trade, the volume of trade rises as well. This result is consistent with Broll and Eckwert (1999), Asseery and Peel (1991), McKenzie and Brooks (1999). (1997). Furthermore, Senadza and Diaba (2017) discovered that the long-term positive impact on exports is particularly welcome, especially given that many African countries have adopted the floating exchange rate regime as part of economic reforms.

The econometric model used is designed to determine whether short-run changes in export earnings exist. All of the determinants have a statistically significant impact on export earnings, according to the findings. Exchange rate volatility (lvol) is associated with both export earnings and exchange rate volatility, indicating a positive relationship between export earnings and exchange rate volatility. This positive relationship implies that as exchange rate volatility rises, so will Sri Lankan iexport earnings. On the other hand, it can be explained as exporters goods being able

to adjust to exchange rate fluctuations on the spot, which is consistent with Hsing (2006), Karadam (2015), Viane and de Vries (1992), Broll and Eckwert (1999), and Asseery and Peel (1991), among others.

Conclusion and Policy Recommendation

This study provides an analysis of the relationship between exchange rate fluctuations and export earnings in Sri Lanka from 2001 to 2019.

The research study examined the impacts of exchange rate volatility on export earnings from the period of 2001 to 2019. In this study, the dependent variable was export earnings in US dollars and the independent variables were exchange rate volatility, industrial production index, and real effective exchange rate. This study mainly deals with data on the exports that are exporting to all over the world. Being the dependent variable of the model with three main individual variables made a particular model for the study. Each variable was to test for unit roots cautiously to avoid the issue of spurious regressions. The study has been implemented with aggregate monthly data over the period between January 2001 and December 2019, consisting of 228 observations.

The study sought to examine the impact of exchange rate volatility on export earnings. In a sample of six major trading countries, panel data models were used to determine the nature of the relationship between the two variables. The empirical findings show that the relationship between exchange rate volatility and export earnings is both determinate and statistically significant. The effects of exchange rate volatility in the short run are positively associated with export earnings and positively in the long run as well. Hence this situation is a natural phenomenon because the exporters cannot immediately adjust the volume of their trade in accordance with fluctuations in the exchange rate. On the other hand, this negative relationship provides the idea to be positive when admitting the fact that exporters being aware of the earlier period variations made appropriate decisions regarding the earnings of their exports. As mentioned by many researchers, it will create an efficient impact for

the exchange rate to extremely fluctuate if all fundamental macroeconomic variables are equally volatile. It is not variated equally, there will be abnormal profit opportunities that arise for investors that smooth exchange rate movements. The exchange rate of the country cannot pertain to any contained pattern or indications about future exchange rates, it would be used to gain a profit. In addition to that, the exchange rate volatility is a risk for the companies which are manufacturing export products since it is a variable that cannot be predicted.

Then, policymakers must take steps to reduce the risks associated with exchange rate fluctuations. Exporting firms can use the forwards exchange rate, which is quoted and traded today but delivered and paid on a specific future date. This method is one of several unique methods used in the financial market. It should be strong and clear enough in many cases, and depending on traders' risk aversion, exchange rate fluctuations increase the costs of protecting against those risks.

In the current context, exports are not limited to goods; the export of services is also important. The country requires Foreign Direct Investment in export industries. Understanding the need for economic reforms to boost exports is essential. There is an urgent need for comprehensive reforms to boost exports. To facilitate and develop Sri Lanka's export industries, the government should create a conducive environment and implement appropriate policy measures. According to the empirical findings, there is a positive relationship between exchange rate volatility and export earnings. This relationship may be natural, as exporters cannot immediately adjust the volume of their exports in response to exchange rate fluctuations.

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