Is There a Long-Run Relationship between Exports and Imports? Evidence from Sri Lanka (1977-2014)

B.M. Sumanarathne [a] and **K.T. Udari Niranjala** [b]

[a] *Department of Economics, University of Ruhuna*
bmsumana@econ.ruh.ac.lk

[b] *Department of Economics, University of Ruhuna*
udari.niranjala@yahoo.com

INTRODUCTION AND RESEARCH PROBLEM

Trade deficit is a common issue in many developing and developed countries. Short-run disequilibria in exports and imports are not considered as bad, but long-run equilibrium is important to maintain the international budget constraint of a country. Sustainable trade balance is a key feature of an effective macroeconomic policy of an economy (Perera and Verma, 2008).

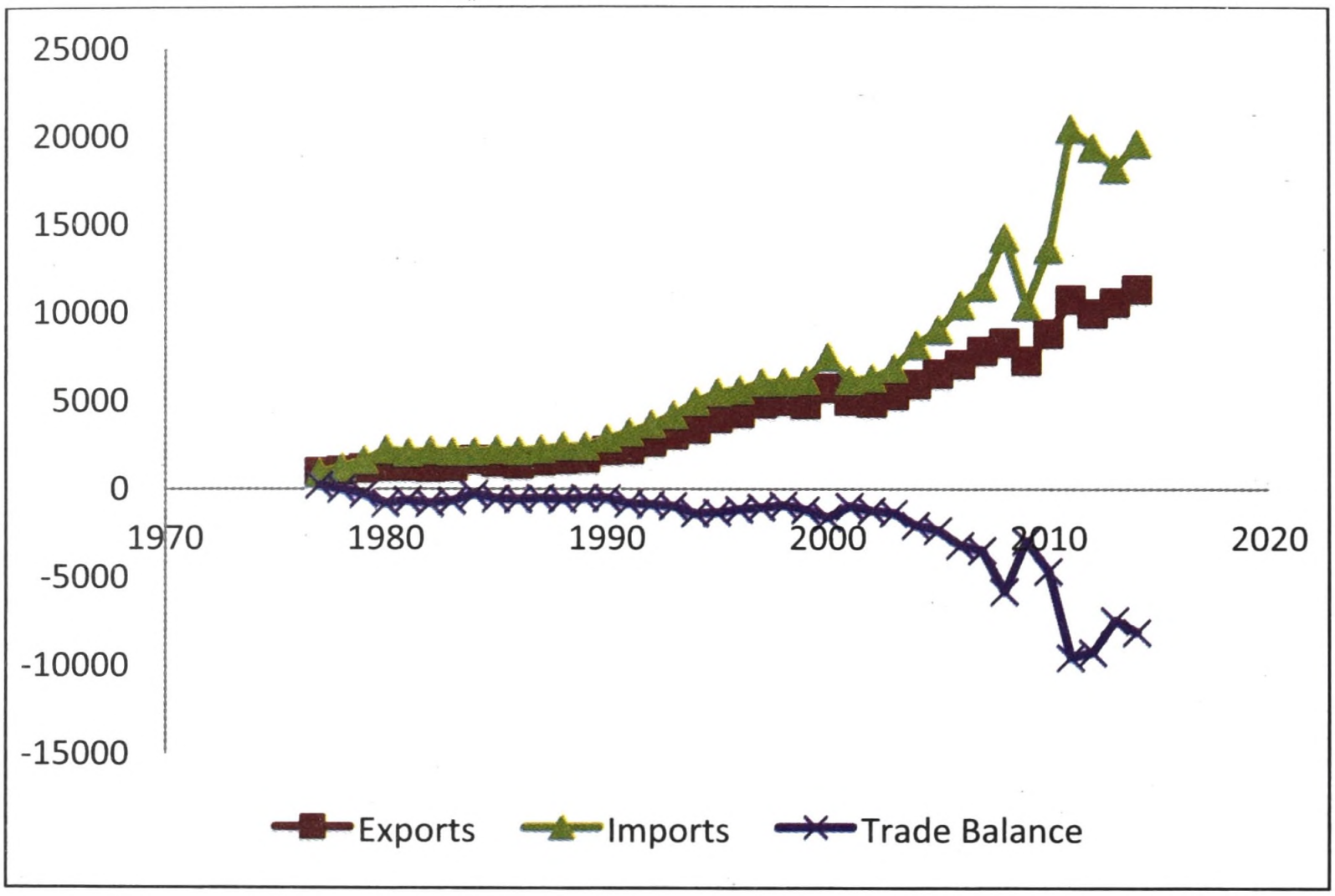
Sri Lanka, the first South Asian country to open up the economy in 1977, has been showing a growing deficit in its trade account.

Figure 1 shows a continuous and growing deficit in the trade balance of Sri Lanka after liberalization of the economy in 1977. Recent large trade deficits have been creating a balance of payments crisis and increasing foreign borrowing. In 2011 import expenditure significantly increased while the earnings from exports declined and led Sri Lanka's trade deficit ballooned to a recorded high of US $ 9.7 billion[1]. This could not be offset by capital inflows and created a

[1] Central Bank of Sri Lanka, Annual Report 2012
[2] Central Bank of Sri Lanka, Annual Report 2014

balance of payments crisis that required remedial measures in 2012. This expansion in the trade deficit has been continued and recorded US $ 9.4, 7.6 and 8.2 billion in 2012, 2013 and 2014 respectively[2]. The sustainability of the trade account is questioned under this background. Hence, this study intends to examine the long run relationship between exports and imports of Sri Lanka for the period of 1977 to 2014.

Figure 14: Exports, Imports and Trade Balance of Sri Lanka from 1977-2004 (US $ Millions)



Source: Annual reports of the Central Bank of Sri Lanka

The long-run relationship between exports and imports and the sustainability of trade deficit have been empirically examined by many researchers under different approaches. Husted (1992), Ahmed and Rogers (1995), Apergis et al. (2000), Bahmani-Oskooee (1994), Wu, Fountas and Chen (1996) and several other researchers have tested the relationship between exports and imports to capture the sustainability of the current account of different countries. Perera and Verma (2008) test the sustainability of trade deficit of Sri Lanka using unit root and co-integration techniques for the period of 1950 to

2006. They have concluded that Sri Lanka is in violation of its international budget constraint and the current account of Sri Lanka is not sustainable. The deficit in the trade balance in Sri Lanka and its sustainability could be analysed using recent trade statistics. Thus, this study uses annual data for the period after liberalizing the Sri Lankan economy (1977 to 2014) and analyses the behaviour of exports and imports of Sri Lanka.

METHODOLOGY

To date various methods have been developed and introduced to measure the long run relationship between exports and imports. Husted (1992) derived the following simple testable model to analyse the long run equilibrium between exports and imports:

$$X_t = a + bM_t + e_t$$

X is exports of goods and services and M is imports of goods and services. According to Husted (1992), 'b' should be equal to one and 'e' should be stationery in the equation to satisfy the inter-temporal budget constrain of an economy. This study is mainly based on the above model.

Annual data for exports and imports of Sri Lanka are gathered from annual reports of the Central Bank of Sri Lanka. Study covers for the period of 1977 to 2014.

The Phillips- Perron test is implemented on data series to investigate the random walk nature. Engle-Granger co-integration test is used to capture the long-run relationship between variables. Wald coefficient test found whether the coefficient of Imports is equal to one. Finally the Engle-Granger causality test is conducted to identify the causal relationship between exports and imports. Stata, E-Views and MS Excel computer packages are used for the data analysis.

RESULTS AND FINDINGS

Table 6 : Phillips-Perron Unit Root Tests for Levels and First Differences of Variables

Variable	PP test statistic		Mackinnon Critical for Rejection of Hypothesis of a Unit Root			Decision	Order of integration
	Levels	First Difference	1%	5%	10%		
Exports	2.407583 (2)	6.744677** (3)	-3.621023	-2.943427	-2.610263	Non stationary at level, but stationary at first difference	I(1)
Imports	1.515703 (8)	-6.820200** (2)	-2.636	-1.951	-1.610	Non stationary at level, but stationary at first difference	I(1)

Source: Author's computation

Note: The numbers in brackets are the lag length. The lag length for PP test is selected according to Newey-West bandwidth criterion.

*** indicates significance at 1 percent level*

Exports and imports series had logarithmic transformation before estimation. Then presence of unit root in the time series data of exports and imports of Sri Lanka is tested using Phillips-Perron unit root test.

According to Table 1, the results of the Phillips- Perron Test for unit root suggest that the data series are non-stationery at levels and become stationery at first difference. Two variables are integrated in order one. Hence, appropriate for test co-integration between two variables.

In order to identify whether there is a long run relationship between exports and imports of Sri Lanka, Engle-Granger co-integration test is conducted. The equation developed by Husted (1992) is estimated using OLS and generated the residual series. This residual series is tested for unit root following Augmented Dickey-Fuller (ADF) unit root test. Table 2 presents the output of the co-integration test and Table 3 presents the ADF unit root test results.

Table 7: Engle-Granger Co-Integration Test Results

Variable	Coefficient	Standard error	t-stat	p-value
C	0.039892	0.241570	0.165137	0.8698
Imports	0.949179	0.028489	33.31703	0.0000

Source: Author's computation

Table 8: ADF Unit Root Test for Engle-Granger Cointegration Approach

$\Delta u_t = 0.047902 - 0.370900_t + 0.001939\ u_{t-1}$	
(0.033) (0.1119) (0.0015)	
$R^2 = 0.2531$	
Durbin Watson d= 1.77	Prob. (F statistic) = 0.007

Source: Author's computation

According to the ADF test for unit root, test statistic (-3.3120) is more negative than the Mackinnon critical value (-2.9424) at five percent significant level. The hypothesis that the error term is unit root at levels is rejected. Thus, co-integration is found between exports and imports. This implies a long run equilibrium relationship between exports and imports of Sri Lanka. According to the Table 2, the coefficient of imports is statistically significant. Imports elasticity of exports is 0.95 and implies that imports have a positive impact on exports of Sri Lanka.

Table 9 : Wald Coefficient Test Results

Equation	Coefficient	Null hypothesis	F-statistic
Exports =f (Imports)	0.95	b = 1	2.78

Source: Author's computation

Wald coefficient test rejects the null hypothesis of 'b' coefficient equals to one. Estimated equation in the Table 2 shows that the slope coefficient is lower than one and equals to 0.95. This implies a growing trend of the trade deficit of Sri Lanka.

Next, the causal relationship between exports and imports of Sri Lanka is checked by employing the Engle-Granger causality test. Table 5 shows the results of the Engle-Granger causality test.

Table 10: Engle-Granger Causality Test Results

Null Hypothesis:	Obs	F-Statistic	Probability
LIMPORTS does not Granger Cause EXPORTS	37	0.16148	0.69031
LEXPORTS does not Granger Cause LIMPORTS		7.35713	0.01040

Source: Author's computation

According to the above results, there is a unidirectional causality from exports to imports in Sri Lanka.

CONCLUSIONS, IMPLICATIONS AND SIGNIFICANCE

This study attempted to analyse the long run relationship between exports and imports of Sri Lanka after liberalisation of the economy in 1977. Engle-Granger co-integration approach confirms a long run equilibrium relationship between exports and imports of Sri Lanka. Estimated results conclude that only US $ 0.95 could be earned as exports income when Sri Lanka spend one dollar for imports. This implies that the trade deficit is growing. Results of the Engle-Granger causality test indicate that exports depend on imports.

Therefore, to fix the problem of country's gapping trade deficit, policy changes must be followed to increase the exports income to the country. This includes releasing resources for science and technological base human resources and protection of property rights. In the longer run the diversification of exports and export markets and ensuring an investment climate to generate exportable products is needed. Dependence of production on the imported inputs should be reduced. Improving productivity and having more value addition in local exports would reduce this unsustainable trade deficit in Sri Lanka.

REFERENCES

Ahmed, S., and Rogers, J. H. (1995), Government Budget Deficits and Trade Deficits. Are Present Value Constraints Satisfied in Long-term Data?" Journal of Monetary Economics, 36 (2), pp. 351-374.

Apergis, N., Katrakilidis, K. P., and Tabakis, N. M. (2000), Current Account Deficit Sustainability: The Case of Greece. Applied Economics Letters, 7, pp. 599-603

Bahmani-Oskooee, M. (1994), Are Imports and Exports of Australia Cointegrated?, Journal of Empirical Integration, Vol. 9 No. 4: 525-533.

Central Bank of Sri Lanka, Various years, *Annual Report*. Colombo: Central Bank of Sri Lanka.

Husted S. (1992), The Emerging US Current Account Deficit In The 1980s: A Cointegration Analysis, The Review of Economic and Statistics, 74, 159-166.

Perera, N. and Verma, R. (2008), An empirical analysis of sustainability of trade deficit: evidence from Sri Lanka, International Journal of Applied Econometrics and Quantitative Studies, 5(1), 2008, 71-92.

Wu, J. L., Stilianos, F., and Chen, S. L. (1996), Testing for the Sustainability of the Current Account Deficit in Two Industrial Countries. Economics Letters, 52 (2), pp. 193-198.