" The relationship among Export, Import and Economic Growth in Sri Lanka: Co-integration analysis."

Original Research Article

ISSN : 2456-1045 (Online)
(ICV-ECO/Impact Value): 3.08
(GIF) Impact Factor: 2.174
Publishing Copyright@International Journal Foundation
Journal Code: ARJMD/ECO/V-18.0/I-1/C-13/OCT-2017
Category : ECONOMY
Volume : 18.0 / Chapter- XIII / Issue -1 (OCTOBER-2017)
Website: www.journalresearchijf.com
Received: 31.10.2017
Accepted: 06.11.2017
Date of Publication: 15-11-2017
Page: 68-71

Name of the Authors:

V.Vaiharathan[1], A.A.M.Nufile[2] & S.Nisthar[3]

[1]South Eastern University of Sri Lanka
[2]Senior Lecturer in Economics, South Eastern University of Sri Lanka
[3]Development Officer, Department of Local Government, Eastern Province, Sri Lanka

Citation of the Article

V.Vaiharathan ; A.A.M.Nufile & S. Nisthar (2017) *The relationship among Export, Import and Economic Growth in Sri Lanka:Co-integration analysis.; Advance Research Journal of Multidisciplinary Discoveries.18.0,C-13(2017):68-71; available at : http://www.journalresearchijf.com*

ABSTRACT

This study aimed to find out the co-integration vectors or the long run relationship among the variables of export, import and Economic growth (GDP) on Sri Lankan context. The annual time series data used in this study were collected from the Annual Report of Central Bank of Sri Lanka during the period from 1950 to 2015. The variables used in this study were Exports, Imports and Economic Growth (GDP) to achieve the objective of this study. The dependent variable in this study was Economic Growth (GDP) and the independent variables used in this study were Exports and Imports. The methodology used in this study was quantitative using the secondary data source. The data used in this study were analyzed by using the statistical software E-Views 7 to find out the long run relationship between the variables through the co-integration analysis. Johansen and Juselius methods were used to find the co-integration relationship. Typically this was found that within the period of 1980 to 2015, in Sri Lankan macroeconomic environment, the gross domestic product, export and import had been encompassed with a long run equilibrium relationship.

Keywords:

Co-integration,
Economic Growth,
Import,
Export,
Time Series

I. INTRODUCTION

In the export earnings of the Sri Lanka mainly driven by earning from the export of textiles and garments product, tea and the coconut; even though, the industrial goods have the great share comparing with agricultural outputs. In the industrial goods, textile sector is viewed as the potential one. Meantime, in the agricultural sector, tea is recognized as the potential one (Economic and social statistics of Sri Lanka, 2012). Sri Lanka's export performance since 2000 has not been satisfaction one. Expanding trade deficit in 2011 and 2012 is partly explained by the unimpressive performance of the export sector. Further, global economic downturn is not the only reason for the low export growth in Sri Lanka (Kelegama, 2013).

In an approximation manner, this can be stated that the Sri Lankan economy has been succeeded 8 percentage growth rates for recent four years; this is 7.7 percentages in the first half of 2014.One of the main prime factors behind on this trend is uprising external demand. Improved performance in trade in services and increased workers' remittances largely offset the deficit in the merchandise trade account, thus containing the current account deficit to a sustainable level. Consequently, gross official reserves reached a historically high level. Meanwhile, the Sri Lankan rupee recorded a marginal appreciation against the US dollar so far during the year. in case of external merchandise trade, Even though, this is to emphasize that the 5percentage growth levels is the satisfaction one in the South Asian Region Further, in the Asian region, china and India have already achieved the 8 percentage growth level. And also output gap between advanced and emerging economies has been narrowing over the past decade and is expected to narrow even further going forward (Velnampy and Achchuthan, 2013). In this context, Export growth is recognized as the main determinant of the production and employment growth of an economy.

Co-integration means two or more times series share common stochastic trends. Thus, while each series exhibit smooth or trending behavior, a linear combination of the series exhibits no trend. For example, GDP, export and import are highly serially correlated so they are smooth and in this sense exhibit a stochastic trend, but the difference between the variables is far less persistent and shows no evidence of stochastic trend. This means the GDP, export and import are co-integrated.

II. RESEARCH PROBLEM

The relationship between export growth and economic growth has long been one of the major areas concerned in the theoretical and empirical literature in international trade and development economics. These highlight the importance of export promotion to achieve higher economic growth.

III. OBJECTIVES

To find out the co-integration vectors among the variables of export, import and Economic growth

IV. HYPOTHESES IN RELATIONS WITH THE CO-INTEGRATION ANALYSIS

H_0; There is none co-integration vector among the time series of export, import and GDP growth (r = 0).

H_1; There is at most one co-integration vector among the time series of export, import and GDP growth (r = 1)

H_0; There is at most one co-integration vector among the time series of export, import and GDP growth ($r \leq 1$)

H_1; There are at most two co-integration vectors among the time series of export, import and GDP growth (r = 2)

H_0; There are at most two co-integration vectors among the time series of export, import and GDP growth ($r \leq 2$)

H_1; There are at most three co-integration vectors among the time series of export, import and GDP growth (r = 3)

V. METHODOLOGY

The advance univariate and multivariate time series analysis have been carried out to discover the existence of co-integration vectors based on the performance of export, import and the economic growth over the last thirty three years from the period of 1980 - 2015. The time series data have been collected from the annual report of Central Bank of Sri Lanka. E-view- versions 7, has been utilized in this study.

Accordingly, the following mode has been developed:

$$LNGDP_t \equiv (LNExport_t, LNImport_t) \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

In this study, Economic growth is a function of export and import. In which, separate models have been utilized

The research models for the study in respect of Co-Integration analysis:

The Johansen's test involves estimating the following VAR model;

$$D\,(LN\_GDP\_CN)_t = \Pi * LN\_GDP\_CN_{t-1} + \sum_{i=1}^{k-1} \Gamma i * D\,(LN\_GDP\_CN)_{t-i} + \Phi D_t + V_t \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where LN_GDP_CN includes all n variables of the model which are integrated at order one I (1). The Π, Γ_i and Φ are parameter matrices to be estimated, D_t is a vector with deterministic elements (constant, trend and dummy) and V_t is a vector of random errors which follow a Gaussian white noise process.

VI. . SIGNIFICANCE OF THE STUDY

This dissertation, through an analysis, will provide useful information for potential exporters, potential importers and the policy makers who could affect through their decisions on external sector and economic growth phase of Sri Lanka. Major consideration of this research can be stated as the period of the research, it covers the post war period. At the same time the usage of advance univariate and multivariate analysis can be revealed a different scenario behind on this research phenomenon.

VII. LITERATURE REVIEW

Dilrukshini W.A. (2005) in accordance with her study, "Is the Export-Led Growth Hypothesis Valid for Sri Lanka? A Time-Series Analysis of Export-Led Growth hypothesis" expressed that the validity of the ELG hypothesis for the case of Sri Lanka. By employing the co-integration test, the Granger causality test, a VAR and IRFs and included previously omitted relevant variables. The study carried out the analyses beyond the traditional two-variable method of testing the ELG using five macroeconomic variables; namely, GDP, exports, imports, investment and labour. The findings of the study fail to support the ELG hypothesis.

Dritsakis, (2005) investigated "the relationship between exports and economic growth in the three of the largest exporting countries in the world, such as European Union, United States of America and Japan". For this purpose researchers have used Granger causality analysis based on error correction model. The results of the study suggested that exports have a causal effect on the development process for the countries of European Union, USA, while there is no causal relationship between the examined variables for Japan. This indicates the presence of a common trend or a long-run relationship between the variables of these examined countries, while there is no long-run relationship between for the variables of Japan. The results of causality analysis suggest that there is a "strong bilateral causal relationship" between exports and economic growth for European Union consistent with the studies in the EU. While the results for Japan suggest that there is not either a long run relationship or any causality between exports and economic growth.

Abhayaratne (1996) in accordance with his study, "the effect of foreign trade on the economic growth between the years of 1960 to1992".He mainly employed the curve of causality and co-integration. The assumption that foreign trade had an incentive effect on economic growth was not confirmed by the result of the study.

Shirazi and Abdul Manap (2005) in accordance with their study, "the validity of the ELG hypothesis for Sri Lanka using co-integration and causality techniques" find no support for the ELG hypothesis. She employed only exports, GDP and imports. This is to be noted that some excluded variables may have misled her findings.

Khan, Umar, Zaman, Ahmad and Shoukat (2012) have approached "the study on exports, imports and economic growth nexus". The study uses the Granger Causality and Co – integration tests to examine the long run correlation among economic growth, exports, and imports of Pakistan taking time serious data for the period 1972- 2009. Results indicated that, both exports and imports are considered an essential part for economic growth of Pakistan. Moreover, economic growth has an important impact on exports and import. Further, a successful and sustained economic growth requires growth of both exports and imports.

Kogid, Mulok, Ching, Lily, Ghazali and Loganathan (2011) in their analyses "the relationship between the economic growth and the import in Malaysia from 1970 to 2007". Results show that there is no co integration exists between economic growth and import, but there exists bilateral causality between economic growth and import. Results also show that import could indirectly contribute to economic growth, and economic growth could also directly contribute to import. These findings may be vital for future economic growth policy.

Arshia Amiria.b and Ulf-G Gerdtham in their study "Relationship between exports, imports, and economic growth in France evidence from co-integration analysis and Granger causality with using geo-statistical models" emphasized the existence of long run unidirectional causality from exports and imports to economic growth in France from 1961 to 2006.

VIII. . RESEARCH GAP

A number of studies have been done in relation to the relationship derivation purpose on GDP, export and import by scholars representing various institutions such as CBSL, universities, etc. The particular researches differ from this study in two manners. One is the period of the research, that has been starting from 1980 to 2015; including the liberalized free trading economy accompanied with the post war emergencies and second is the research model, which has strictly utilized the advance time series analysis under which the Johnson Co-integration test to identify the long term equilibrium relationship between the variables among the variables were performed.

IX. DATA ANALYSIS AND DISCUSSION

Co-integration

Co-integration is a technique through which the long run co-integration vectors are estimated, basically the co-integration beta derives a stationary linear association between none stationary variables, in co-integration test the tested null hypothesis is there is none co-integrated equation among variable. To check the statistical significance of the null the Johnson and Juselius technique has been used.

Co-integration means two or more times series share common stochastic trends. Thus, while each series exhibit smooth or trending behavior, a linear combination of the series exhibits no trend. For example, GDP, export and import are highly serially correlated so they are smooth and in this sense exhibit a stochastic trend, but the difference between the variables is far less persistent and shows no evidence of stochastic trend. This means the GDP, export and import are co-integrated.

The finding that many macro time series may contain a unit root has spurred the development of the theory of non-stationary time series analysis. Engle and Granger (1987) pointed out that a linear combination of two or more non-stationary series may be stationary. If such a stationary linear combination exists, the non-stationary time series are said to be co-integrated. The stationary linear combination is called the co-integrating equation and may be interpreted as a long-run equilibrium relationship among the variables.

The concept of co-integration was formalized by Clive W.J. Granger in a series of papers in 1980s (Granger, 1981; Granger and Weiss, 1983; Granger, 1986; Engle and Granger, 1987), and in 2003 Granger received the normal prize in economics for this work. A flurry of research activity followed Granger's original contributions in this area and produced a practical set of econometric procedures for analyzing co integrated time series.

Mathematical structure of co-integration model

Johansen and Juselius method

VAR-based co-integration tests using the methodology developed in Johansen (1991, 1995) performed using a Group object or an estimated VAR object.
Consider a VAR of order p:

$$LN\_GDP\_CN_t = c_1\, LN\_GDP\_CN_{t-1} + \cdots + c_p\, LN\_GDP\_CN_{t-p} + \beta x_t + \varepsilon_t$$

$$D(LN\_GDP\_CN)_t = \Pi * LN\_GDP\_CN_{t-1} + \sum_{i=1}^{k-1} \Gamma i * D(LN\_GDP\_CN)_{t-i} + \Phi D_t + V_t$$

Where LN_GDP_CN includes all n variables of the model which are integrated at order one I (1). The Π, Γ_i and Φ are parameter matrices to be estimated, D_t is a vector with deterministic elements (constant, trend and dummy) and V_t is a vector of random errors which follow a Gaussian white noise process.

Equation (1) implies that there can never be any relationship between a variable with a stochastic trend, I (1) and a variable without a stochastic trend, I (0). So D $(LN\_GDP\_CN)_t \sim I(0)$, then Π will be a matrix of zero, except a linear combination of the variables $LN\_GDP\_CN_t$ is stationary.

The Johansen test for co-integration evaluates the rank (r) of the matrix Π. If r = 0, all variables are I (1) and thus not co-integrated. In case 0 < r < N, there exist r co-integrating vectors. In the third case, if r = N all the variables are I (0) and thus stationary, and any combination of stationary variables will be stationary.

Π represents the long response matrix and is defined as the product of two matrices: α and β′, of dimension (g×r) and (r×g) respectively. The β matrix contains the long-run coefficients of the co-integrating vectors; α is known as the adjustment parameter matrix and is similar to an error correction term. The linear combination(s) $\beta'*LN\_GDP\_CN_{t-k}$ of this matrix will be I (0) in the case where the times series are co-integrated. In other words, if rank of Π = r = K, the variables in levels are stationary meaning that no integration exist; if rank Π = r = 0, denoting that all the elements in the adjustment matrix have zero value. Therefore, none of the linear combinations are stationary. According to the Granger representation theorem (Engle and Granger, 1987), when K > 0 and rank of Π (r) < K, there are r co-integrating vectors or r stationary linear combinations of the variables.

The Johansen co-integration method estimates the Π matrix through an unrestricted VAR and tests whether one can reject the restriction implied by the reduced rank of Π. Two methods of testing for reduced rank of Π are the trace test and the maximum Eigen-value, respectively:

$$\lambda \max(r, r+1) = -T \, LN\,(1-\lambda r+1)$$
$$\lambda \text{trace} = -T\sum_{i=r+1}^{n} LN\,1-(\lambda_i^2)$$

Where, λ_i is the estimated values of the ordered Eigen values obtained from the estimated matrix and T is the number of the observations after the lag adjustment. The trace statistics test the null hypothesis that the number of distinct co-integrating vectors (r) is less than or equal to (r) against a general alternative. The maximal Eigen value tests the null that the number of co-integrating vectors is (r) against the alternative of (r+1) co-integrating vectors.

Co-integration analysis: co-integration analysis for linear deterministic model

Table 01: Co-integration analysis for linear deterministic model

Null	Alternative	Max.St.	5% C V	Trace St.	5% C V
r=0*	r=1	28.48743	25.82321	51.38259	42.91525
r=≤ 1	r=2	15.383	19.38704	22.89515	28.87211
r=≤ 2	r=3	7.512154	12.51798	7.512154	12.51798

"*" indicates that the rejection of hypothesis at conventional level of significance (0.05)

According to the co-integration analysis done in the previous part of the study, there are four different models have been taken into analyses and as per the gained scores of model evaluating criterions like log likely hood, AIC, the linear deterministic model be chosen.

The chart represents the Johnson and Juselius co-integration test under which the maximum Eigen and trace statistic values indicates that the null hypothesis, there are none co-integrating equation (r=0) in the model, will be rejected at the 0.05 level of confidence. Consequently the alternative, there

Typically this is meant that within the period of 1980 to 2015, in Sri Lankan macroeconomic environment, the gross domestic product, export and import had been encompassed with a long run equilibrium relationship. In a macro econometric way of speaking, the scene will be postulated that there is a stationary linear combination (I (0)) between none stationary series; gross domestic product, export and import; prove to be integrated at order one (I (1)).

Table 02: Normalized co-integrating equation for linear deterministic model

1 Cointegrating Equation(s):	Log Likelihood	93.38208
Normalized Cointegrating coefficients (Standard error in parentheses)		
LN_GDP_CN	LN_IM_CM	LN_EX_CN
1	0.802584	-1.70278
	-0.15453	-0.17418

Source = Author estimation using excel 2010

$LN\_GDP\_CN_t$ = 0.803 $LN\_IM\_CN_t$- 1.703 $LN\_EX\_CN_t$, the long run co-integrating equation derived by normalizing on output based on the estimating co integrating coefficients. The negative signed co integrating coefficient of export (-1.73) indicates that the value of export output elasticity within the period of 1980 to 2015 in Sri Lanka. At the same time, the positive signed co integrating coefficient of import (0.803) indicates that the value of import output elasticity within the period of 1980 to 2015 in Sri Lanka.

X. FINDINGS AND CONCLUSION

In case of co-integration analysis, Johansen and Juselius approach was used into four different models with four different trend components such as linear deterministic, quadratic deterministic, none deterministic, none deterministic restricted constant under these different models, there appropriately one, one, three, none co integrating relationship/s were found. Trace and maximum Eigen value test estimation applied on to the four models and the results are analyzed in a comprehensive manner. Hypotheses in relations with the co-integration analysis tested. The status of hypothesis related with co -integration analysis given above, as per the rules of rejection the null is rejected. Consequently the alternative; H_1; there is one co-integrating vector among the time series of Export, Import and GDP growth, is accepted.

Typically this is meant that within the period of 1980 to 2015, in Sri Lankan macroeconomic environment, the gross domestic product, export and import had been encompassed with a long run equilibrium relationship. In a macro econometric way of speaking, the scene will be postulated that there is a stationary linear combination (I (0)) between none stationary series; gross domestic product, export and import; prove to be integrated at order one (I (1)).

REFERENCES

[1] **Abhayaratne, A.S.P, (1996),** "Foreign Trade and Economic Growth Evidence from Sri Lanka, 1962-1992", Applied Economics Letters, 3: Pp. 567-570

[2] **Dritsakis, N. (2005),** "Exports and Economic Growth: an empirical investigation of EU, USA and Japan using causality tests", Department of Applied Informatics, University of Macedonia, Economics and Social Sciences.

[3] **Kelegama,S. (2013),** "Export sector in Sri Lanka: Issues and Challenges", Institute of policy studies of Sri Lanka, National Chamber of Exporters of Sri Lanka.

[4] **Kogid,M. , Mulok,D., Ching,K., Lily,J., Ghazali,F. &Loganathan, N. (2011),** "Does Import Affect Economic Growth in Malaysia", The Empirical Economics Letters, 10 (3), Pp. 297- 307.

[5] **Velnampy, T &Achchuthan, S. (2013),** "Fiscal Deficit and Economic Growth: A Study on Sri Lankan Economic Perspective", in Developing Country Studies, 3(3), Pp. 166-174.

*****