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Dynamics between Trade Deficit and its Determinants: An Empirical Evidence from Sri Lanka

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Abstract

The purpose of this study is to explore the short and long term dynamics between trade deficit and its determinants such as real effective exchange rate, urbanization, inflation, trade openness and government spending in case of Sri Lanka for the period 1985 to 2018. The short run and long run analysis of the econometric model of the study is performed by ARDL bound testing approach. The findings of the study demonstrate the existence of long run relationship between trade deficit and its determinants. The results also revealed that appreciation of real effective exchange rate significantly increase the trade deficit in the long run. However the trade openness and government spending significantly reduced the trade deficit. The study prescribed that issue of trade deficit can be overcome if real effective exchange rate fluctuations, unorganized urban sprawl and government spending could be properly monitored and managed. Fiscal policies should be devised in a manner which could facilitate self-sufficiency and increase in exports, hence reduction in trade deficit. This paper contributes the literature by exploring the major determinants of trade deficit in emerging economy of Sri Lanka. It also focuses the impact of urbanization and real effective exchange rate on trade deficit. The policy implications are discussed to overcome trade deficit.

Keywords: *ARDL, Government spending, Inflation, Real Effective Exchange Rate, Sri Lanka, Trade Openness, Urbanization.*

Introduction

"Trade deficit is considered as an important macroeconomic indicator to judge the economic performance of a country which is obtained by comparing the exports and imports (Hassan et al., 2017). If the volume of exports exceeds the imports then it is trade surplus but if the imports volume is greater than the exports then it indicates trade deficit. There are multiple and complex factors behind the trade deficit problem. The economies facing persistent trade deficit usually remain backward and developing. There are many internal and external factors responsible for the trade deficit. The internal factors include human resource development, governance, industrial value addition, energy supply, law and order situation and research and technology. Whereas the external factors include real effective exchange rate volatility, foreign debt servicing, foreign direct investment, degree of openness etc. The economies who overcome these problems,

track the way of development but those who fail to get rid of trade deficit and related issues face unlimited hurdles in the journey of growth. The (Aqeel and Nishat, 2000; Muller 2008; Jawaid and Raza, 2013; Hassan et al., 2015) reveal that budget deficit creates trade deficit. But the Monacelli and Perotti (2007) opposed by finding the negative and significant relationship between the budget deficit and trade deficit. Many past studies show that changes in nominal exchange rate lead to bring changes in real exchange rate which in turn affects the trade balance (Greenwood, 1984; Rahman et al., 1997; Duasa, 2007). Therefore the main emphasis of this article is to find those factors which are responsible for the deficit in balance of payment in developing and emerging economies like Sri Lanka.

Sri Lanka is facing severe issue of trade deficit since its independence in 1948 and trying to overcome it by increasing its exports. Its trade deficit increased from 0.01 billion US dollars in 1965 to 5.14 billion US dollars in 2019. However during early 70s, Sri Lankan government introduced many reforms in its trade policy and adopted trade openness. The local industries were developed with the aim to raise production of import substitutes so that dependence on imported raw materials and finished goods could be reduced. Privatization of the public owned businesses and adoption of different exchange rate regimes were also exercised to resolve the issue of trade deficit during this era. But all these efforts were resulted in partial success due to change in government policies and priorities. These circumstances motivate the researcher to consider the most relevant macroeconomic variables to test the dynamics between trade deficit and its determinants. The research questions include: Does urbanization give rise to trade deficit? Is real effective exchange rate widening or contracting trade deficit? What is the impact of openness on trade deficit? What are the policy implications to reduce trade deficit?

This paper uses the trade deficit as dependent variable while the independent variables are selected on the basis of literature review in case of developing and developed economies. The major factor in this regard is real effective exchange rate (REER). Some researchers found that real effective exchange rate is negatively related to trade deficit while others found the opposite findings. Same situation exists in case of literature related to urbanization and trade liberalization as factors affecting the trade deficit. These contradictory studies provided a direction to prepare a model to test their impact on trade deficit. For the purpose, this study used urbanization, real effective exchange rate, trade openness, inflation and government general spending for monitoring the effect of these factors on trade deficit of Sri Lanka. The further organization of the study is as follows: section 2 contains literature review, section 3 explains the data source and methodology while section 4 throws light on results and interpretations whereas section 5 concludes the study.

Literature Review

There is a sea of literature about the relationship of real effective exchange rate and trade openness with trade deficit. As the trade is an important element for economic growth of an economy but it is seriously impacted by the fluctuations in REER so the results of previous studies are still inconclusive. It requires more empirical work on the deficit-real exchange rate- openness nexus. As real effective exchange rate is very important factor affecting trade deficit, so many researchers found that appreciation of REER increases the trade deficit while others found the opposite results.

Weerasinghe and Perera (2019) explored the elements of trade deficit in case of Sri Lankan economy. They found the positive impact of exchange rate while negative impact of inflation on trade balance. Asif and Rehman (2019) uses Johansen Multivariate co-integration approach to investigate the effect of REER on trade deficit in Pakistan for the time span of 1985-2017. Their findings confirmed the two way causal linkages and long run relationship between the two. Similar findings were obtained by Jorda and Burguet (1998) and Trinh (2012) in case of European Union and Vietnam respectively. Shah and Majeed (2014) scrutinized the effect of REER on trade deficit for 1980-2011 in Pakistan using ARDL approach. They found positive relationship between both variables in short as well as in long term. The increase in real effective exchange rate leads to depreciate the local currency, making exports inexpensive for trading

countries and imports expensive for the home country. In addition due to appreciation of real effective exchange rate, exporters loose interest and reduce or stop exporting due to low prices in the international markets. So the deficit in balance of payment increased. On the contrary, Dhasmana (2012) explored the negative relationship between trade balance and real exchange rate in case of India. Thus the conclusion is still confusing.

Hassan et al., (2015) examined the impact of urbanization, unemployment, foreign direct investment, money supply and economic development on trade deficit in case of Pakistan. They found positive and significant relationship between urbanization and trade deficit in short and long term. Due to increase in urban population in developing countries, unemployment increases and leads to decrease the aggregate demand, which in turn reduces general price level and profits of entrepreneurs as well. So decline in the profits of entrepreneurs forces them to reduce investments, which shrinks exports and therefore increases trade deficit. While the urban sprawl increases aggregate demand in the country and puts upward pressure on volume of imports, hence increases trade deficit. However urbanization also increases the productivity and raises the exports after meeting the local market demand (Hassan et al., 2012). Inflation is another important factor affecting trade deficit. Increased inflation in exporting country increases the trade deficit by increasing the prices of exports. Conversely, inflation makes the imported goods cheaper for the people of country with high inflation. In this way inflation adds the trade deficit. Alemu and Jin-sang (2014) investigated the impact of inflation on export sector in selected Asian countries. They found that the local currency depreciated by the inflation narrows the trade gap.

Seyyed et al., (2011), used panel data of 19 countries to analyze the impact of trade openness on export and economic growth. The results of the study suggested that countries with less trade barriers (tariff and non-tariff) were able to reduce their trade deficit through enhancing GDP and export growth. Trade liberalization improved not only the dependence on imports but also quality and prices of exports which resultantly helped in reducing trade deficit. Muller (2008) used Vector Auto Regression on U.S. time series data to explain the effects of fiscal spending on foreign trade. The results showed that an increase in government spending significantly depreciated the nominal exchange rate, appreciated the terms of trade and increased net exports. However the accommodating monetary policy disturbed the process but export performance did not affect a lot and trade deficit decreased significantly due to increased government spending.

Materials and Methods

This section will provide information about data sources and methodology which is going to be used for empirical analysis of the selected model. Following (Cameron, 1994; Ehrlich 1996), the current study proposes the linear-log model. The previous literature shows that linear-log model provides more reliable results.

$$TD = \beta_0 + \beta_1 lnUB + \beta_2 lnREER + \beta_3 lnOPN + \beta_4 lnINF + \beta_5 lnGEXP + \mu \qquad (1)$$

The dependent variable TD is calculated by dividing the total imports by exports of goods and services. In case of ratio equal to one, trade is balanced. However trade deficit is evident if this ratio is found more than one while the ratio less than one depicts trade surplus. As far as the independent variables are concerned, urbanization is obtained by dividing the urban population to total population. The second independent variable REER is constructed by dividing nominal effective exchange rate by price deflator. The data source for this index is the study of Darvas (2012). An increase in index portrays that local currency is appreciated in comparison of the weighted average of foreign currencies. While the decrease in index value displays the depreciation of the local currency in comparison of the weighted average of foreign currencies. Trade openness is created by dividing the summation of exports and imports on GDP. The variable of inflation is annual percentage of consumer prices while government expenditure is obtained by dividing the government general expenditure on GDP.

Table 1: Variables Description

Variables Names	Variables Representation	Variable Transformation	Data Source	Sample Period
Trade Deficit	TD_t	Value of Imports/Value of Exports	WDI,World Bank,2019	1985-2018
Urbanization	$lnUB_t$	ln[(urban Population)/(total Population)]	WDI,World Bank,2019	1985-2018
Real effective exchange rate	$lnREER_t$	ln[(Nominal Effective exchange rate)/(Price Deflator)]	Darvas (2012)	1985-2018
Trade Openness	$lnOPN_t$	ln[(Imports +Exports)/GDP]	WDI, World Bank, 2019	1985-2018
Inflation	$lnINF_t$	ln[Inflation, consumer prices annual percentage]	WDI, World Bank, 2019	1985-2018
Government spending	$lnGEXP_t$	ln[Govt. General Spending/ GDP]	WDI, World Bank, 2019	1985-2018

The estimation of the model is to be started from application of Ng-Perron and KPSS Unit root tests. Afterwards ARDL Bounds testing technique will be applied to test the existence of long term relationship between dependent variable and its explanatory variables. The ARDL approach will also provide the estimated short run and long run coefficients of the explanatory variables of the model. In the last, stability of the mean and variance of the disturbance term of the model will be investigated by applying CUSUM and CUSUM square test.

Results and Discussion

The empirical outcomes and their interpretation will be presented after discussing the methodology. In this regard, Table 2 reveals the descriptive statistics (including mean, median and others) of the variables. The Jarque Bera test is found to be insignificant and showed that all the variables are normally distributed. After discussing the descriptive stats, the variance inflation factor matrix is reported in Table 3. First, coefficients of correlation are shown for each variable, then variance inflation factor is calculated using formula VIF = $[1-1/(r)^2]$ and presented in matrices.

The variance inflation factor of all variables is less than 10. Hence it is concluded that there exist no multicollinearity among the explanatory variables. Afterwards, Ng-Perron and KPSS tests are applied to check the issue of unit root. Their results are reported in Table 4, which shows that according to NG-Perron test, variables of urbanization, inflation and government expenditure are found to be stationary at level while all other variables including dependent variable of trade deficit are found to be stationary at first difference. While KPSS unit root test suggested that variables of inflation and government expenditure are found to be stationary at level and all others including dependent variable are stationary at first difference.

Table 2: Descriptive Stats

Variables	TD	lnUB	lnREER	lnOPN	lnINF	lnGEXP
Mean	1.365	2.914	4.534	1.511	2.270	2.007
Median	1.348	2.914	4.529	1.510	2.281	2.013
Maximum	1.700	2.927	4.730	1.554	3.263	2.196
Minimum	1.165	2.901	4.369	1.474	0.392	1.684
Std. Dev.	0.153	0.008	0.099	0.021	0.559	0.096
Jarque-Bera	2.943	2.250	1.132	1.056	12.162	10.299
Probability	0.229	0.324	0.567	0.589	0.002	0.005

Thus, the variables used for this study have mixed order of integration. It means that data set qualifies the initial requirement of mixed order of integration for the application of ARDL approach in the light of literature available for long run co-integration analysis.

Table 3: Coefficient of Correlation and Variance Inflation Factor

Variables	TD	lnUB	lnREER	lnOPN	lnINF	lnGEXP
TD	1	-	-	-	-	-
lnUB	0.192 (1.038)	1	-	-	-	-
lnREER	0.199 (1.041)	-0.648 (1.725)	1	-	-	-
lnOPN	0.197 (1.040)	-0.646 (1.716)	0.199 (1.041)	1	-	-
lnINF	0.115 (1.013)	0.239 (1.061)	-0.281 (1.086)	-0.282 (1.086)	1	-
lnGEXP	0.179 (1.033)	-0.167 (1.028)	0.557 (1.451)	0.560 (1.458)	0.007 (1.640)	1

Note: VIF is shown in parenthesis.

Table 4: Unit Root Tests
NG Perron Test

	At Level				At First Difference			
Variables	MZa	MZt	MSB	MPT	MZa	MZt	MSB	MPT
TD_t	-2.025	-0.995	0.491	11.989	-16.608*	-2.86062	0.172	1.552
$lnUB_t$	1.311*	1.384	1.055	81.258	-0.085	-0.14742	1.729	149.913
$lnREER_t$	-3.824	-1.137	0.297	6.532	-16.345*	-2.857	0.174	1.504
$lnOPN_t$	-3.947	-1.166	0.295	6.389	-16.039*	-2.788	0.173	1.687
$lnINF_t$	-13.989*	-2.596	0.185	1.932	-13.548	-2.602	0.192	1.809
$lnGEXP_t$	-10.018*	-2.006	0.222	2.490	-16.510	-2.863	0.173	1.518

*Shows at 10 percent level of significance.

KPSS Test

KPSS Unit Root Test At Level		KPSS Unit Root Test At First Difference	
Variables	LM Stat	Variables	LM Stat
TD_t	0.543	TD_t	0.138*
$lnUB_t$	1.762	$lnUB_t$	0.262*
$lnREER_t$	0.932	$lnREER_t$	0.156*
$lnOPN_t$	0.927	$lnOPN_t$	0.155*
$lnINF_t$	0.218*	$lnINF_t$	0.047
$lnGEXP_t$	0.252*	$lnGEXP_t$	0.048

*Shows at 1 percent level of significance.

Now the next step is to find out the long run relationship among the variables, so ARDL Bounds Testing Approach applied and the estimated results are reported in Table 5. As the value of F-statistic (4.304) is greater than the upper critical bound at 10 percent level of significance (3.782), so long run relationship exists between trade deficit and its determinants. The estimated probability values of the chi-square tests for all the diagnostics are found to be insignificant which shows the absence of serial correlation, heteroscedasticity and non-normality problems in the model.

Table 6 reveals the estimates for long term coefficients based on ARDL approach. The long run results show that urbanization is significantly increasing the trade deficit in Sri Lanka. It means that urbanization puts upward pressure on the aggregate demand of the country, thus accelerates imports volume and trade deficit as well. The estimated coefficient of real effective exchange rate is 35.012, which is also positive and significant in long term. It means that 1% increase in REER increases the trade deficit by 0.350 units. The estimated coefficient of trade openness is negative and significant. The negative coefficient of trade openness means that increase in trade openness reduces trade deficit. So 1% increase in trade openness reduces the trade deficit by 1.491 units in the long term. It is generally viewed that when a country relaxes its trade barriers either tariff or non-tariff, economic development takes place which brings betterment in infrastructure, factors productivity and income and employment. The increased production improves the export's volume and reduces imports, hence checks the trade deficit in the country. The estimated coefficient of inflation is positive and significant which shows that inflation increases the cost of production and prices of goods and leads to reduce people's purchasing power, resultantly investment, employment and export decreases. People prefers cheaper imported goods. Thus trade deficit increases through widening the gap between imports and exports. The estimated coefficient of government spending is negative and significant. It means that trade deficit shrinks as government increases its general expenditures on health, education and other public welfare projects. Increased government spending affects real effective exchange rate which improves the terms of trade.

The short term coefficients based on ARDL approach are reported in Table 7. The coefficient of urbanization is found to be negative and significant. It means that trade deficit decreases by increase in urban population in the short term. Due to increased urbanization, the education, income and employment level of population increases which in turn improves the economic conditions and output of the country. Resultantly, exports increase and trade deficit reduces. The real effective exchange rate is found to affect the trade deficit positively and significantly in the short run. The estimated coefficient of inflation is found positive and significant in the short term. The coefficient for the first-period lagged error term is found to be negative and significant, which confirms the evidence of convergence hypothesis in Sri Lanka, it means that long run and stable equilibrium will be restored by following 75% speed of adjustment and this long run equilibrium will be restored in approximately 1.3313 (1/0.751 = 1.331) years.

Table 5: ARDL Bound Test

ARDL Bound Testing Approach/ Optimal Lags: 1,0,0,1,1,1 F-Stat: 4.304*, W-Stat: 25.829*				
Level of significance	**Critical Bounds for F-test**		**Critical Bounds for W –test**	
	LCB	UCB	LCB	UCB
5 %	3.078	4.498	18.473	26.987
10%	2.562	3.782	15.375	22.693
				Diagnostic Tests
R^2	0.674	Serial Correlation		0.568
Adjusted R^2	0.552	Functional Form		0.420
		Normality		0.667
		Hetroscedasticity		0.857
		Durbin H Stat		1.823
F-Stat	5.520			
P-value(F Stat)	0.000			
DW Stat	1.783			

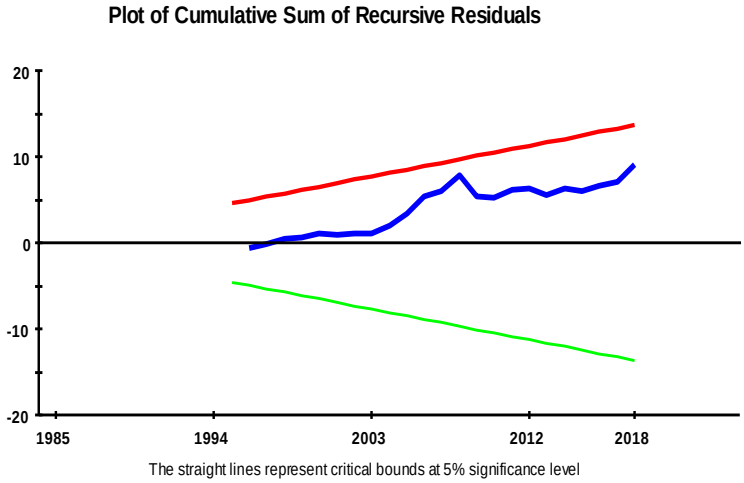
Table 6: Long Run Coefficients based on ARDL

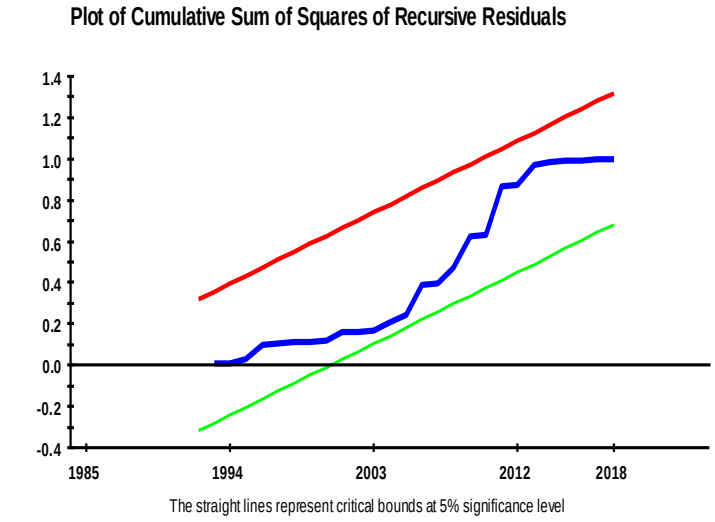
Estimated long term coefficients based on ARDL Approach Dependent Variable: TD_t		
Variables	Coefficients	Probability
$lnUB_t$	14.227	0.024
$lnREER_t$	35.012	0.022
$lnOPN_t$	-149.119	0.032
$lnINF_t$	0.931	0.053
$lnGEXP_t$	-1.883	0.014
C	28.260	0.491

Table 7: Short Run Coefficients based on ARDL

Estimated short term coefficients based on ARDL Approach Dependent Variable:DTD_t		
Variables	Coefficients	Probability
$DlnUB_t$	-80.450	0.001
$DlnREER_t$	25.014	0.062
$DlnOPN_t$	-112.003	0.068
$DlnINF_t$	0.069	0.064
$DlnGEXP_t$	-0.333	0.114
ECT_{t-1}	-0.751	0.000
	Diagnostics for ECM	
R^2	0.580	Mean Dependent Variable
		0.003
Adjusted R^2	0.423	S.D Dependent Variable
		0.102
S.E of Regression	0.077	Akaike Information Criterion
		34.638
Residual sum of squares	0.144	Schwarz Baysian criterion
		27.006
Log likelihood		Durbin Watson Stat
	44.638	1.783
F statistics	5.542	Probability Value(F Stat)
		0.001

In the end, this study applied the stability test of CUSUM and CUSUM square to ensure that mean and variance of disturbance term of the model are structurally stable. It is found that both mean and variance of error term were found to be structurally stable, so there is no evidence of structural break in the data set for the selected period (1985 -2018).





Conclusion

This study investigates the effect of urbanization, REER, trade openness, inflation and government spending on trade deficit in Sri Lanka for 1985-2018. Phillip and Perron (1988) and KPSS (1992) tests are used to test the stationarity of selected variables. Afterwards, ARDL co-integration technique is applied for testing the existence of co-integrating relationship between dependent and independent variables. Lastly, CUSUM and CUSUM Square tests are utilized to check the overall stability of the model. This paper proved that urbanization, REER, trade openness, inflation and government expenditure are the important determinants of trade deficit. The empirical findings suggest that appreciation of real effective exchange

rate, urbanization and inflation increase the trade deficit significantly in the long run in Sri Lanka. As far as the coefficient of trade openness and government expenditures are concerned, they are found to be negative and significant in the long run. It depicts that both factors can reduce trade deficit. As far as short run is concerned, the coefficient of lagged error correction term is found to be negative and significant confirming existence of convergence hypothesis. It means that Sri Lanka will attain long run and stable equilibrium which is disturbed due to any economic or non-economic shock in the short run. The estimated coefficient of error term are found to be structurally stable. The study prescribed that serious issue of trade deficit in Sri Lanka can be improved through proper management of real effective exchange rate, inflation and urban population. The government should check the unorganized urbanization and promote the local industry particularly related to import substitutes. These steps enable the country to be self-sufficient and increase the exports, thus reduce trade deficit.

Declaration

We hereby confirm that the manuscript has no any actual or potential conflict of interest. We confirm that the paper has not been published previously, it is not under consideration for publication elsewhere.

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