*International Research Journal of Social Sciences*_____ ISSN 2319–3565
Vol. **12(2),** 1-8, July **(2023)** *Int. Res. J. Social Sci.*

Do remittances spur economic growth through export-led Growth: Empirical evidence from Sri Lanka?

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Available online at: www.isca.in, www.isca.me
Received 11th July 2022, revised 11th March 2023, accepted 18th May 2023

Abstract

Covering a sample from 1990 to 2020 the present study empirically investigates whether remittance influence the trade flows of Sri Lanka in long-run. The stationary condition of the series is verified by the ADF and Philips-Perron unit root tests. The short-run unilateral causality between export and remittances is validated using Wald Granger Causality. The long-run correlation between the variables is assessed using ARDL bound test techniques. The ECT method is used to verify that the variables have a long-term relationship. Further, ARDL bound test shows that remittance has positively influenced the export performance of Sri Lanka during the study period. It's conceivable that remittances are used for investment, and households have less desire to purchase imported goods and services. Granger Causality and ECT test validate the existence of short-run and long-run associations among the variables. Moreover, findings revealed, that exports and remittances influence the Sri Lankans' economic growth; hence efforts should be made to boost economic growth through remittance-led export. Thus, governments and policymakers should put more devised to enhance higher inflows of contemporary capital, like remittances, to stimulate export growth.

Keywords: Remittances, ARDL, Granger Causality, Export, Recipient country.

Introduction

Remittances are a vital resource of income for the domestic people in developing nations, and they are regarded as a reliable source[1]. The remittances can significantly improve the well-being of families left behind, primarily by reducing poverty and improving health, education, and income distribution[2]. Remittances have been vital in foreign currency earnings, providing a significant bulwark against the expanding trade deficit while bolstering Sri Lanka's external sector resilience. Foreign exchange revenues have financed around 80% of the annual trade deficit through employee remittances[3].

Further, remittances have a favorable effect on export, and this benefit increases as remittances rise with Gros Domestic Product (GDP)[4].

Reaching economic growth is the prime goal of every nation. Export is one of the crucial factors in the growth of an economy, as it stimulates growth by moving goods to sectors where they have a competitive advantage, increasing efficiency. Furthermore, unskilled labor creates a large number of job opportunities, which helps to minimize economic disparity and uplift the standard of living in emerging countries. More foreign direct investment (FDI) and technology transfer are also attracted by enhanced trade opennes[5]. Higher exports and a positive influence on growth result from remittances in export sectors[6].

Sri Lanka has received a substantial amount of remittance, particularly between 1992 and 2006[7] and Hien[8] pointed out that increasing remittance pushes economic growth by increasing home country income, reducing credit limitations, attracting foreign and local capital, and developing human capital through education and health. However, Chami[9] confirmed that remittances had a negative impact on growth because a large inflow of remittances diminishes the spur to work, limiting labor force participation and output growth.

Scholars attempted to establish the relationship between remittances and economic growth[10-14] in Sri Lanka. Since Sri Lanka is an immense beneficiary of overseas remittances (Figure-1), and also a significant source of foreign exchange earnings it is vital to consider the importance of remittances in each sector. However, researchers have paid less attention to assessing the effect of remittances on exports in Sri Lanka. With this prime motivation, the present empirical study sought to delve into the relationship between remittances and export in Sri Lanka.

According to Figure-1 workers' repatriation rose to nearly eight percent of GDP from 2001-2020, indicating the rising importance of workers' remittances in Sri Lanka's GDP, which averaged around 6% between 1990-2000. However, except for 2016-2020, remittances have been declining for the past six years. Workers' remittances surged significantly in the second half of 2020, with the highest monthly remittances in December 2020, up 5.8% year on year to US$7.1 billion in 2020.

Figure-1: Workers Remittance (% of GDP in Sri Lanka from 1990- 2020).

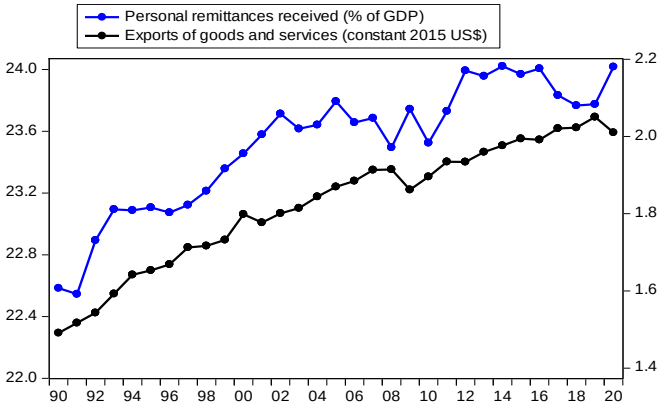

Figure-2: Exports of goods and services (constant 2015 US$) in Sri Lanka.

After setting the introduction, Section two evaluates the previous scholarly works on the impact of repatriation on export performance, both globally and nationally. The research approach is discussed in Section 3, and the final section ends with the results and conclusions.

Literature Review: Marwana[15] used the Johansen Cointegration technique and the Solow-model approach to analyze the impact of export, remittance, and overseas development assistance (ODA) on the growth of Sudan during the years 1977–2010. They confirmed the existence of the positive relationship between export, growth and remittance in the longrun. Further, they also proved the two-way connection with remittances and economic growth. Furthermore, they found any causal relationship in Sudan's exports and growth throughout the considered period.

Using random and fixed effects as well as the interaction of dummy variable models Soma Rani Sutradhar[16] examines the influence of workers' remittances on the economic growth of South Asian countries by engaging panel data from 1977 to 2016. They confirmed significant and negative relationships in Bangladesh, Pakistan and Sri Lanka whereas a positive relationship between remittances and economic growth was found in India.

From 2000 to 2016, Eranda[10] used panel data to portray the impact of workers' remittances on trade flows. He noticed that a large volume of remittances is linked to a less diverse export portfolio. He also demonstrated that higher government efficacy allows for overall export diversification; rather than modifying the number of exported product names, trade improvements and actual exchange rate volatility promote export concentration. Muhammad[17] analyzed the relationship between remittance and exports and concluded that the negative effect of workers' remittance on exports in Pakistan from the period 1981 to 2012.

Kumar[18] explored the influence of remittances, financial development and exports, on Pakistan's economic growth during 1980 to 2009. The bound tests technique indicated that exports are a significant influence on remittances in the short run. Fayad[19] discovered a significant correlation between export growth and remittances using time series data from 1980 to 1990.

Shahzad et al[19] used OLS (FMOLS) and Dynamic Ordinary Least Square (DOLS) models to examine the long and short term associations between remittances, foreign direct investment, exports, and economic growth in South Asian nations from 1988 to 2011. They revealed that remittances, capital, FDI, and exports had a positive effect on economic growth whereas employment had a negative impact. Further, the Granger causality shows that FDI Granger causes growth in the short term.

Nihar and Sethi[21] explored whether remittance led to an export performance in certain South Asian countries from 1993 to 2017. They applied the Johansen–Fisher panel cointegration method, Pedroni's, and Kao's method to validate their findings and confirmed the permanence of long-run relationship between the variables. Further, they found remittance inflows harm export performance.

Ramesh and Acharya[22] analyzed the role of remittances, cooperatives, infrastructure and FDI in the export performance, by applying the Autoregressive Distributive Lag (ARDL) approach of cointegration from 1993 to 2018in Nepal. It proved that the cooperatives have less contribution to export-led activity; however, the aspect is positive. Further, their findings revealed that remittances have a significant detrimental effect on export enforcement, which is the outcome of the large number and quality of infrastructure development projects.

Kandil and Mirzaie[23] found that remittances burgeoning export in Tunisia but not in Jordan and Egypt. Bayangos and Jansen[24] studied the influence of worker's remittance on the export of Philippines and found a negative effect on export. Likewise, Chowdhury and Rabbi[25] explored the impact of remittances on export in Bangladesh from 1971 to 2008. They confirmed that

the increasing remittances caused to deteriorating the export competitiveness, conformity with the story of the Dutch disease harming the export performance. Shamim[26] detected a adverse relationship between workers' remittances and export, using data from Pakistan. Using the yearly data from 1993 to 2017[21] suggested that remittances have negatively influenced export performance in South Asian countries.

Tung[27] investigated the consequences of remittance on the trade balance for 17 countries in the Asia-Pacific region from 1980 to 2015. The estimated results strongly indicated that remittance inflows negatively impact the trade balance of these countries. Mohamed Saadi[28] observed that when remittances are turned into an investment it causes to increase the export in developing countries from 2002 to 2014.

The majority of the findings in the preceding discussion have shown the detrimental impact of remittances on export performance in many nations, connecting with the Dutch disease story. In general, remittances raise external reserves, which leads the home currency to gain in the global market, resulting in cheaper imports and more costly exports, having a negative overall impact on export performance.

This study highlights the need for further research into how remittances impact Sri Lanka's export performance since there hasn't been a thorough review of the role of remittances in relation to export performance in Sri Lanka. Against this backdrop, the present study investigates the effects of remittances on exports in Sri Lanka using annual data from 1990 to 2020 and Autoregressive Distributed Lag (ARDL) technique is appliance for the cointegration of variables with different orders of integration.

Theoretical background: In receiving countries, remittances stimulate capital accumulation and impact the expansion of productive capacity. Further, recipient households have had the power to enhance their physical and human capital accumulation[29]. As a result of remittances, labor inputs increased. Since the remittances are treated as non-labor income by the recipients' country, it is expected to have a negative impact on labor participation rate[30]. Remittances can redefine total factor productivity by altering the efficiency of domestic investment. The real exchange rate, which describes the Dutch disease impacts on receiving countries, may appreciate remittances. These can happen if equilibrium exchange rate appreciation causes production sectors to contract, resulting in dynamic production externalities[29].

In this empirical investigation, Mankiw[31] extended the fundamental growth model of Solow (1956) by incorporating shift factors into the neoclassical Cobb-Douglas production function. According Toto Rao & Takirua[32], the primary Hicks-neutral technical progress with constant returns of production function find as follows.

$$Y_t = A_t K_t^{\alpha} L_t^{l\ -\propto} \quad (1)$$

Where: A_t is technology, K and L are capital and labour, respectively and t indicates the time period. As a result, the Solow growth model assumes a technical progression as follows:

$$A_t = A_0 e^{gT} \quad (2)$$

Where: A_0 is the original stock of information. It is similarly expected that:

$$A_t = f\left(r_{t,}\ e_t, f_t, g_t,\ n_t\right) \quad (3)$$

Where: r- remittance, e- export, f- foreign direct investment, g - GDP and n– employment. The rearrangement of the equation of (1) and (3) results:

$$Y_t = \left(r_{t,}\ e_t, f_t, g_t,\ n_t\right)\ K_t^{\alpha} L_t^{l\ -\propto} \quad (4)$$

Methodology

Data: Annual data from 1990 to 2020 was considered for the variables analyzed in this present study. The entire variable considered for this study is extracted from World Bank Development Indicators (Table-1). To change the normality and linearity of the data, it was transformed into natural logarithms.

Table-1: Detail of variables.

Variable	Description	Measurement	Source
Ex	Exports of goods and services	(constant 2015 US$)	WBDI
Rem	Personal remittances	received (% of GDP)	WBDI
Fdi	Foreign direct investment)	net inflows (% of GDP	WBDI
Gdp	Real GDP at Constant National Prices	Millions of 2017 U.S. Dollars	WBDI
Em	Employment to Population Ratio	Percent	WBDI

Unit Toot Test: Since the time series have a trend or drift the ADF and PP tests were performed to validate the stationarity of the variables and also escape the difficulty of spurious regression.

The following hypotheses were established to confirm whether the variables have unit root or non-stationary in statistics.
$H_0 = \beta_1 = 1$ (Variables are non- stationary)
$H_0 = \delta_1 = 0$ (Variables are stationary)

Mostly, the unit root specifies the acceptance of the alternative hypothesis when a p-value is greater than 1%, 5%, and 10%.

Determination of optimal lag length: The likelihood for successive values (lags) in economic time series data to be highly correlated increases the chance of multicollinearity in the model. As a result, the AIC or Schwartz criterion with the lowest output lag must be chosen[33]. In a vector autoregressive (VAR) estimation with few observations, the Akaike Selection Criterion (AIC) should be used to choose the lag length that "prefers" the more simple models. The information criterion with the least criteria value, conversely, indicates the best lag length to use. The Akaike information criterion is preferred by empirical researchers (AIC). Therefore, the present study considered the Akaike Information Criterion (AIC) for optimal lag-length selection.

Econometric Specification: Employing Auto Regressive Distributed Lag (ARDL) method, the present study examines the relationship between export and worker's remittance in Sri Lanka by employing yearly data covering from 1990 to 2020. Also, the data on GDP, export, FDI, remittance and employment are taken up and mined from the World Bank Development Indicators.

$$\mathrm{Ex_t} = \beta_0 + \beta_1 Remi_t + \beta_2 Gdp_t + \beta_3 Fdi_t + \beta_3 Em_t + \varepsilon_t$$

ARDL and the ECM Approach: The ARDL technique is the more suitable method to determine whether there is a long-term link among the variables when the main repressors are I (1), I (0), or somewhat integrated. Since the present study is mixed with I (1), and I (0) it considers the ARDL approach to analyzing the findings.

$$\mathrm{Ex_t} = \delta_1 \mathrm{Remi_{t-i}} + \delta_2 Gdp_{t-i} + \delta_3 \mathrm{Fdi_{t-i}} + \delta_4 Em_{t-i} + \sum_{i=0}^{p} \beta_{1i} \Delta \mathrm{Ex_{t-i}} + \sum_{i=0}^{q1} \beta_{2i} \Delta Remi_{t-i} + \sum_{i=0}^{q2} \beta_{3i} \Delta \mathrm{Gdp_{t-i}} + \sum_{i=0}^{q3} \beta_{4i} \Delta \mathrm{Fdi_{t-i}} + \sum_{i=0}^{q4} \beta_{5i} \Delta Em_{t-1} + \mathrm{u_t}$$

Where: Ex - Exports of goods and services (constant 2015 US$), Remi - Personal remittances, received (% of GDP), Fdi - Foreign direct investment, net inflows (% of GDP), Gdp - GDP (Real) at Constant National Prices, Millions of 2017 U.S. Dollars, Em - Employment to Population Ratio for, Percent, δ_1, δ_2, δ_3, and δ_4 – coefficients, U_t - error term

In the ARDL bound approach, the F- statistics value determines whether the variables have a long-run cointegration. Using the Wald or F-statistic, the null hypothesis is assessed using the Unrestricted Error Correction Model while considering the lagged variables Ex, Remi, Gdp, Fdi, and Em. When the F-statistic is less than the lower critical bounds, it means the variables have no long-term co-integration.

The hypothesis for the co-integration is constructed as follows:

$H_0 = \delta_1 = \delta_2 = \delta_3 = 0$ (There is no co-integration among the variables).

$H_1 = \delta_1 \neq \delta_2 \neq \delta_3 \neq 0$ (There is co-integration among the variables).

Table-2: ADF and PP unit root test.

When the variables have long-run co-integration, the following model is estimated.

$$\Delta \mathrm{Ex_t} = \mathrm{Ex_1} + \sum_{i=0}^{p} \delta_{1i} \Delta \mathrm{Ex_{t-i}} + \sum_{i=0}^{q1} \beta_{1i} \Delta Ex_{t-i} + \sum_{i=0}^{q2} \beta_{2i} \Delta \mathrm{Ex_{t-i}} + \sum_{i=0}^{q3} \beta_{3i} \Delta \mathrm{Fdi_{t-i}} + \sum_{i=0}^{q4} \beta_{4i} \Delta Em_{t-1} + \mathrm{u_t}$$

The equations below describe the short-run dynamics of the ARDL model and the error correction model:

$$\Delta \mathrm{Ex_t} = \delta_0 + \sum_{i=0}^{p} \beta_{1i} \Delta \mathrm{Rem_{t-i}} + \sum_{i=0}^{q1} \beta_{2i} \Delta Gdp_{t-i} + \sum_{i=0}^{q2} \beta_{3i} \Delta \mathrm{Fdi_{t-i}} + \sum_{i=0}^{q3} \beta_{4i} \Delta \mathrm{Em_{t-i}} + \lambda \Delta ECT_{t-1} + v_t$$

Diagnostic test: To overcome some of the drawbacks of the Durbin-Watson autocorrelation test, popular correcting autocorrelation methods such as Breusch-Godfrey serial correlation, Lagrange Multiplier (LM) test and Breusch and Godfrey (B - G) autocorrelation are used for model diagnostics. Up to the stated number of lags, the null hypothesis of the B-G test confirms that there is no serial autocorrelation. To see if the estimated model was normally distributed, the Jarque-Bera normality test was used. The CUSUM and CUSUMSQ tests are also used to determine whether or not the data set is fundamentally broken. It provides more reliable data series results for the variables.

Granger causality test: The Granger Causality approach is a statistical method for evaluating information between time series. The null hypothesis cannot be rejected if the p-values are greater than 0.05, indicating that there is no Granger causal relationship between variables and vice versa. The null hypothesis is rejected if the p-value is less than 0.05, indicating that there is a Granger causal relationship between variables and vice versa. The present study performed the VAR Granger causality analysis to determine short-run causality between the variables.

Results and discussion

Unit Root test: To validate the reliability of regression results, data had checked and confirmed whether it meet the assumptions of regression as well as normally distributed before performing the model of the study. The time series data found trends (unit root problems) and ADF and PP methods were applied to eliminate the de-trended and have a constant mean and variance over time (time series data can be stationary). Table-2 portrays the outcomes of the ADF and PP unit root tests and except for FDI, all other variables have a unit root problem when variables are considered at the level. However, variables become stationary at the first difference. Therefore it is concluded that variables mixed of I (0) and I (1) can go for the ARDL bound test approach.

Variable	ADF Test		PP Test		Order
	Level	1st difference	Level	1st difference	
LEX_t	-2.43875 (0.1402)	-5.77178 (0.000)	-4.34897(0.0018)	-6.58613 (0.0000)	*I*(1)
LEM_t	-2.11860 (0.2392)	-6.65005 (0.000)	-2.26960 (0.1878)	-5.97589 (0.000)	*I*(1)
$LREM_t$	-2.07335 (0.2561)	-5.98750 (0.000)	-2.54002 (0.1165)	-3.26183 (0.0245)	*I*(1)
$LGDP_t$	-1.01812 (0.7337)	-6.358 (0.000)	-3.29377 (0.7767)	-3.29377 (0.0245)	*I*(1)
$LFDI_t$	-7.86247 (0.000)		-4.977132 (0.0004)		*I*(0)

Graphical valuation between remittances and export: Exploratory data analysis (EDA) such as scatter plots and confidence ellipse by kernel fit have been estimated to validate the real connection between remittances and export in Sri Lanka from 1990 to 2020. Figure-1 illustrates that workers sendings and exports in Sri Lanka expanded by 95 percent of the confidence region from 1990 to 2020.

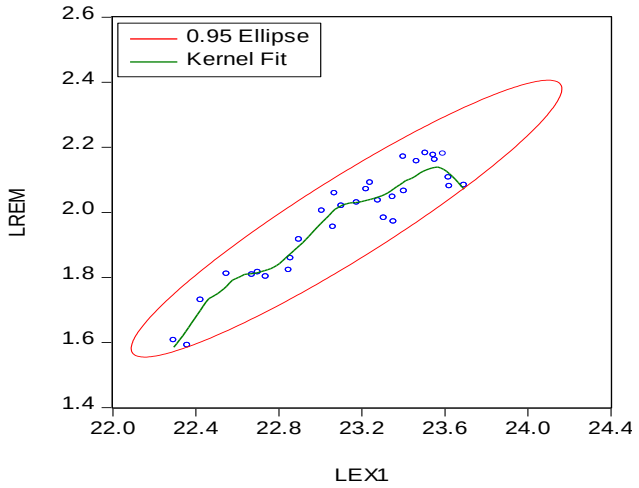

Figure-1: Relationship between worker's remittances and export in Sri Lanka from 1990- to 2020.

Table-3 Lag length criteria: Because our data sample is small, we picked Akaike -Information Criteria (AIC) to match the data attributes. As indicated in column AIC of Table-3, the lags are selected for the whole model using the ARDL (1, 2, 0, 0, 2) lag length selection criteria.

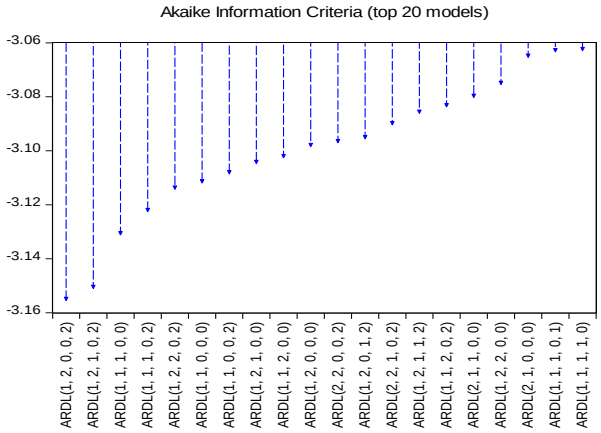

Figure-1: Model Selection Criteria.

With the exception of FDI, all other variables, including Ex, Rem, GDP, and Ex, are stationary at first difference as shown in Table-1. After confirming the mixed stationary of I (1) and I (0) lag selection was performed and E-views 9 was automatically selected (Figure-2) based on the Akaike Information Criterion (AIC) lag of 2 (1, 2, 0, 0, 2) which's the best compared to others since it having a small lag length. Therefore, the ARDL (1, 2, 0, 0, 2) model is applied to examine the association between remittance and export in Sri Lanka.

Cointegration test: Following the lag section using ARDL, the long run relationship between the variables is completed. At a 5% level of significance, the estimated F-statistics (Table-4) is 8.7069, with critical value ranges of I (0) = 2.56 and I (1) = 3.49. The null hypothesis will be established by comparing estimated F-statistics to critical values.

Table-3: VAR Lag Order Selection Criteria.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	118.4042	NA	2.76e-10	-7.820979	-7.585238	-7.747148
1	244.8405	200.5542*	2.61e-13	-14.81659	-13.40214*	-14.37360*
2	274.6085	36.95339	2.22e-13*	-15.14541*	-12.55227	-14.33327

Table-4: Cointegration test results.

Test statistic	Value	
F- Statistic	8.7069	
K	5	
Significance	*I*(0) Bound	*I*(1) Bound
10%	2.2	3.09
5%	2.56	3.49
1%	3.29	4.37

Table-5: Findings of the Diagnostic tests**.**

Model	Test statistic			
	Breusch-Godfrey Serial Correlation (LM Test)		Heteroskedasticity (ARCH Test)	
	F- Statistic	Prob. *F* (2, 15)	F-statistic	Prob. *F* (1, 25)
ARDL (1, 2, 0, 0, 2)	0.8433	0.7301	0.6285	0.6124
J-B test statistic	χ^2			*p*-value
	0.001393			13.15278

Diagnostic test: To confirm the study model's reliability, various diagnostic tests are performed. The JB test statistics indicate that the error term is normally distributed and that the model is stable as long as the functional form is correct (Table-5). Autocorrelation and heteroscedasticity problems are also eliminated from the model. Figure-2 and 3 depict the model's CUSUM and CUSUM of squares results. The recursive constancy check confirmed the stability test models as CUSUM and CUSUM of squares lines are within the bounds.

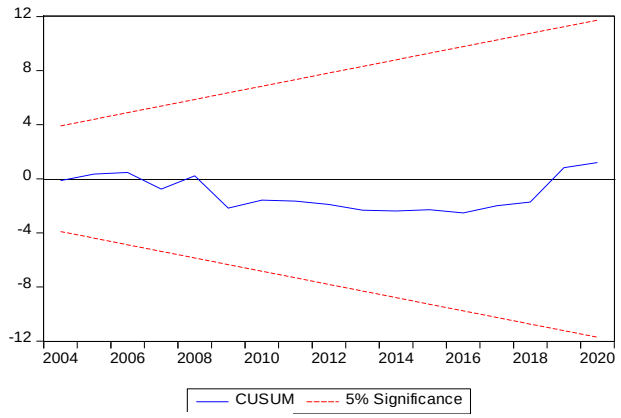

Figure-2: CUSUM Test.

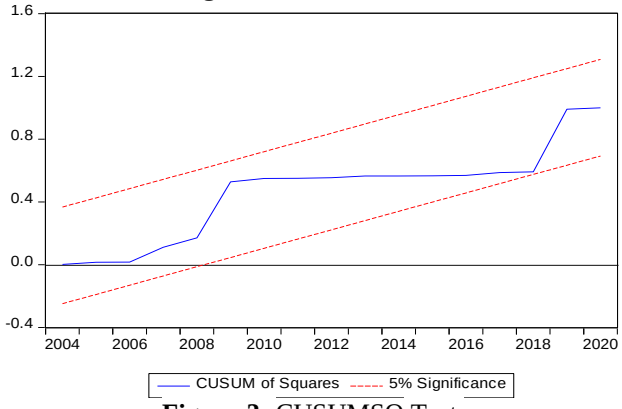

Figure-3: CUSUMSQ Test.

Table-6: Long -Run coefficient of variables. **p<0.01.*

Dependent Variables: $\mathbf{lnEx_t}$			
Variable	Coefficient	*t*-statistic	*p*-value
$\mathbf{lnRem_t}$	0.769327	2.729886	0.0133
$\mathbf{lnGDP_t}$	0.457012	5.646422	0.0000
$\mathbf{LFDI_t}$	0.069128	1.595560	0.1271
$\mathbf{LEM_t}$	1.128776	1.360345	0.1896
C	11.78257	3.576080	0.0020

Table-7: Coefficient of Error correction**.** **p<0.01.*

Dependent Variables: $\boldsymbol{lnEX_t}$			
Variable	Coefficient	*t*-statistic	*p*-value
$\mathbf{ECT_{t-1}}$	-0.843654	-2.2620	0.0363*

Table-6 demonstrates the long term relationship between regress and and explanatory variables. Also, validating the subsistence of a strong relationship among the variables ARDL cointegration confirms that there was a significant effect between remittance and export in Sri Lanka during the study period. The assessed coefficient of remittance given in Table-6 indicates that 1 percent increases in remittance induce 76 percent of export in Sri Lanka. The findings of the study further imply that Sri Lanka was not experienced the indication of Dutch disease which indicates that the flow of remittances seemed to have an impact on the exchange rate. This finding is confirmed by the findings of Hien[8]; Marwana et al[15]; Shahzad et al[16] and Fayad[19] that remittances and export have a long run cointegration as well as a positive relationship. Further, this finding contrast with Muhammad et al[7], Soma Rani Sutradhar[16], Jena and Sethi[21]; Bayangos and Jansen[24]; Chowdhury and Rabbi[25]; Shamim[26]; Tung[27].

In order to validate the existence of long-run relationship between the variables ECT_{t-1} proceed was employed after conforming to the long run cointegration. The Error Correction Term (ECT_{t-1}) value of -0.843954 carries a negative and

significant (Table-7) coefficient at a 5% level describes that the model is dynamically stable and comes to equilibrium by 84 percent of error every year.

Granger Causality Test: To confirm the interconnection between remittance and export in Sri Lanka, VAR Granger causality has been used. The table depicts the results of single-equation VAR Granger causality (Chi-sq test). According to Table-8, (a) the null hypothesis "remittance does not Granger Cause export" is rejected since the corresponding p-value is less than the 5% significant level; (b) the null hypothesis "export does not Granger Cause remittance" cannot be rejected since the null hypothesis's corresponding p-value is greater than 5% significant level. As a result, findings in Table-8 suggest that there is a unidirectional causality in Sri Lanka that runs from remittance to export.

Table-8: VAR Granger Causality Tests.

Null Hypothesis	Chi-sq	df	Prob.
$\Delta LREM_t$ does not Granger Cause ΔLEX_t	4.557685	2	0.0452*
ΔLEX_t does not Granger Cause $\Delta LREM_t$	6.192399	2	0.1024

Conclusion

Workers' remittances have grown over the past few decades in Sri Lanka and a significant contributor to currency inflows for Sri Lanka. It is providing a significant platform against the nation's expanding trade imbalance and so strengthening the resilience of the country's external sector. Many Sri Lankans migrate to other nations in pursuit of work, sending their earnings back to their families in Sri Lanka. Workers' remittances contribute to enhancing the financial condition of recipients (consumption at the household level) and maintaining the foreign assets at the nationwide and, but it's also interesting to search into whether remittances have any effect on the economy. Considering Sri Lanka receives a high amount of remittances, this paper examines whether the workers' remittances have much to do with the country's exports. The findings revealed that the contribution of remittances has a significant positive relationship with the export performance of the country from 1990 to 2020. Further, the study discovered that during the study period, Sri Lanka did not encounter any symptoms of the Dutch disease which indicates remittances create a devaluing of the real exchange rate, which upturns export diversification (the exchange rate was affected by the flow of remittances). Further, the VAR granger causality confirms that there is a unidirectional relationship between remittance and export during the study period in Sri Lanka. To maximize the positive effects of remittances on export and economic growth, the government and policymakers should focus on ways to make remittances and labor migration cheaper, safer, and more productive, engaging all relevant partners.

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