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Remittances as a determinant of import function: A time series analysis

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Abstract
The time series analysis focuses on establishing a relationship between remittances and import in the economy of Sri Lanka. The present study's objective, therefore, examines the relationship between remittances inflow and imports in the case of Sri Lanka. Empirical analyses are carried out with the time series econometric techniques encompasses Johansen cointegration test, Vector Auto-Regressive (VAR) analysis and Granger-causality test using time series data over the period of 1977-2017. The main finding is that there is a bidirectional causality relationship between imports and remittances in Sri Lanka. Despite, there is the absence of long-run determination between the two, in the short-run, foreign remittances determine imports. Therefore, it should necessary to take appropriate strategies and migration policy changes to convert the utilization of foreign remittance towards investment.

Keywords: remittances, imports, Sri Lanka, granger-causality test

1. Introduction

The remittances play a prominent role in the households of migrants and contribute to the balance of payment of their homeland as well (Al Mukit *et al*., 2013) [2]. Correspondingly, workers' remittances in Sri Lanka, have been being an increasingly significant role for the country's economy in terms of both exports and GDP **(**Sanika and Chandana, 2018) [7]. In contemporary years, remittances from workforces have been growing rapidly to become one of the foremost external finance sources in developing countries. It tends to accelerate the speed of economic growth and national savings and also enlarges the investment in receiver countries (Raheem *et al*., 2014) [6].

In general, remittances are an essential mechanism of transferring incomes from developed economies to developing economies. The inflow of remittances impacts the economic growth of the receiving nations by generating savings and investment and it has a short-run impact on aggregate demand and production by way of consumption as well (Solimano, 2003; Al-Mukit *et al*., 2013) [2]. Foreign currency generated by migrant labour eases the import of capital goods, thereby increase in the production potential of an economy (Ahmed and Uddin, 2009) [1].

Despite, remittance has been as an injection of wealth into the economy on the other hand imports leads to induce the function of income to become outflow (Khan *et al*., 2007) [9]. Generally, remittance not only contributes to accumulating income thereby enhance their families' standard of living but also it allows workers to end imported consumer goods to their family or relatives. Because of the increase in income causing a change in consumption of imported goods, consequently, remittances impact negatively the value of multiplier being a leakage (Khan *et al*., 2007) [9]. However, the overall impacts of remittances are determined by the behaviour and preferences of remittance-receiving households (Sultonov, 2013) [8].

Remittances, as a result of the export of labour, can influence the key macro-economic variable including imports, thereby leads to enhanced aggregate demand and henceforth hinder economic growth. Similarly, it has been observed that in less developing countries, the balance of payment problems caused through a high proportion of imported goods in consumption, can be alleviated with the flow of remittances (Khan *et al*., 2007) [9].

If money recipient families via remittances receive more then they will spend more thereby increasing demand for goods and services leads to the rising domestic price level. This is because of the consequence of more import decision of money recipient who is induced by receiving remittances. Nevertheless, remittances allow increasing supply of foreign currency, subsequently, either depreciation of foreign currency or appreciation of local currency thereby cheaper import and costly export. By way of import becomes cheaper, as a result, the country may benefit from import policy at a better extent it would influence on the remittance (Al Mukit *et al*., 2013) [2].

Furthermore, due to receipt of remittance, increase the household income of migrant families. Consequently, they may have higher propensity to consume which would lead to the increasing demand for goods (Al Mukit *et al*., 2013) [2]. Therefore, it is expected that remittances income can be as a determinant of consumption of imported goods due to more marginal propensity to consume of recipients of remittances.

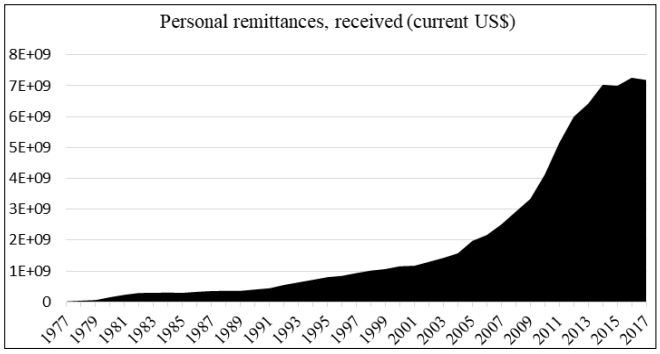
As aforementioned, the debatable phenomenon on the relationship between remittance and import is essential to carry out an investigation to investigate whether foreign remittance induces outflow of local currency through encouraging households' expenditure on import.

In this backdrop, it is mandatory to identify how remittances affect the import. The present study, therefore, examines the impact of remittances inflow on imports in the case of Sri Lanka. In that way, the present study will provide an empirical

analysis to a debatable research question 'Does foreign remittances determine the import in Sri Lanka?' In doing so, observations on foreign remittances and foreign imports will be utilized in this study for the case of the Sri Lankan economy during the period 1977-2017.

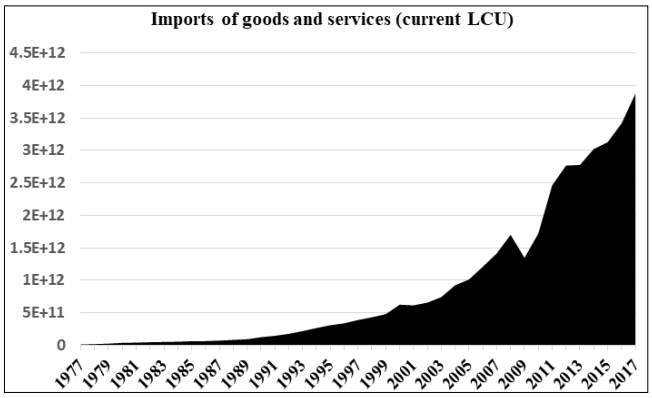
2. Workers' remittances in Sri Lanka

The following figure depicts the tendency of imports and personal remittances in Sri Lanka. Imports of goods and service have been showing an increasing tendency. Imports have been increased over time in the Sri Lankan economy according to the growing demands for the consumption of imported goods. Likewise, personal remittances of migrants have shown a clear trend, it seems increasing figure similar to imported goods and services.



***Source*:** World Bank data, 2019

Fig 1: Personal remittances in Sri Lanka



***Source*:** World Bank data, 2019

Fig 2: Imports of goods and services in Sri Lanka

Remittance tendency in Sri Lanka is similar to global trends. Worldwide, workers' remittances continued the second largest financial inflow to developing countries in 2003 after foreign direct investment, it had shown more than double of net foreign assistance. In the earlier decades, workers' remittances into Sri Lanka were substantial and growing. Considerably, remittances were larger and more stable than both foreign direct investment and on a per capita basis, and workers' remittances were recorded to Sri Lanka as the top in South Asia. Thus, migrant workers' remittances remain to increase, despite the country had contrary experiences on weak labour markets and the tightening of border controls in the industrial countries after the terrorist attacks in 2001 (Esperanza *et al*.,2005) [3].

Even with, it is observable that Sri Lanka had experienced with a substantial inflow of remittances as a result of a significant increase in migration of both skilled and unskilled labour, during the past few years, workers' remittances into Sri Lanka has been declined substantially like other economies namely India, Pakistan and Bangladesh as of notable decline in labour migration to the Middle Eastern countries. The Middle Eastern region remains the major labour market for Sri Lankan migrant workforces, recorded for over 90 per cent of annual migrants for foreign employment from the country. Though, a decline in labour migration to the Middle Eastern countries has occurred as the wake of low oil prices and increasing unrest in the region in recent years. Furthermore, it is also observed that mismatch between the international demand for employments and Sri Lanka's supply capabilities, and permanent migration of skilled workers and professionals leading to either limit of foreign exchange remittances or increase foreign exchange outflows (Central bank annual report, 2017).

Even if in this background, it should be noted that remittances by migrant workers have increased substantially in the long run. Corresponding to generated remittances, imports consumption also has been increased steadily, in the long run. Therefore, as we expected to have a relationship between the two, it can be concluded that remittances might be induced imports consumption.

3. Literature Review

There are few studies that examine the relationship between import and remittances in the selected different economies. The prior empirical studies have already found that there is a relationship between imports and remittances implies foreign remittances induce consumption of import goods.

The scholars investigated the role of remittances on the trade balance of eleven Middle Eastern and North African MENA economics using panel regression analysis. They assumed that remittances are preserved as an exogenous source of permanent income because of qualitative evidence is vague as to whether remittances are considered as permanent or temporary, and studies suggest that the majority of remittances have been employed as consumption expenditures emphasizing that remittances are part of the permanent income as stated by Friedman in his permanent income hypothesis. The scholars also indicated that the impact of remittance on imports is not direct but relied on the proportion of remittances spent by households on imported products. The results found that remittances have affected increasing trade deficits by inducing import-led consumption expenditures (Farzanegan and Hassan, 2016) [4].

Nevertheless, Farzanegan and Hassan, (2016) [4] recommended to utilize the remittances as an investment and to stimulate their beneficial effect on the trade balance of receiving nations. Beyond that, they suggested that to persuade financial services includes savings incentives, interest rate rewards on migrants' deposits, and remittance back bonds to allot larger amounts of remittances to savings as an alternative of consumption.

The empirical research analysis has been conducted to examine the relationship between external determinants and

economic growth in Pakistan using time series econometric techniques. The results showed that foreign remittances and foreign direct investment influence positively on the economic growth of Pakistan. Besides, the results also found that imports affect adversely on the growth of the Pakistan economy (Tahir *et al*., 2015) [9].

The authors examined the relationship between remittances and imports they empathized that according to the expected import function worker's remittances have a vital role in determining imports in an economy. The long-term relationship between remittances and import has found to be a stable and positive associate. Besides, Granger causality analysis found the unidirectional causality relationship between two (Raheem *et al*., 2014) [6].

Al-Mukit *et al*., (2013) [2] they examined the relationship between remittance and import in Bangladesh employing both Johansen Cointegration test and Granger causality analysis. The result of Johansen Cointegration tests exposed that the relationship between remittance and import is stable and positive. Further, the Granger causality test confirmed the existence of unidirectional causality relationship between import and remittance indicating there is no significant impact generating demand on imported goods rather import employs a positive shock on the remittance of Bangladesh.

The study was conducted in Tajikistan to examine the impact of remittance on imports. The result found that remittances inflows impact significantly on imports. If the impact of remittances is taken into account of real domestic income, the effect of remittances on import would be considerably stronger. In addition, the result revealed that when compared remittances income and savings, savings lead to only a small proportionate of expenditure while remittances impact significantly on the expenditures of consumption, even though remittances effect on investment expenditures is irrelevant (Sultonov, 2013) [8].

Khan *et al*., (2007) [9] investigated the relationship between remittances and imports in Pakistan. They found that remittances of oversees are generally spent on imports and the marginal propensity of import and coefficient of remittances are positively related to import as well. The study revealed that remittances have been being employed as a significant determination of imports in the economy of Pakistan.

According to the prior empirical evidence, the selected macro variables have significant interrelation between two, as most of the studies have found that foreign remittances determine the consumption of imports goods in an economy.

4. Research Methodology

In this study an attempt to establish the association between two macroeconomic variables namely remittances and import in the case of Sri Lankan economy. To examine the research purpose, time-series data has been taken over the periods from 1977 to 2017 from World Bank data.

Most previous studies have defined the aggregate import as a function of both real domestic income and the relative price of imports (Sultonov, (2013) [8]; Murray and Ginman (1976), Goldstein and Khan (1985) [9], Bertola and Faini (1991), Hooper and Marquez (1993).

The import function can be written as follow,

$M_t = f\{Y_t, RP_t\}$

Where M_t is total imports, Y indicates the real domestic income, RP represents the relative price indicating the ratio of import's price to the domestic price level.

In this study, the import is specified to depend on both Personal remittances (REM) and trade openness. The present study utilizes the following model by which dependent variable represents the total imported goods while explanatory variables namely remittances (*REM)* and trade openness (*TO)* being as the determination of import. Generally, the log-linear form of the equation is used in the model as shown below,

$$M_t = f\{REM_t, TO_t\}$$
$$ln\, M_t = \beta_0 + \beta_1 lnREM_t + \beta_2 lnTO_t + \varepsilon_t$$

In this study, in order to identify whether how much do countries dependence on international trade, openness to trade has been utilized which is also often called trade-to-GDP-ratio. Openness to trade is the sum of imports and exports and divides by GDP.

The openness index [1] measures the degree of both reliance of domestic producers on international markets and their trade orientation of exports and the dependence of domestic consumers on the international market of goods and services (BIS performance indicators, 2015).

Openness to trade is defined as follows (at current prices, current exchange rates):

$$\frac{\text{Imports (both goods and services)} + \text{Exports (both goods and services)}}{\text{GDP}}$$

In the present analysis time series, econometric analysis namely Augmented Dickey-Fuller unit root test, Johansen cointegration test, Vector Auto-Regressive (VAR) analysis and Granger-causality test are to be tested in a framework using time series data over the period of 1977-2017.

As an initial step of the analysis, time-series data are to be converted into their logarithms before the analysis in order to interpret the elasticity of the variables. Secondly, to establish the order of integration of the variables the Augmented Dickey-Fuller unit root test is to be utilized using the following the model.

$$\Delta Y_t = \beta_1 + \beta_{2t+\delta} Y_{t-1} + \alpha_i \Sigma \Delta Y_{t-i} + \varepsilon_t$$

Where εt is a white noise error term and $\Delta Y_{t-1} = Y_{t-1} - Y_{t-2}$ and so on are the number of lagged difference term which is empirically determined. If all variables are being non-stationary, it follows to find the existence of a cointegrating relationship. If not, based on the results of the stationary test the study will be intended to choose an appropriate econometric model.

The scholars have been used various econometric models in

[1] A low ratio of a country does not indicate high (tariff or non-tariff) obstacles to foreign trade, but it is may be due to the factors especially size and geographic remoteness from prospective trading partners. The larger the ratio implies that the more the country is exposed to international trade.

order to find the long-run and short-run relationship between foreign remittances and imports. The Johansen cointegration tests can be used to be in order to establish the existence of a long-term relationship between the two variables in this study. Similarly, in order to find the short-term relationship, Granger-causality test is to be used in this study since Granger-causality test is appropriate to establish a short-run relationship while using Johansen cointegration tests for establishing the existence of long-run relationship (Granger, 1986) [10].

There are three different sorts of the situation in which a Granger-causality test can be applied. In this line, Granger-causality can also be tested in a VAR framework, where we have the results of Johansen cointegration tests in which variables are not cointegrated. Granger-causality in a VAR framework indicates a correlation between the present value of a variable and the past values of another variable. For instance, if we consider two variables namely X and Y, by which if lagged values of X and Y can forecast X variable while Y variable causes X. On the contrary, if X variable stimulates Y variable, then variable X Granger causes Y. This is termed unidirectional causality represents one variable causes another variable (association is valid in only one direction). In opposition, both variables X and Y influenced by the other's lagged value in addition to its own lagged, this is called bidirectional causality (the relationship is valid in both directions) (Urbain, 1989) [10].

Furthermore, when building a VAR model, the selection order criteria to decide on a functional lag length of VAR is essential due to the fact that choosing a higher-order lag length rather than the true lag order increases the mean square forecast errors of the VAR model, and selecting a lower lag order than the true lag lengths usually causes auto correlated errors (Lutkepohl, 1991). For that reason, the accuracy of VAR models highly relies on selecting the true lag lengths. Hence, varsoc command is to be employed to run lag-order selection diagnostics.

In this study, a three-variable VAR model is to be employed. By developing the VAR model a short-run dynamic relationship can be examined over the VAR estimation as long-run equilibrium did not exist between the three time-series variables. In order to test the relationship between imports and remittances in Sri Lanka, a three-variable VAR model can be developed as follows:

$$\begin{pmatrix} \Delta Rem\, t \\ \Delta Imp\ \ t \\ \Delta To\ \ t \end{pmatrix} = \alpha_0 + \alpha_1 \begin{pmatrix} \Delta Rem\, t-1 \\ \Delta Imp\ t-1 \\ \Delta To\ \ t-1 \end{pmatrix} + \alpha_2 \begin{pmatrix} \Delta Rem\, t-2 \\ \Delta Imp\ t-2 \\ \Delta To\ \ t-2 \end{pmatrix} + \ldots\ldots + \alpha_p \begin{pmatrix} \Delta Rem\, t-p \\ \Delta Imp\ \ t-p \\ \Delta To\ \ t-p \end{pmatrix} + \alpha_{p+1} \begin{pmatrix} Dt-4 \\ Dt-4 \\ Dt-4 \end{pmatrix} + U_t$$

Where α_0 indicating a vector of the constant term, α_1 is the matrix of parameters and Ut representing the innovation term.

Granger in a VAR framework indicates a correlation between present value of a variable and the past values of another variable. The Granger -causality two-stage method is performed by two equations separately:

$$Imp_t = \beta_0 + \beta_1 Rem_t + \beta_2 To_t + \beta_3 D_{t-1} + e_t$$
$$Rem_t = \delta_0 + \delta_1 Imp_t + \delta_2 To\ p_t + \delta_3 D_{t-1} + e_t, \quad (1)$$
$$\Delta \hat{e}_t = \alpha 1\, \hat{e}_{t-1} + \varepsilon_t$$
$$\Delta \hat{e}_t = \alpha 1 \hat{e}_{t-1} + \Sigma \alpha_i + {}_1\Delta \hat{e}_{t-i} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

Eventually, the developed model of Granger causality test in a three-variable VAR framework can be expressed as follows:

$$\begin{pmatrix} \Delta Rem\, t \\ \Delta Imp\ \ t \\ \Delta To\ \ t \end{pmatrix} = \alpha_0 + \alpha_1 \begin{pmatrix} \Delta Rem\, t-1 \\ \Delta Imp\ t-1 \\ \Delta To\ \ t-1 \end{pmatrix} + \alpha_2 \begin{pmatrix} \Delta Rem\, t-2 \\ \Delta Imp\ t-2 \\ \Delta To\ \ t-2 \end{pmatrix} + \ldots\ldots + \alpha_p \begin{pmatrix} \Delta Rem\, t-p \\ \Delta Imp\ \ t-p \\ \Delta To\ \ t-p \end{pmatrix} + \alpha_{p+1} \begin{pmatrix} Dt-4 \\ Dt-4 \\ Dt-4 \end{pmatrix} + U_t \ldots\ldots \quad (3)$$

$$\Delta Imp_t = \alpha_1 + \sum_{p-1}^{1} \beta_{1p} \Delta Rem_{t-p} + \sum_{p-1}^{1} \beta_{1p} \Delta To_{t-p} + \sum_{p-1}^{1} \delta_{1p} \Delta Imp_{t-p} + y_1 D_{t-1} + \varepsilon_{1t} \quad (4)$$

$$\Delta Rem_t = \alpha_2 + \sum_{p-1}^{1} \beta_{2p} \Delta Rem_{t-p} + \sum_{p-1}^{1} \beta_{2p} \Delta To_{t-p} + \sum_{p-1}^{1} \delta_{2p} \Delta Imp_{t-p} + y_2 D_{t-1} + \varepsilon_{2t} \quad (5)$$

Where, Imp indicating imports and Rem representing foreign remittances.

Thus, the present study employs with VAR model to fin whether remittance causes import in the short run by employing Granger causality tests while Johansen co-integration test is to be employed to find that whether remittance causes import in the long- run in Sri Lanka.

5. Results

5.1 Results of Unit Roots Test

In order to build an appropriate VAR model, all-time series that are utilized in the study must be stationary therefore a unit-root test of the data is essential in this study. The ADF test is utilized to check whether the selected time series is stationary or not, and the results of the ADF unit roots test are presented in table 01.

Table 5.1.1: Results of the Augmented Dickey-Fuller Test

Variables	Test statistics	Order of Integration	MacKinnon p-value
D. lnimports	-5.610	I(1) ***	0.0000
D. lnremittances	-4.004	I(1) ***	0.0014
D. lntrade openness	-5.576	I(1) ***	0.0000
*** indicates one percent significant level			

***Source*:** Author's computation by STATA

The results indicate that all variables incorporated in the study are stationary in the order I (1). After first differencing import, remittance and trade openness are found to be stationary at the at one per cent significant level, implying that these variables are integrated of order 1 that is indicated by I (1).

5.2 Results of Lag-order Selection

At the second step is selection order criteria to decide on a functional lag length of VAR model for that, the study utilized the varsoc command to run lag-order selection diagnostics.

Table 5.2.1: Results of Lag-order Selection

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-16.6565				.000581	1.06251	1.10856	1.19313
1	147.219	327.75	9	0.000	-1.3e-07	-7.30914	-7.12494	-6.78668
2	172.345	50.251	9	0.000	-5.7e-08	-8.18079	-7.85845	-7.26648
3	190.303	35.917*	9	0.000	-3.6e-08*	-8.665.4*	-8.20456*	-7.35889*
4	195.931	11.256	9	0.259	-4.6e-08	-7.88415	-7.88415	-6.78478

***Source*:** Author's computation by STATA

The above table represents the results of lag-order selection. Accordingly, varsoc reports the final prediction error (FPE), Akaike's information criterion (AIC), the Hannan and Quinn information criterion (HQIC) and Schwarz's Bayesian information criterion (SBIC), lag order selection statistics for a series of vector autoregressions (VAR) of order 1,2, and maximum lag (3). A sequence of the likelihood ratio (LR) tests statistics for all the full VARs of the order less than or equal to the highest lag order is also reported in the same table. An '*' indicating the optimal lag selection of VAR.

According to the result (LR), the likelihood-ratio tests selected a model with three lags. Further, AIC and FPE have both selected a model with three lags, whereas SBIC and HQIC have also both chosen a model with three lags. The obtained results permit to reject the null hypothesis is that all the coefficients on the p^{th} lags of the endogenous variables are zero. As a result, we can conclude that both the likelihood ratio test and other criterions recommend three is the optimal lags and lag 3 has been selected to build the appropriate VAR model in the study.

Correspondingly, the results from table 2 recommend that the appropriate model for our selected data is VAR (3) because lag-order selection furnished lag order 3 as maximum lag order.

5.3 Results of Johnsen co integration

The cointegration method is appropriate to estimate the long-run relationship between the selected variables as the variables are considered to be I (1).

Johansen tests are utilized in this study for the cointegration test. The following table reports the results of Johansen tests including eigenvalue, trace statistic and 5% critical value have been used to explore the number of cointegrating vectors. To explore the number of cointegrating vectors, Maximal Eigenvalue and Trace statistics both have been used.

Table 5.3.1: Results of Johansen cointegration tests

Maximum rank	Parms	LL	Eigenvalue	Trace statistic	5% critical value
0	12	140.46699		28.3633*	29.68
1	17	152.3646	0.45672	4.5681	15.41
2	20	154.31237	0.09506	0.6726	3.76
3	21	154.64865	0.01710		

***Source*:** Author's computation by STATA

In the table, Maximum rank where 0 indicates there is no cointegration among the variables, similarly rank 1 implies that there is one cointegration and likewise. When trace statistic is higher than 5% critical value, then we can reject the null hypothesis that is there are no cointegrations on the other hand when we have lower trace statistics than 5% critical value as a result, we accept the null hypothesis.

According to the estimated results, at first level (Max rank 0) where the null hypothesis is, there is no cointegration among the variables. From the results, we can accept the null hypothesis since trace statistics are lower than 5% critical value.

In the second level, (Max rank 1) in which the null hypothesis is there is no one cointegration among the variables, accordingly the estimated results also reveal that trace statistics are lower than 5% critical value consequently, we cannot reject the null hypothesis, therefore we accept that there is no one cointegration implies there is no long-run relationship among the variables. Similarly, rest of the max ranks' results also found that there are no two cointegrations and there are no three cointegrations respectively. Therefore, the Johansen tests of cointegration found that the selected variables are not cointegrated since all trace statistics are lower than 5% critical value *indicating* there are no long-run associations among the variables showing workers' remittances would not determine the imports in the long-term.

When we found that Johansen results of cointegration where if variables are cointegrated, then we can utilize VECM (Vector Error Correction Model) on the other hand when we found the results that imply variables are not cointegrated, consequently VAR (Vector Auto-Regressive) model can be used. Accordingly, in the selected model, variables are not cointegrated in the long -term, then we can go with VAR model to find the short term relationship between imports and remittances by employing Granger causality tests.

5.4 Results of Vector Auto-Regressive techniques (VAR)

Afterwards, of identification of a VAR (3) model, the study was forwarded to the model estimation process. The model estimation results from the VAR (3) model are presented in the following tables.

The output of VAR classifies its results by each equation, where an equation is identified with its dependent variable namely imports, remittances and trade openness henceforward, there are an imports equation, a remittances equation, and a trade openness equation.

Table 5.4.1: Results of VAR

Equation	Parms	RMSE	R-sq	chi2	P>chi2
Imports	10	.098106	0.9967	11585.16	0.
Remittances	10	.04066	0.9991	40709.89	0.0000
Trade openness	10	.066998	0.9030	353.5701	0.0000

***Source*:** Author's computation by STATA

As we might expect, the whole table of coefficients is rather long. Based on the calculated results of VAR, except the constant terms, a VAR with n (3) variables and k (3) lags will have kn2 coefficients. In this study consist of 3-variables, 3-lag, VAR has exactly 27 coefficients that are estimated with only 38 observations.

The test results for imports indicate that apart from the constant term, first lag of the imports and first and three lags of the remittances are statistically significant in terms of p-value whereas the coefficients of trade openness are not significant in this imports equation.

Table 5.4.2: Coefficient Estimates of VAR for imports

	Coefficient	Std. Error	Z value	P value
Imports (L1)	.7027836	.2820625	2.49	0.013
Imports (L2)	.2699205	.3996612	0.68	0.499
Imports (L3)	.3034869	.2825539	1.07	0.283
Remittances (L1)	-.2890091	.1631179	-1.77	0.076
Remittances (L2)	.103658	.2066913	0.50	0.616
Remittances (L3)	-.2178256	.1188839	-1.83	0.067
Trade openness (L1)	.1820147	.3894313	0.47	0.640
Trade openness (L2)	-.7094816	.5945161	-1.19	0.233
Trade openness (L3)	.1222585	.3742617	0.33	0.744
CONS	1.061288	.3128937	3.39	0.001

***Source*:** Author's computation by STATA

When we glance at the coefficients for the remittance's equations (Table 5.4.3) apart from the constant term, mostly coefficients of each variable are significant in remittances equations, noteworthy its first lag of each variable has a statistically significant effect in this equation.

Table 5.4.3: Coefficient Estimates of VAR for remittances

	Coefficient	Std. Error	Z value	P value
Imports (L1)	.3777592	.1169009	3.23	0.001
Imports (L2)	.3187117	.1656397	1.92	0.054
Imports (L3)	-.154944	.1171045	-1.32	0.186
Remittances (L1)	.5184431	.0676043	7.67	0.000
Remittances (L2)	.0633412	.0856633	0.74	0.460
Remittances (L3)	-.3324037	.0492715	-6.75	0.000
Trade openness (L1)	-.5372619	.1613999	-3.33	0.001
Trade openness (L2)	-.5137253	0.2463973	-2.08	0.037
Trade openness (L3)	.3205593	.1551128	2.07	0.039
CONS	.8955997	0.1296789	6.91	0.000

***Source*:** Author's computation by STATA

The test results for trade openness equation reveals that apart from constant term, lag (3) of the imports and remittances, lags (1) and (3) of the trade openness are statistically significant in terms of corresponding probabilities values while the coefficients of variables of other lag levels are not significant in this trade openness equation.

Table 5.4.4: Coefficient Estimates of VAR for trade openness

	Coefficient	Std.Error	Z value	P value
Imports (L1)	-0.239258	0.1926253	-1.24	0.214
Imports (L2)	-0.1987425	0.2729355	-0.73	0.467
Imports (L3)	0.5542769	0.1929609	2.87	0.004
Remittances (L1)	-0.1633501	0.111396	-1.47	0.143
Remittances (L2)	0.1305321	0.141153	0.92	0.355
Remittances (L3)	-0.1462283	0.0811878	-1.80	0.072
Trade openness (L1)	1.211587	0.2659493	4.56	0.000
Trade openness (L2)	-0.0155312	0.4060052	-0.04	0.969
Trade openness (L3)	-0.4514974	0.2555897	-1.77	0.077
CONS	0.6191139	0.2136805	2.90	0.004

Source: Author's computation by STATA

5.5 Results of Granger Causality Tests

Granger causality is more about a short-run relationship, besides, Johansen test of cointegration exposes the long-run association of import and remittance. Following, perform the Granger causality test to examine the short-run relationship between remittance and import.

We can glance down the table of chi2, df and probability value to reveal the results of Granger causality Wald tests.

Table 5.5.1: Results of the Granger causality test

Equation	Excluded	chi2	df	Prob > chi2
Ln Import	Ln Remittances	19.006	3	0.000
Ln Import	Ln Trade openness	10.925	3	0.012
Ln Import	ALL	19.55	6	0.003
Ln Remittances	Ln Imports	333.64	3	0.000
Ln Remittances	Ln Trade openness	187.61	3	0.000
Ln Remittances	ALL	349.1	6	0.000
Ln Trade openness	Ln Imports	14.37	3	0.002
Ln Trade openness	Ln Remittances	9.4198	3	0.024
Ln Trade openness	ALL	20.724	6	0.002

***Source*:** Author's computation by STATA

In the view of the Granger causality test, the Null hypothesis is the lagged value of foreign remittance does not cause import, an alternative hypothesis is foreign remittance does cause import. Accordingly, in the first segment of rows of the above table indicates that lagged values of remittances cause import as p-value is equal to 0.000 due to that null hypothesis can be rejected at 1 per cent level of significance. Similarly, lagged values of trade openness also cause import as the results of time-series found to be 0.012. Therefore, the null hypothesis can be rejected, consequently, the direction of causality is from both remittances to import and trade openness to import as well.

In the same segment, the p-value for all is 0.003 and the null

hypothesis stating that 'foreign remittance and trade openness as a whole cannot cause import' can be rejected at 1 per cent level of significance, therefore the results found to be foreign remittance and trade openness as a whole can cause import.

In the second part of the table shows that lagged values of both import and Trade openness cause remittances as p values for both the variables are being one per cent of significant level. Therefore, both import and trade openness because workers' remittances imply the direction of causality is from both imports and trade openness to remittances. Meanwhile, in the same segment, the results found that imports and trade openness as a whole can cause foreign remittance.

Furthermore, the results of the third section of the table also found to be significant results. According to the results, both import and remittances would lead to trade openness equally both as a whole would lead to trade openness.

Further, the Granger causality test confirmed the existence of bidirectional causality between imports and remittances since the whole results reveal that remittance would generate demand on imports goods and imports would determine remittances as well.

6. Conclusion

The main purpose of this was to investigate the relationship between foreign remittances and imports. To carry out the empirical analysis, the study focused on the economy of Sri Lanka by employing time series data over the period 1977-2017. Time-series econometrics techniques namely Johansen cointegration test, Vector Auto-Regressive (VAR) analysis and Granger-causality test have been employed appropriately to establish the relationship between imports and remittance in both long term and short-term.

Johansen Cointegration tests were used to find a long-run association between two and found that the absence of a long-run relationship between remittance and import indicating workers' remittances would not determine the imports in the long-term in the case of Sri Lanka. Further, Granger causality test was employed for examining the short-term relationship and it confirmed the existence of bidirectional causality between import and remittances as the whole results exposed that remittances cause import and imports cause remittances as well. Additionally, trade openness also positively influences on imports in Sri Lanka.

According to the results, in Sri Lanka, the macro -economics variables namely import and workers' remittance have a relationship in the short – run but not in the long- run. Even if not found the long-run association between two variables, the study revealed that foreign remittances determine imports. Indicating that recipients of foreign remittances are induced to consume import goods while they receive remittances in the short run. Therefore, thus remittances would have been being increased consumption on import goods, remittances could be a root to increase imports rather than exports. Indeed, it is predictable that workers' remittances would be one of the root cause of the trade deficit in Sri Lanka through inducing consumption pattern toward imports good. Therefore, the study suggests to easing appropriate inducement in order to increase saving and investment of migrant's workers to convert their utilization from consumption pattern to investment by which the country can overcome its trade deficit problems and upsurge economic growth in the long-run. In addition to that, strategies should be made in such a way to sustain the existing good inflow of worker's remittances via introducing incentives to facilitate foreign employment comprising pre-migration facilities and services, identification of appropriate employment opportunities, pre-training, and pre-departure loan schemes. Doing this will eventually benefit recipients of foreign remittances as well as the economy of Sri Lanka in order to attain sustainable economic growth.

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