ROLE OF PUBLIC DEBT IN ECONOMIC GROWTH OF SRI LANKA: An ARDL Approach

Naeem AKRAM*

Abstract

Over the past few years most of the developing countries are facing hardship in collecting enough revenues to finance their budget. The situation of balance of payments is also not favouring the developing countries and the current account deficit is faced by them. Consequently twin deficits have emerged and the reliance on public external and domestic debt to finance the developmental activities have increased. The present study examines the consequences of public debt for economic growth and investment in Sri Lanka, for the period 1975-2014 by using the Autoregressive Distributed lag Model (ARDL) technique. The present study reveals that in Sri Lanka, public external debt has helped the process of economic growth; but debt servicing has a negative relationship to per capita GDP and investment. The external debt played a crucial role in development of this civil war which had hit the country; but however, debt servicing is a major concern in Sri Lanka. Domestic debt has positive and significant relationship with per capita GDP.

Key words: Public Debt, Economic Growth, Investment, ARDL.
JEL Classification: H63, O43, E22, C22.

I. Introduction

In the recent years, indebtedness of developing countries has emerged as one of the major development policy issues. Public debt, can be classified as sum of external debt and the domestic debt. Indeed, since the 1950's much of the extraordinary growth in developing countries can be described as debt-related. According to the traditional neoclassical models of economic development, developing countries at initial stage have limited capital stocks, less investment opportunities and capital mobility from developed countries; which increases the economic growth [Chowdhury (2001)]. As long as these borrowed resources are used for productive investment; countries do not face macroeconomic instability [Burnside and Dollar

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(2000). Similarly, domestic savings and investments are positively affected by external debt that indirectly has positive impact on economic growth [Eaton (1993)].

On the other hand, high level of accumulated debt also has adverse impact on investment and economic growth. In this regard, 'debt overhang', 'crowding out' and 'uncertainty' describe these impacts. 'Debt overhang' theory asserts that if there is a probability that country's future debt will be more than its repayment ability then the anticipated costs of debt-servicing can depress the investment [Krugman (1988)]. However, the extent to which investment is discouraged by debt overhang, depends on how the government generate resources to finance debt service obligations [Karagol (2002)]. Similarly, if a greater share of foreign capital is used to service the external debt, very little will remain to finance investment and growth. This channel is known as 'crowding out' effect [Diaz-Alejandro (1981)]. The 'uncertainty' created by debt in shape of possibilities of default, rescheduling, etc., would make future inflows and additional lending instable and create a situation where waiting option is used by foreign, as well as, the domestic investors. This results in reducing productivity of capital that decelerates the economic growth [Moss and Hanley (2003)]. In developing countries, domestic debt received far less attention by the policy makers. However, domestic financing is becoming increasingly vital because over the years, donor's willingness to lend has reduced. Use of domestic debt to finance fiscal deficit requires a complex assessment of its costs and benefits. In developing countries, justification behind the creation of domestic debt is that it defends countries from adverse external shocks and foreign exchange risks; it also kindles the development of internal financial markets. Barajas and Salamat and Salazar) [(1999), (2000)], and Kumhof and Tanner (2005) are of the view that as government securities in developing countries are considered an attempt by banks to guard against high private sector credit risk, therefore domestic debt helps in crowding the private investment. Furthermore, countries (China, India, Chile for instance) which have evaded major financial or fiscal crisis in the last decades, are those that relied comparatively more on internal financing of their growth [Aizenmann, et al. (2004)].

However, internal financing entails problems of its own. For instance, if financing is made through the central bank by printing more money, then it is inflationary in nature and likely to promote financial repression. Domestic debt's consequences on fiscal sustainability are another important concern. According to Beugrand, et al. (2002) in comparison with external debt, the domestic debt is more expensive. Moreover, due to domestic debt, the banks become self-satisfied about costs and decrease the efforts to mobilize deposits and finance private sector projects because of the high-yielding public domestic debt. Similarly, as domestic debt provides heavy earnings to banks; therefore, from a risk-weighted point of view, government borrowing is attractive to banks and to some extent domestic debt crowd-out the private investment [Hauner (2006)]. So far, most of the, studies conducted on debt-related issues have focused entirely on the external debt, leaving out a very impor-

tant part of total indebtedness (domestic debt). In contrast, the present study would analyse the combined effects of domestic and external debt on economic growth.

The layout of the paper as follows; after the introductory (Section I), review of relevant literature is presented in Section II. Section III discusses the theoretical background of the debt-growth relationship. Section IV is devoted to the discussion on data and empirical methodology. Section V presents the empirical results of the study; conclusions and policy implications emerge from the study are given in Section VI, followed by bibliography and an Appendix.

II. Literature Review

Over the last three decades, numerous studies were conducted on external debt-economic growth nexuses. Following the oil crisis, of 1979, all economies felt the heat of global recession in 1980-83; because of the slow economic growth of industrial countries. High real interest rate coupled with low price of their exports and some debtor countries faced a severe debt-servicing problem. An overview of the available literature regarding each of these is summarized as under.

Kruger (1987) found that after oil crisis, the oil-importing countries faced a large current account deficit while the oil exporters were able to accumulate the current account surpluses. These surpluses are lent to commercial banks; whereas deficit of oil importing countries is financed by banks. Sachs (1990). It shows that if higher taxes cover the debt servicing then they create distortions in the economy; like tax evasion, reduction in work efforts, capital flight and barriers to trade, etc., which are likely to reduce the economic growth. Levy and Chowdhury (1993) also finds that due to expectations of rise in taxes, an increase in public external debt discourages the capital formation, encourages capital flight, and depresses the economic growth. Husain (1997) is of the view that debtor country's domestic tax system plays a central role in determining the investment impact of external debt. Harmful effects would only be present if domestic tax system is highly distorted.

Smyth and Hsing (1995) found that 38.4 of debt as percentage of GDP is the optimal level of debt in the selected developing countries. It concludes that in early 1980s the ratio of external debt rose but it remained below 38.4; but during the same period the debt financing tended to stimulate the economic growth. However, during 1986-93, debt as percentage of GDP rose from 40.7 to 50.9 per cent. Later it was above the optimal debt ratio (38.4) – the economic growth got adversely affected by external debt. Maghyereh, et al. (2002) concluded a 53 per cent threshold level of debt as percentage of GDP for Jordon. Clements, et al. (2003) found that threshold level of 20–25 per cent of GDP for external debts estimated net present value and 50 per cent of GDP for its face value - debt depresses the economic growth. However, public investment seems to be unaffected by the stock of public debt while debt servicing curtails public investment. Similarly, Patillo, et al. (2002) found that approximately 160 per cent of export-

to-debt level external debt is growth enhancing, thereafter, it is growth reducing. Latter, Patillo, et al. (2004) concluded that negative impact of external debt on growth is transmitted strongly through total factor productivity (TFP) and the investment (physical capital accumulation). It also revealed that in countries with high debt level, doubling of debt will shrink the GDP growth by approximately one per cent.

According to Cunningham (1993), through the adverse impacts of debt on productivity of capital and labour, the growth of public debt has a negative relationship with economic growth. Fosu [(1996), (1999)] also concluded that debt burden through diminishing marginal productivity of capital affects the GDP growth negatively and on an average, a country having high level of debt. faces approximately one per cent per annum reduction in GDP growth rate. Chowdhury (2001) also comes to similar conclusion that debt is harmful for economic growth of a country. Iqbal and Zahid (1998) found that budget deficit has a negative relationship with GDP growth and that lowering the budget deficit is helpful for economic growth. Similarly, external debt also negatively affects the economic growth signifying that relying on domestic resources, which is the best option to financing growth. However, Lin and Sosin (2001) empirically found that for African countries, the debt has negative and significant relationship with economic growth but for Latin American countries, it is insignificant. However, for Asian and other developing countries, the relationship is positive but insignificant. It has been concluded that efficient utilization of debt is very vital for economic growth but carelessness and mismanagement of funds can hamper it.

There are two debt overhang concepts. Sachs and Williamsons (1986) presented the first concept that when indebted countries pay their debts then these real resources are transferred from private sector to public sector. Feldstein (1986) sets the second concept that governments need to impose tax on private sector to finance the debt obligations which results in sinking the return of investment leading towards a reduction in investment. Sawada (1994) is of the view that in heavily indebted countries, current external debt is more than their expected present value of future returns; therefore, they have to face the debt overhang problems. Sen, et al. (2007) also comes to a conclusion that due to severe debt overhanging effects; growth in Latin American economies slows down. However, the impact of debt overhang on economic growth in Asian countries has turned out to be negative but Afxentiou and Serletis (1996) fails to find out a causal relationship between debt and GDP, and concludes that debt overhang is rather exaggerated. It also finds that if resources are transferred into inputs then the external debt would have a positive effect on economic development.

According to Deshpande (1990), debt has negative impact on investment. It is also supported by Mahdavi (2004) and Fosu (2007) arguing that expenditures on debt servicing may shift the public expenditures from social sectors (like health and education) to public investment which affects the growth severely. Serieux Samy (2001) found that there exists a debt overhang effect but it does not act through external account; rather it acts through national budget. It also finds that crowding out effect is very strong

but its effects are more on the quality of investment rather than the rate of investment. Similarly, according to Warner (1992) debt tends to crowd-out investment. However, the study has been criticised for using a biased and unreliable methodology to prove the assertions [Rockerbie (1994)]. Cohen (1993) showed that in highly indebted developing countries, the level of debt does not have any role in slowness of investment.

Taghavi (2000) found that investment, both in short-run and long-run, is negatively affected by public debt which has significant crowding-out effect on investment and cause inflation in the long-run. Habimana (2005) found that different debt variables have a significant and negative impact on investment in Rwanda. On one hand debt/revenue ratio cost of debt servicing reduces public investment and on the other hand, higher taxes have a disincentive effect on investment returns, necessary to service debt obligations. Were (2001) concludes that in Kenya, external debt have negative impact on economic growth and private investment. Not only the past debt accumulation deters growth but in the short-run the current debt flows also curtails the economic growth. However, the current debt flows stimulate investment while the past debt accumulation discourages investment.

Karagol (2002) found that in the long-run, there exists one-way relationship between debt servicing and economic growth in Turkey. However, debt affects the GNP negatively, both in the short-run as well as in the long-run. It is argued that existence of causality between debt service and GNP is due to the fact that in the past, borrowed resources were misallocated. Ramakrishna (2003) reveals that Ethiopia is facing debt overhang situation coupled with severe debt service problems. However, fiscal balance, investment and openness to trade have a positive relationship with economic growth. Focus of most of studies on public debt is only due to external debt and economic growth, neglecting domestic debt entirely or mentioning it in the passing. The reason is the understanding that unlike domestic debt, external debt is more difficult to service and repay.

For further review, the study of Abbas (2005), focus and affirms the conventional wisdom of decision to switch from external to domestic debt, is fraught with difficulties. It also concludes that relationship between the domestic debt and economic growth is negative. Latter, Abbas (2007) found that if domestic debt (as percentage of bank deposits) exceeds 35 per cent then it undermines the economic growth. Importantly, in his calculus, the quality of domestic debt determines the optimal size of it. If debt is marketable issued to 'non-banking sector' and bears positive real interest rates, then the high level of domestic debt can also be sustainable. However, Blavy (2006) finds that 'threshold level of debt is 21 per cent of GDP. It was also found that doubling of public debt would reduce productivity growth of about 1.5 per cent.

There are very limited studies conducted to analyse the effects of debt on economic growth of Sri Lanka. Fonseka and Ranasinghe (2008) concluded that over the years, public debt in Sri Lanka has increased, resulting in high debt servicing obligations. Both, debt as well as debt servicing, have negative impact on Sri Lankan's eco-

nomic growth. Ekanayake (2011) analysed the debt sustainability of Sri Lanka and found that by 2015 'one standard deviation positive growth shock would result in reducing the debt to GDP ratio by 2.4 per cent'.

From the so far review of literature, it can be broadly surmised, that ideas about relationship of external and domestic debt on economic growth are not so clear; and divergent opinion exists practically on every aspect of the relationship of debt with key economic variables. It is noteworthy that most studies on the subject focus on relationship between the external debt and economic growth, neglecting the domestic debt entirely or mentioning it for reference sake. Secondly, most of these studies conducted by using the panel data, but as different countries vary in socio-economic conditions; therefore, it is very important that time-series analysis may also be used.

III. Theoretical Foundation of the Debt Growth Nexuses

Understanding the process of economic growth is recognized as an eventual objective of development economics. In aftermath of the industrial revolution of 18th century, the economies of Europe and USA grew at a rate, much faster than they did in the pre-industrial revolution period. Reflecting the reality of economic progress; there was a rapid change in economic thinking, and the role of economic growth in raising standards of living became the focal point of economic literature after the World War II.[1] Numerous theoretical and empirical studies have been conducted to analyse the process of economic growth and its consequences. Growth literature can be divided into following major schools of thought: The Classical and Neo-Classical Growth Models, the Keynesian and Neo-Keynesian Models, the Endogenous Growth Model and the most recent developments in the growth literature, which attempt to rescue the classical and neo-classical models from the stranglehold of steady-state growth. The role of public debt among these models is summarised as under:

1. *Classical Growth Model*

Ricardian Equivalence makes the basis of a formal model. According to this theory, governments can finance their expenditures either through taxing the current taxpayers or by borrowing from the public. If government borrows then in future, it has to repay this borrowing by increasing taxes above the normal taxes. Ricardo further argues that in case of borrowings, although taxpayers get more money but they also realize that in future, they would have to pay higher taxes. Therefore, in order to pay the future tax rise, they save the tax cut. Hence, the net effect will be similar to the financing of expenditures through taxes. Barro (1979) formalized these ideas in a mathematical model and concluded that taxes or debt financing will have no impact on interest rates, capital formation and aggregate demand. Since fiscal and monetary policies do not affect savings, investment and long-run economic growth; there is not much discussion in literature of the role of public debt in the classical literature of economic growth.

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[1] Rogers (2003).

2. *Keynesian and Neo-Keynesian Growth Model*

In the Keynesian model, formalized by Harrod (1942) and Domar (1946), public expenditure and policy tools are assumed as exogenous to the process of long-run economic growth. According to the Keynesian model an increase in fiscal deficit or public expenditure; or a reduction in taxes will boost the aggregate demand and income directly; and will result in growth, output and employment. However, it also has a crowding out effect that increases the interest rate, appreciates currency, and consequently increases the output; not necessarily proportional to an increase in aggregate demand. Within Keynesian framework, public debt keeps the national income growing at the full-employment level.[2]

3. *Neo Classical/Exogenous Growth Model*

Solow (1956) gave more importance to capital formation as in his view, new capital is more valuable in comparison to the old capital, because new capital is produced by adopting new technology. According to his model, in the long-run fiscal policy it is neutral but it might have an impact on steady state per capita income levels. In the Solow model, a tax cut and/or budget deficit stimulate consumers spending and reduce national savings. The decline in savings raises the interest rate, which crowds out investment and ultimately affects economy and the economic well-being of a country.

Diamond (1965) introduced the role of debt in neoclassical model and concluded that taxes need to finance interest payments of external debt and have two very important effects on long-run economic growth. Taxes, directly reduce the available lifetime consumption, disposable income and savings of all individual taxpayer. Hence, it results in reducing capital stock, leading toward sluggish economic growth. Moreover, internal debt will also result in reduction of capital stock because of substitution of government debt for physical capital.

4. *Endogenous Growth Model*

The models developed by Lucas (1988) and Romer (1986) are a response to the theoretical and empirical deficiencies of neoclassical model. In neoclassical economic growth models, long-run economic growth rate is determined exogenously by assuming constant technical progress rate or savings. However, technological progress and savings rate remain unexplained.

According to the endogenous growth models, long-run growth rate depends on government actions. Therefore, fiscal and monetary policies have a great potential for long-run economic growth. According to Villanueva (1972), if technical change is considered as endogenous then the economic growth would be affected by an increase in public debt. Lin (2000) found that real interest rate may not increase by the

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[2] Gehrels (1957).

government debt and consequently, government debt would increase the per capita GDP growth rate. However, if growth rate is lower than real interest rate, then debt would depress the economic growth.

5. *New Growth Models*

Recently, the political economic models are used for analysing determinants of economic growth. These models focus on impacts of factors like legal origins, corruption, quality of governance, democracy, and the institutions.[3] Taking into account the relative importance of climatic conditions and geographical constraints, major debates relates to the issue of links between the international economic integration and growth. In new growth models, the role of public debt is analysed in the context of its effective utilization.

IV. Data and Estimation Methodology

Time series data, spanning over the period of 1975-2014 has been used to analyse the impacts of public debt on economic growth of Sri Lanka. A brief description along with data source of various variables used in the study, is presented in Table 1.

Time-series data has a problem of settling the issue of stationarity of data at the first step. If some variables are I(I) then the standard regression analysis may

TABLE 1

Details of the Data

Sr. No.	Name of Variables	Data Source	Definition of Variables
1.	Per Capita GDP (Yt).	World Development Indicators.	GDP per Capita in US$.
2.	Investment (Kt).		Gross Fixed Capital Formation as percentage to GDP.
3.	External Debt (ED_Y).		External Debt as percentage to GDP.
4.	Debt Servicing (DS_Y).		External Debt Servicing as percentage to GDP.
5.	Population Growth Rate (pop).		Population Growth Rate.
6.	Domestic Debt (dd_y).[4]	International Financial Statistics.	Domestic Debt as percentage to GDP.

[3] See, Zak and Knack (2001), Glaeser (2004), and Acemoglu and Robinson (2006).

[4] Abbas (2007) defined the domestic debt as 'all domestically held claims of central government' on the analogy of the definition of public and publicly guaranteed external debt by Global Development Finance. In this regard, the International Financial Statistics (IFS) database series 22a+42a and 20c+40c serves the purpose. Hence, Domestic Debt = Bank's claim on government + Central bank securities = IFS [(22a+42a)+(20c+40c)].

yield spurious results.[5] To tackle the issue. latest approach is cointegration analysis. The results of the unit root test (Augmented Dickey Fuller test) reveals that the model includes a mixture of I(0) and I(I) variables. The most appropriate method for estimation in these circumstances is the Autoregressive distributed lags model (ARDL) proposed by Pesaran, et al. (2001).[6]

Keeping in view the importance of investment, Presbitero (2005) is of the view that it is better to disentangle the analysis of public debt and economic growth in a two-step relationship. First, the direct links between the public debt and economic growth which are explored; and then the relationship between public debt and investment is also analysed. The basic conditional VECM equation for relationship between the public debt and economic growth can be written, as in Equation (1).

$$\Delta y_t = \alpha + \gamma_1 y_{t-1} + \gamma_2 pop_{t-1} + \gamma_3 k_{t-1} + \gamma_4 ed\_y_{t-1} + \gamma_5 ds\_y_{t-1} + \gamma_6\, dd\_y_{t-1} +$$
$$\sum_{i=1}^{p} \omega_i \Delta y_{t-i} + \sum_{i=0}^{p}\tau_i \Delta pop_{t-i} + \sum_{i=0}^{p}\sigma_i \Delta k_{t-i} + \sum_{i=0}^{p} \beta_i \Delta ed\_y_{t-i} +$$
$$\sum_{i=0}^{p}\varphi_i \Delta ds\_y_{t-i} + \sum_{i=0}^{p}\theta_i \Delta dd\_y_{t-i} + \varepsilon_t \tag{1}$$

Following the analogy that investment is the basic channel through which debt affects economic growth, the ARDL specifications for investment equation is, presented in Equation (2).

$$\Delta k_t = \alpha + \gamma_1 k_{t-1} + \gamma_2 pop_{t-1} + \gamma_3 yt_{t-1} + \gamma_4 ed\_y_{t-1} + \gamma_5 ds\_y_{t-1} + \gamma_6\, dd\_y_{t-1} +$$
$$\sum_{i=1}^{p} \omega_i \Delta k_{t-i} + \sum_{i=0}^{p}\tau_i \Delta pop_{t-i} + \sum_{i=0}^{p}\sigma_i \Delta y_{t-i} + \sum_{i=0}^{p} \beta_i \Delta ed\_y_{t-i} +$$
$$\sum_{i=0}^{p}\varphi_i \Delta ds\_y_{t-i} + \sum_{i=0}^{p}\theta_i \Delta dd\_y_{t-i} + \varepsilon_t \tag{2}$$

where α is intercept, εt is the error term; similarly, $\gamma 1 \ldots\ldots \gamma 6$ are the long-run coefficients and ω, τ, σ, β, φ and θ are the short-run dynamic coefficients. It is also worthwhile to define the variables (here) y, pop and k denotes per capita GDP, population growth rate and investment, respectively. Similarly, ed_y (external debt as percentage of GDP), ds_y (debt servicing as percentage of GDP) and dd_y (domestic debt as percentage of GDP) are the major indicators of public debt.

It may be noted that although in the ARDL approach, the order of integration does not matter much, yet if any variable is found to be integrated of order 2 i.e., if the series is I(2), then on such series the ARDL technique cannot be applied. The results obtained by using the Augmented Dickey and Fuller test (1979) shows that all variables are either I (1) or I (0).

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[5] Newbold (1974).

[6] Details of Estimation Issues is presented in Appendix.

TABLE 2

Results of Unit Root Test for Sri Lanka

Name of Variables	Level			1st Difference		
	Intercept	Trend and Intercept	None	Intercept	Trend and Intercept	None
Yt	-0.0339	-2.6532	5.2262	-6.9451*	-6.7934*	-3.2464*
POP	-3.9042*	-4.4243*	-5.0292*	*****	****	****
KT	-2.3891	-2.1765	0.842	-2.6947**	-4.0890*	-2.5736*
ED_Y	-3.1309*	-2.7057**	-3.1812*	*****	****	****
DD_Y	-0.6826	2.835	0.5433	-3.1519*	-3.8317*	-1.9745*
DS_Y	-2.0154	-1.5526	-0.5353	-3.7140*	-3.6236*	-3.6236*

Null Hypothesis: Existence of unit root, **denotes the rejection of Null at 5% and 1% level, respectively.

V. Estimation Results

1. *Analysis of Impact of Public Debt on Economic Growth*

The ARDL cointegration procedure begins with conducting the bound test for the null hypothesis of no co-integration. i.e.,

Ho : $\gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = \gamma_6 = 0$, against the alternative hypothesis of

H1 : $\gamma_1 \neq \gamma_2 \neq \gamma_3 \neq \gamma_4 \neq \gamma_5 \neq \gamma_6 \neq 0$

For F-test selection, maximum lag length is very important. The observations in the study are annual and have 40 observations with six parameters. For such a short data, as suggested by Pesaran, et al. (2001), a maximum lag length of 2 was selected by the author of this study. The estimation results of F-test for the level of significance are, summarized in Table 3.

The results reveal that calculated F-statistic is greater than the upper bound critical values. It depicts that there exist a co-integrating relationship among variables. After determination of the existence of cointegration among variables, the next step in the

TABLE 3

Bouns F Test Results

F-Statistic Values	Lag Length	Significance Level	Bound Critical Values	
			I(0)	I(I)
		1%	2.96	4.26
7.68	2	5%	2.32	3.50
		10%	2.03	3.13

ARDL approach, to estimate the long-run coefficients for Equation (1). To find out the optimal length for the long-run coefficients of this equation, Schwarz Bayesian criterion (SBC) of the lag selection is utilized. The long-run estimation results are, summarized in Table 4.

a) *Long-Run Relationships*

The results confirm the negative relationship between the external debt indicators and the economic growth. Due to civil war in most of the history of Sri Lanka; situation of the current account and fiscal account balance was not satisfactory.[7] For developmental activities, the country was led to heavy dependency on external debt. Hence as percentage of GDP, the external debt played a positive role in economic growth. However, debt servicing had a negative relationship with per capita GDP. It can be infer that instead of debt overhang effects public external debt is stimulating economic growth, but debt servicing is causing the crowding out effect. Similar to some of the extant findings, e.g., Abbas (2007) the effects of domestic debt are positive and significant on economic growth in Sri Lanka.

The population growth in Sri Lanka, has a negative and significant relationship confirming the existence of Malthusian theorem which is also supported by Coale and Edger (1958), and Naqvi (2010). The conventional wisdom is that investment enhances economic growth and this proposition has received support from various studies, e.g., Barro (1991), Mankiw, et al. (1992), Pattillo, et al. (2002) and, Abbas and Christensen (2007); who says that investment has had a positive relationship with per capita.

TABLE 4

Long-Run Estimation Results using YT as
Dependent Variable (1, 0, 1, 0, 0, 1)

Variables	Coefficient	Std. Error	t-Statistic
Constant	0.4736	0.25269	1.8744
POP	-0.0507*	0.01667	-3.0405
KT	0.0473*	0.02122	2.2276
ED_Y	0.0290*	0.00964	3.0066
DS_Y	-0.0678*	0.02440	-2.7781
DD_Y	0.0102**	0.00574	1.7733
R-squared	0.9917	Serial Correlation LM test	0.3338
Adjusted R-squared	0.9889	P value of LM test	0.1058
F-statistic	357.0872		
Prob(F-statistic)	0.0000		

* and ** denotes significance at 5% and 10 % level, respectively.

[7] See, Akram (2012).

Diagnostic tests results suggest a high value of R2 revealing that considering the number of variables, overall goodness of fit of the model is satisfactory. The F-Statistic measuring joint significance of all regressors in the model which is also statistically significant. Serial correlation LM test indicate that there exists no serial correlation.

b)   *Short-Run Relationships*

After estimating the long-run coefficients, final step in the ARDL approach is the analysis of Error Correction and estimation of short-run coefficients. According to the relevant theory if there is cointegration among variables then in the short-run, error correction will also happen. The results of Error Correction Model are summarized in Table 5.

According to the results of Table 5 the existence of a stable long-run relationship among variables is further confirmed by the significant error correction term [Bannerjee and Mestre (1998)]. The coefficient of error correction term also represents the speed of adjustment. This follows a disturbance in the unrestricted model as to how quickly the variables return back to their long-run values. The results suggest that following a shock, approximately 98 per cent of adjustments towards

TABLE 5

Error Correction Representation
of the Selected ARDL Model

Variables	Coefficient	Std. Error	t-Statistic
Constant	0.02751	0.02142	1.28465
D[YT(-1)]	0.21174	0.51977	0.40737
D(POP)	-0.032	0.02036	-1.57129
D(KT)	0.12393	0.07255	1.70821
D[KT(-1)]	0.01139	0.06208	0.18345
D(ED_Y)	0.07692*	0.02841	2.70798
D(DS_Y)	-0.03066	0.02143	-1.43078
D(DD_Y)	-0.02757	0.02886	-0.95544
D[DD_Y(-1)]	-0.00838	0.03135	-0.26731
ECT(-1)	-0.98998*	0.45430	-2.17915
R-squared			
Adjusted R-squared			
F-statistic			
Prob. (F-statistic)			

* denotes significance at 5% level.

the long-run equilibrium is completed after one year. It is revealed that in Sri Lanka, the public external debt as percentage of GDP has a positive and significant relationship with per capita GDP, which is similar to the findings of long-run estimation, Both the debt servicing and domestic debt have a negative but insignificant relationship in the short-run with per capita GDP. It can be inferred that effects of external debt on per capita GDP are both, the long-run as well as the short-run phenomenon. Population growth and investment do not have significant impact on per capita GDP. It depicts that effects of investment and population growth are transmitted to economic growth in only the long-run but in the short-run the effects are marginal. The cumulative sum (CUSUM) graph show that coefficient of the short-run lies within the critical limits and indicate stability in the coefficients, over the sample period.

2.   *Analysis: Impact of Public Debt on Investment*

To analyse the impact of debt on investment Equation (2) is used and the following test of cointegration is performed:

Ho : $\gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = \gamma_6 = 0$ against the alternative hypothesis of
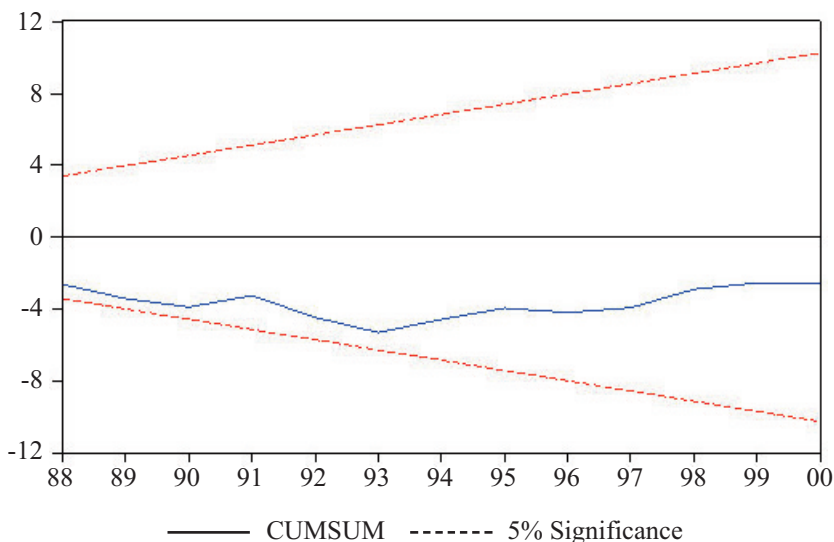H1 : $\gamma_1 \neq \gamma_2 \neq \gamma_3 \neq \gamma_4 \neq \gamma_5 \neq \gamma_6 \neq 0$.

FIGURE 1
CUMSUM Test Results

TABLE 6

Bound F test Results

F-Statistic Value	Lag Length	Significance Level	Bound Critical Values	
			I(0)	I(I)
5.45	2	1%	2.96	4.26
		5%	2.32	3.50
		10%	2.03	3.13

Similar to the estimation reported, maximum lag length of 2 has been selected. The results of F-test for significance are summarized in Table 6, which shows that calculated F-statistics value is higher than the upper bound critical values at one per cent level of significance. It depicts that there exist a cointegrating relationship among the variables. Using the SBC criterion for lag selection, the estimated long-run relationships for Equation (2) are summarized in Table 7.

a)   The Long-Run Relationships

Results in the long-run reveals, that external debt as percentage of GDP has a positive and significant impact on investment; whereas, debt servicing has a negative and significant relationship with investment. It further confirms the existence of crowding-out effect in Sri Lanka. In brief, the combined results of the impact of public external debt and debt servicing shows that economic growth of Sri Lanka is negatively affected

TABLE 7

Long Run Estimation Results using KT as
Dependent Variable (1, 0, 1, 0, 0, 1)

Variables	Coefficient	Std. Error	t-Statistic
Constant	1.1551	1.03669	1.11422
POP	0.12174*	0.02913	4.17874
YT	0.01591*	0.00767	2.07512
ED_Y	0.24830**	0.12486	1.98864
DS_Y	-0.19974*	0.09659	-2.06802
DD_Y	0.05801**	0.03231	1.79508
R-squared	0.81222	Serial Correlation LM test	1.02564
Adjusted R-squared	0.74962	P value of LM test	0.12586
F-statistic	12.9758		
Prob. (F-statistic)	0.0000		

* and ** denotes significance at 5% and 10 % level, respectively.

by crowding-out effect of public debt on investment; however, there exist no debt over-hang effect of external debt. The domestic debt also has a positive and significant impact on investment. The possible reason seems to be that, as domestic debt enhances the public investment, it might crowd-out private investment. But due to a large public sector, positive effects of domestic debt on investment have outweighed the negative impacts on private investment; thus, the net result is a positive impact on investment.

The results also reveal that population growth rate and the per capita GDP has a significant and positive relationship with investment. The diagnostic tests show that there exists no serial autocorrelation and satisfactory goodness of fit. In the last step of ARDL, the short-run coefficients of the model are estimated and results are presented in Table 8. According to its results the existence of a stable long-run relationship among variables is further confirmed. The coefficients of error correction suggest that following a shock, after one year about 86 per cent of the adjustment back towards the long-run equilibrium is completed.

b) *The Short-Run Relationships*

It is also evident from the results that per capita GDP and external debt have a positive and significant relationship with investment in the short-run. The cumula-

TABLE 8

Error Correction Representation
of the Selected ARDL Model

Variables	Coefficient	Std. Error	t-Statistic
Constant	-0.0857	0.0638	-1.3426
D[KT(-1)]	0.3276*	0.1404	2.3326
D(POP)	0.0936	0.0637	1.4693
D(YT)	1.4984*	0.6661	2.2495
D[YT(-1)]	1.2872	1.3776	0.9344
D(ED_Y)	0.2720*	0.1215	2.2379
D(DS_Y)	-0.02	0.1263	-0.1586
D(DD_Y)	0.0321	0.0562	0.5707
D[DD_Y(-1)]	0.0792	0.0869	0.9109
ECT(-1)	-0.8607*	0.3202	-2.6878
R-squared	0.77996		
Adjusted R-squared	0.6385		
F-statistic	5.51375		
Prob (F-statistic)	0.00241		

* denotes significance at 5% level.

tive sum (CUSUM) in Figure 2, shows that the short-run coefficients lies within critical limits and indicate stability in the coefficients, over the sample period.

VI. Conclusion and Policy Implications

The study examines the principal consequences of contracting public debt for economic growth and investment in Sri Lanka. Furthermore, it investigates the impact of certain other variables on growth. In Sri Lanka, public external debt has a positive and significant relationship with per capita GDP and investment, both in the short-run and long-run. However, debt servicing has a positive and significant relationship with per capita GDP and investment. Therefore, it can be inferred that although external debt has played a very crucial role due to civil war which hit the country, but the expenditure to service this debt has harmed the economic growth and has tended to crowd-out investment. The results also indicate that investment has a positive effect while population growth has a negative impact on economic growth. Keeping in view the findings of the study, various general and country specific policy implications have emerged.

1. In Sri Lanka, a positive relationship exist between the public external debt and per capita GDP, but yet the debt servicing through 'crowding-out effect' has hindered the economic growth. Therefore, in order to accelerate economic growth, developing countries must adopt such policies, which are likely to result in reducing their debt burden; at least to make sure that the rising debt burden does not reach an unsustainable level.
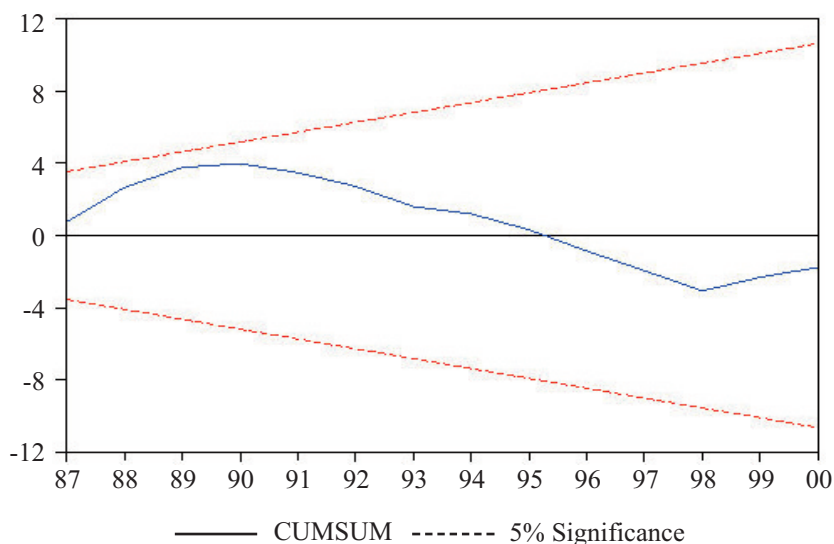

————— CUMSUM   ------- 5% Significance

FIGURE 2
CUMSUM Test Results

2. From the estimation results, it also follows that population growth rate is harmful for economic growth. Thus, in order to stimulate the growth performance a country must adopt effective population control policies. It may also be interesting to highlight new areas of research which the present study suggests.

    a) For a comprehensive analysis of the impact of public external debt on economic growth, a micro-level study will be extremely useful. In such a study, various foreign aid/loan funded development projects may be analyzed in context to their impacts on local community and poverty reduction efforts. It is worthwhile to point out that differentiation of effects of foreign loan funded projects and the local currency projects is very difficult. However, this context (as reference points) states that due to low capacity of developing countries, it is not advisable to start mega projects without the help of donor agencies. Therefore, the analysis of the impact of mega projects on poverty reduction can be extremely helpful.

    b) Investment plays a pivotal role for making a decisive impact of domestic debt on economic growth and poverty. But, domestic debt behave differently for private and public investment; as it stimulates public investment but reduce the private investment. Although, obtaining data for public and private investment separately, is a difficult task but it is very important that a study may be conducted wherein the impact of domestic debt on public and private investment should be analyzed, separately; and then their separate effects on overall investment can be determined.

Economic Affairs Division,
Government of Pakistan, Islamabad.

Bibliography

Abbas, S.M., 2005, Public debt sustainability and growth in post-HIPC sub-Saharan Africa: The role of DD, Paper for GD Net's 2004/05 project on macroeconomic policy challenges of low Income countries.

Abbas, S.M., 2007, Public domestic debt and growth in LICs, Draft doctoral thesis, Oxford: University of Oxford.http://users.ox.ac.uk/~hert1734/Public%20domestic%20debt% 20and%20growth.pdf

Abbas, S.M., and J.E. Christensen, 2007, The role of domestic debt markets in economic growth: An empirical investigation for low-income countries and emerging markets, IMF working paper 07/127.

Acemoglu, D., J.A. Robinson, 2006, Economic origins of dictatorship and democracy, Cambridge: Cambridge University Press.

Afxentiou, P., A. Serletis, 1996, Foreign indebtedness in low and middle income developing countries, Social and Economic Studies, : 133-159.

Aizenman, J., B. Pinto, and A. Radziwill, 2004, Sources for financing domestic capital, Is foreign saving a viable option for developing countries? NBER working paper 10624.

Akram N., 2012, Fiscal scenario of south Asian countries: Implications for economic growth and poverty alleviation, Science Journal of Economics, 2.

Bannerjee, A.D., and R. Mestre, 1998, Error-correction mechanism test for cointegration in single equation frame work, Journal of Time Series Analysis, : 267-283.

Barajas S., and N. Salazar, 1999, Interest spreads in banking in Colombia, IMF staff papers, 46: 196-224.

Barajas, S., and N. Salazar, 2000, The impact of liberalization and foreign investment in Colombia's financial sector, Journal of Development Economics, : 157-196.

Barro, R.J., 1979, On the determination of the public debt, The Journal of Political Economy, : 940-971.

Barro, R., and X. Sala-i-Martin, 2003, Economic growth, 2nd eddition, Cambridge: MIT Press.

Barro, Robert J., 1991,Economic growth in a cross section of countries, Quarterly Journal of Economics, 106(2): 407–33.

Beugrand, P., B. Loko and M. Mlachila, 2002, The choice between external and domestic debt in financing budget deficits: The case of central and west African countries, IMF working paper 02/79.

Blavy, R., 2006, Public debt and productivity: The difficult quest for growth in Jamaica, IMF working paper 06/235.

Burnside, C., and D. Dollar, 2000, Aid, policies and growth, American Economic Review, : 847-68.

Chowdhury, A.R, 2001, External debt and growth in developing countries: A sensitivity and causal analysis, WIDER discussion paper 2001/95.

Chowdhury, A.R., 2004). External ebt, growth and the HIPC initiative: Is the country choice too narrow? Chapter 8, In debt relief for poor countries, eds., Addison, Hansen and Tarp.

Clements, B., R. Bhattacharya and Nguyen, T.Q. (2003, External debt, public investment, and growth in low-income countries, IMF working paper 03/249.

Coale, A.J., M.H. Edgar, 1958, Population growth and economic development in low income countries, Princeton: Princeton University Press.

Cohen, D., 1993, "low investment and large LCD debt in the 1980.s, The American Economic Review, 83(3): 437-449.

Cunningham, R.T., 1993, The effects of debt burden on economic growth in heavily indebted nations, Journal of Economic Development, : 115-126.

Deshpande, A., 1990, The debt overhang and the disincentive to invest, Journal of Development Economics, : 169-187.

Diamond, P.A., 1965, National debt in a neoclassical growth model, The American Economic Review, : 1126-1150.

Diaz-Alejandro, C., 1981, Southern cone stabilization plans, Economic stabilization in developing countries, The Brookings Institution.

Dickey, D., W. Fuller, 1979. Distribution of the estimators for autoregressive time series with a unit root, Journal of the American Statistical Association, 84: 427-431.

Domar, E.D., 1946, Capital expansion, rate of growth and employment, Econometrica, : 137-147.

Eaton, Jonathan, 1993, Sovereign debt: a primer, World Bank Economic Review, 7(2): 137-172.

Elbadawi, I.A., J.N. Benno, N.U, Njuguna, 1999, Debt overhang and economic growth in Sub-Saharan Africa, Chapter 5, in: External rinance for low-income countries, ed., Iqbal, Zubair and Ravi Kanbur, Washington, D.C: IMF Institute.

Ekanayake, D., 2011, Assessing government debt sustainability in Sri Lanka. Retrieved   from:http://www.cbsl.gov.lk/pics_n_docs/10_pub/docs/IRC/2011/Govt._Debt_Full.pdf

Feldstein M., 1986, Budget deficits, Tax rules, and real interest rates, National Bureau of Economic Research, Working paper 1970.

Fonseka, A.T., and S.S. Ranasinghe, 2008, Sustainability of Sri Lanka's public debt, Sri Lankan Journal of Management, 13(1 and 2): 185-212.

Fosu, A.K., 1996, The impact of external debt on economic growth in Sub-Saharan Africa, Journal of Economic Development, : 93-118.

Fosu, A.K., 1999, The external debt burden and economic growth in the 1980s: Evidence from Sub-Saharan Africa, Canadian Journal of Development Studies, : 307-318.

Fosu, A.K., 2007, The external debt-servicing constraint and public expenditure composition, WIDER research paper 2007/36.

Gehrels, F., 1957, Government debt as a generator of economic growth, The Review of Economics and Statistics, 39 (2): 183-192.

Glaeser, et al. 2004, Do institutions cause growth? Journal of Economic Growth, September.

Habimana, A., 2005, The effects of external debt burden on capital accumulation: A case study of Rwanda, Thesis submitted for the degree of Magister Commercii, in the Department of Economics, University of the Western Cape.

Harrod, R.F., 1942, Toward a dynamic Economics: some recent developments of economic theory and their application to policy, London: Macmillan.

Hauner, D., 2006,Fiscal policy and financial development., IMF working paper 06/26.

Husain, A.M.,1997, Domestic taxes and the external debt. Laffer Curve, Economica, 64(225): 519-525.

IMF, 2016, International Financial Statistics CD-ROM, Washington D.C: IMF.

Iqbal, Z., and G.M. Zahid, 1998, Macroeconomic determinants of economic growth in Pakistan, The Pakistan Development Review, 37(2): 125-148.

Karagol, E., 2002, The causality analysis of external debt service and GNP, The case of Turkey, Central Bank Review, : 39-64.

Krueger, A.O., 1987, Debt, and LDC growth, American Economic Review, : 159-164.

Krugman, P., 1988,Financing vs. forgiving a Debt Overhang, Journal of Development Economics, 29: 253-268.

Kumhof, M., and E. Tanner, 2005, Government debt: A key role in financial intermediatiIMF working paper 05/57.

Levy, A., and K. Chowdhury, 1993, An integrative analysis of external debt, capital accumulation and production in Latin America, Asia-Pacific and Sub-Saharan Africa, Journal of Economics and Finance, 17(3): 105-119.

Lin, S., 2000, Government debt and economic growth in an overlapping generations model, Southern Economic Journal, 66 (3): 754-763.

Lin, S., and K. Sosin, 2001), Foreign debt and economic growth, Economics of Transition, 9 (3): 635-655.

Lucas, R.E. Jr., 1988, On the mechanics of economic development, Journal of Monetary Economics, : 3-42.

Maghyereh, A., G. Omet, and F. Kalaji, 2002, External debt and economic growth in Jordan, The threshold effect, The Hashemite University, Jordan.

Mahdavi, S.,2004, Shifts in the composition of government spending in response to external debt burden, World Development, 32(7): 1139–1157.

Malthus, T.R., 1798, An easy on the principle of population, London: W. Pickering

Mankiw, N.G., D. Romer, D.N. Weil, 1992, A contribution to the empirics of economic growth, The Quarterly Journal of Economics, 107(2): 407-437.

Moss, T.J., and S.C. Hanley, 2003, The other costs of high debt in poor countries: Growth, policy dynamics, and institutions, Issue paper on debt sustainability, Center for Global Development.

Naqvi, S.N.H., 2010, The evolution of development policy: A reinterpretation, Oxford: Oxford University Press.

Newbold, P., C.W.J. Granger, 1974, Spurious regressions in econometrics, Journal of Econometrics, 2: 111–120.

Pattillo, C., H. Poirson, and R. Ricci, 2002, External debt and growth, IMF working paper 02/69.

Pattillo, C., H. Poirson, and R. Ricci, 2004, What are the channels through which external debt affects growth? IMF working paper 04/15.

Pesaran, H.M., Y.Shin and R.J. Smith, 2001, Bounds testing approaches to the analysis of level relationships, Journal of Applied Econometrics, : 289-326

Presbitero, A.F., 2005, The debt-growth nexus: an empirical analysis, mimeo, Downloadable at: http://www.unicatt.it/convegno/open_economy/Allegati/debtgrowth_presbitero.pdf

Ramakrishna, G., 2003, External debt of ethiopia: an empirical analysis of debt and growth, Journal of Business and Public Affairs, : 29–35.

Ricardo, D., 1817, On the principles of political economy and taxation, Cambridge: Cambridge University press.

Rogers, M., 2003), A survey of economic growth, The Economic Record, 79(244): 112–135.

Romer, P.. 1986, Increasing returns and long run growth, Journal of Political Economy. 94: 1002–37.

Romer, P., 1994, The origins of endogenous growth, Journal of Economic Perspectives, 8: 55–72.

Rockerbie, D.W., 1994, Did debt crisis cause the investment crisis? Further evidence, Applied Economics, : 731-738.

Sachs, J.D., J. Williamson, 1986, Managing the LDC debt crisis, Brookings Papers on Economic Activity, : 397-440.

Sachs, J.D., 1990, External debt, structural adjustment and economic growth, International Monetary and Financial Issues for the 1990s.

Sawada, Y., 1994), Are the heavily indebted countries solvent? Tests of inter temporal borrowing constraints, Journal of Development Economics, : 325-337.

Sen, S., K.M. Kasibhatla, and D.B. Stewart, 2007, Debt overhang and economic growth – the Asian and the Latin American experiences, Economic Systems , 31: 3-11.

Serieux, J., and Y. Samy, 2001, The debt service burden and growth: evidence from low income countries, Canada: The North-South Institute Ottawa.

Smith, A., 1776, An inquiry into the nature and causes of the wealth of nations, R.H. Campbell and A.S. Skinner, eds., Oxford: Clarendon.

Smyth, D., Y. Hsing, 1995, In search of an optimal debt ratio for economic growth, Contemporary Economic Policy, : 51-59.

Solow, R., 1956, A contribution to the theory of economic growth, Quarterly Journal of Economics, 70: 65-94.

Taghavi, M., 2000, Debt, growth and inflation in large European economies: A vec-
    tor auto-regression analysis, Journal of Evolutionary Economics, 10: 159-173.

Villanueva, D.P., 1972, Public debt, Efficient labor, and growth: Comment, Journal
    of Money, Credit and Banking, 4(4): 1016-1018.

Warner, A.M.,1992, Did the debt crisis cause the investment crisis, Quarterly Jour-
    nal of Economics, : 1161- 1186.

Were, M.,2001, The impact of external debt on economic growth and privet invest-
    ment in Kenya: An empirical assessment, Kenya Institute for Public Policy Re-
    search and Analysis.

World Bank, 2016, World Development Indicators, Washington, D. C.: World Bank.

World Development reports, Various editions, Washington, D.C. World Bank.

Zak, P.J. and S. Knack, 2001, Trust and growth, Economic Journal, April.

APPENDIX

Autoregressive Distributed Lag (ARDL) Cointegration Analysis

Autoregressive distributed lag (ARDL) approach developed by Pesaran, et al. (2001) has become very popular, in the recent years. The main advantage of the ARDL model given the power and testing of long-run relationship is that, it can be applied irrespective of the order of integration (even in small samples) while other cointegration techniques require all variables to be of equal degree of integration (and of large samples). It means that ARDL technique is applicable irrespective of whether the underlying regressors are purely $I(0)$, purely $I(1)$ or a mixture of both. However, in the presence of $I(2)$ variable, the technique will crash and can yield spurious results.

The general Vector Autoregressive (VAR) of order p in z_t; can be written as:

$$z_t = c_0 + \beta t + \sum_{i=1}^{p} \alpha_i z_{t-i} + \varepsilon_t, \, t = 1,2,3,\dots T \qquad (A\text{-}1)$$

where c_0 represents $(k+1)$ vector of intercepts and β denotes $(k+1)$ vector of trend coefficients. Following vector equilibrium correction model (VECM), correspond to Equation (A-1) and can be written as:

$$\Delta z_t = c_0 + \beta t + \Pi z_{t-1} \sum_{i=1}^{p} \varphi z_{t-i} + \varepsilon_t, \, t = 1,2,3,\dots T \qquad (A\text{-}2)$$

where $\Pi = I_{k+1} + \sum_{i=1}^{p} \omega_i$ and $\phi_i = - \sum_{j=i+1}^{p} \omega_i$ i=1,2,3,……p-1, which contain the long-run multipliers and short-run dynamic coefficients of the VECM. The vector of variables y_t and x_t is z_t, where y_t is the dependent variable and x_t is the vector of independent variables; with a multivariate identically and independently distributed (i.i.d) zero which means error vector $\varepsilon_t = (\varepsilon_{1t}, \varepsilon'_{2t})$; and a homoskedastic process. Assuming that a unique long-run relationship exists among variables, the conditional VECM Equation (A-2) now becomes:

$$\Delta z_t = c_{y0} + \beta t + \psi_{yy} y_{t-1} + \psi_{xx} x_{t-1} + \sum_{i=1}^{p-1} \lambda_i \Delta y_{t-i} + \sum_{i=1}^{p-1} \xi_i \Delta x_{t-i} + \varepsilon_{yt}, \, T = 1,2,3,\dots T \quad (A\text{-}3)$$

where ψ_i are the long-run multipliers, c_0 is drift and ε_t is the white noise.

The first step in the ARDL bounds testing approach is to estimate Equation (A-3) by ordinary least squares (OLS). In this step the existence of a long-run relationship among the variables is tested by conducting an F-test for joint significance of coefficients of the lagged levels of the variables. Two critical bound values have been provided by Pesaran, et al. (2001) for the testing of cointegration: a lower value assuming that regressors are $I(0)$ and an upper value while assuming regressors to be $I(1)$. If the

calculated F-statistic is above the upper critical value, it can be concluded that there exists a long-run relationship. Conversely, if the test statistic falls below the lower critical value then there exists no long-run relationship. However, if the statistic falls between the lower and upper critical values, the result is inconclusive and Error Correction model decides about the existence of the long-run relationship. In the second step, after establishing the cointegration, the long-run model is estimated. In the third and final step, the short-run dynamic parameters by estimating an error correction model, associated with the long run model, is estimated.