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Do the GDP, Budget Deficit, External Debts, Exports and Imports affect each other for Pakistan: An ARDL Approach

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Abstract: *This paper examines the dynamic casual short and long run associations among the GDP, Budget Deficit, Imports, Exports and External Debts for the Pakistan economy by employing bounds testing (ARDL) methodology for the period of 1999 to 2014. The results of bond test proposed that variables included in the study are bound and move together in the long run. The empirical results of Pairwise Granger Causality stated the bidirectional relationship among the Budget Deficit and Exports while one-way or unidirectional causation found among the Exports & Budget Deficit, GDP & External Debts and Budget Deficit & External Debts but there is no causality from GDP to Budget Deficit, External Debts to Exports, Exports to External Debts, External Debts to Imports and Imports to Exports.*

Keywords: *Budget Deficits, External Debts, Trade, GDP, ARDL.*

I. Introduction

The relationship among the External Debts, Imports, Exports, Budget Deficit and Gross Domestic Product (GDP) has increased the significance and interests among the researchers and policy makers. These macroeconomic indicators have frequently seen as essential tools for the growth and development in the low income countries. Frankel and Romer (1999) have demonstrated that international trade is the most important tool of economic growth of a country as it helps to produce more goods and services by transferring production to those countries which have comparative advantage in producing them. The economy of Pakistan has a feather of grater monetary expansions which directly or indirectly linked with the external or internal debts.

Tanzi (1982) has stated that developing countries used to depends upon the deficit financing because of their inability to manage the domestic resources, narrow tax base, low tax to GDP ratio and rigid tax structure. Yousaf (1988) explained that an excess of money supply contributes to enlarge the general price level and imports of a country. Like other low income countries the economy of Pakistan is also experiencing a large and growing budget deficit problem since its birth. According to Chudhary and Abe (1999) a growing budget deficit of a country lead towards the high inflation, high external debts, current account deficits, crowding out of private investments and ultimately low economic growth.

In this meticulous paper we have tried to build up a long run relationship and short run dynamics among the GDP, External Debts, Imports, Exports and budget deficit variables by employing ARDL (autoregressive distributed lag) method and pair wise granger causality approach.

II. Review Of Literature

In a Time Series Econometric analysis made by Zahid and Zahid (1998), the key macroeconomic factors have been traced that affect the GDP Growth rate in Pakistan. The result shows that the Budget Deficit as a ratio to GDP has a negative association with the economic growth rate. High budget deficits crowds out the private sector investment activities. Mounting current expenditures of government and diminishing taxation revenues contribute towards high budget deficits. It was found that 1% increase in Exports-GDP ratio raises the growth rate of Real GDP by 77% per year. Also the higher exports earnings relax the foreign exchange constraint on the output. The ratio of Imports to GDP shows that an increase in import of goods by 1% accelerates the real gross domestic product growth 32% per annum. Output growth was thus affected positively by Exports more than by Imports. It was estimated that the coefficient of Foreign Debt as a ratio to gross domestic product shows a negative impact on the economic growth of Pakistan.

Chaudhary & Ghulam (2005) determined the macroeconomic impacts of budget deficit on the foreign sector of Pakistan using 2SLS and simultaneous equation methodologies for the period of 1965 to 1999. The main objective of the research was to examine the methodology that how the monetary impulses have channelized and how it affects the other relevant macroeconomic variables. It was found that budget deficit of Pakistan has inversely affected the money supply of Pakistan and resultantly disturb the inflationary condition and balance of payments of the country. Further government of Pakistan has enforced the central bank to print

more money in order to narrow the gap of budget deficit. It was concluded that that fiscal and monetary variables are most significant to establish the macroeconomic stability in the foreign economic sector of Pakistan.

Fatima et al. (2011) analyzed the casual relationship between fiscal deficit and economic growth of Pakistan using simultaneous equation approach for the period of 1980 to 2009. Results suggested that fiscal deficit adversely affect the economy of Pakistan. It was suggested that the ratio of direct tax may be more then indirect tax, enhancement in tax revenue collection mechanism and increase the tax to GDP ratio in order to improve and narrow the gap of fiscal deficit in Pakistan.

Soukiazis et al. (2011) empirically analyzed the economic growth of Portugal for both external and internal balances after employing the Thirlwall's law. The ultimate objective of the study was to fill the gap by developing a growth model in line with the Thirlwall's laws which takes into account both external and internal imbalances. Result explains that growth rate in Portugal actually a balance of payment constrained and the major disadvantage is the high fluctuations of the component of demand and particularly in exports. An increase in trade openness has positive effects on external debts either in short or long run period. As a result there are positive effects of external borrowing on economic growth of Turkey. Further the economy of Turkey has achieved the economic development targets after efficiently utilizing the foreign debts.

Rais & Tanzeela (2012) studied the relationship among the public debt and economic growth in Pakistan using simple regression estimation approach for the period of 1972 to 2010. Result explains that internal and external debts have inverse relationship with economic growth of Pakistan. Further it was found that domestic debts have positive effects on consumption and exports of Pakistan in both public and private sectors but having negatively related with per capita income. Moreover the policies of International Monetary Fund (IMF) also failed to improve the bad health condition of Pakistan economy.

Kizilgol & Ipek (2013) empirically analyzed the relationship between trade openness and external debts for Turkish economy using ARDL approach through the application of generalized method of moments (GMM) for the period of 1990 to 2012. Result explains that an increase in trade openness has positive effects on external debts either in short or long run period. As a result there are positive effects of external borrowing on economic growth of Turkey. Further the economy of Turkey has achieved the economic development targets after efficiently utilizing the foreign debts.

Ramzan et al. (2013) investigated the links of budget deficit and economic growth of Pakistan using descriptive study and multiple regression analysis for the period of 1980 to 2010. The result confirms the liner relationship between budget deficit, GDP and domestic credit in Pakistan. Further correlation among the inflation and investment was found weak while a moderate correlation was found among the budget deficit and investment.

Wakeel & Kafait (2013) scrutinized the impacts of budget deficit on output, inflation and balance of trade of Pakistan using simultaneous equation methodology for the period of 1970 to 2010. Three stages least-square approach has been employed for empirical estimations. Result explains the negative associations among the balance of trade and output. It was concluded that developing countries used to increase the expenditures in order to increase output, due to this problem of over expenditures, the economies of developing countries engaged into another social problem named deficit and similarly financing the budget deficit lead towards high inflation, higher deficit in trade and ultimately it negatively affect the total output.

Metha & Kayumi (2014) tried to found the impacts of current account deficit on external debts and foreign exchange rate of India for the period of 1990 to 2013. It was found that current account balance have a strong positive associations with the external debt for both short and long run period. Further an increase in the current account deficit exerted an extra pressure due to this reason external borrowing of India has increased.

III. Research Methodology

The present study is secondary in nature. In this study the behavior of some key macroeconomics variables have been investigated on sample period of 1999-2014. Annual time series data have been collected from the different economic surveys, annual reports of state bank of Pakistan (SBP), world economic data base and from the hand book of statistics (SBP). This annual time series data have been converted into monthly data for better empirical estimations. Statistical software Eviews has been used in the study for empirical estimations. ARDL model has been employed to check the long run association ships among the variables such as GDP, Budget Deficit, Imports, Exports and External Debts.

Literature on time series has a plenty of methods and techniques for the testing of long run associations among the variables. Generally Engle and Granger test statistic (1987), maximum likelihood based Johansen test statistic (1988, 1991) and Johansen Juselius (1990) are the most commonly used techniques in this regard. The precondition for the use of these techniques is that the variables must have integrated of orders one. Further these techniques affiliated with low power and do not have good sample properties. Due to these several reasons a recently developed ARDL technique has been employed in this research purposed by Pesaran and Shin (1999).

The standard ARDL technique contained several steps. The selection of optimum number of lag period in the bond test statistic has greater importance. So firstly the absence or presence of long run association ship among the variables is tested by selecting the optimum number of lags in an error correction mechanism using standard criteria such as Akaike Information Criterion (AIC) and Schwartz Information Criterions (SIC). The lag which provides minimum Akaike and Schwarz criteria and at the same time it does not have the problem of autocorrelation is accepted as an optimum Karagol et al. (2007). After that the restricted version of the equation is solved for the short run and long run solutions. The long run relationship among the variables examined through long run coefficients calculated form estimated ARDL model and their respective statistical significance while short run relationship among the variables detected with the help of error correction model.

In order to apply the ARDL model firstly unrestricted error correction model has been applied after that the overall significance of the coefficients of lag dependent and independent variables has been tested by applying WALD test. Grater then calculated F statistic then critical values of WALD test statistic rejected Altintas & Ayricay (2010). ARDL model is based on the assumption that all the included variables are I(0) or I(1) and non is I(2) Bolat et al. (2011). As the existence of I(2) variables F-statistics provided by Pesaran et al. (2001) regarding all the included variables becomes invalid and lead towards misleading interpretations Basar et al. (2009). The stability of short run and long run coefficients have also examined with the help of CUSUM test statistic.

IV. Empirical Results and Discussions

4.1 Bound Test

As explained earlier in this study the behavior of some macroeconomic variables GDP, Budget Deficit, Exports, Imports and External Debts have been examined and their short run and long run association ships have been assessed using ARDL. Therefore Budget Deficit, Exports, Imports and External Debts are independent variables and Real GDP Growth rate is the dependent variable of the research. These variables which has been selected in this research also used by Easterly (1993) and Zahid & Zahid (1998) in their studies while regressing the growth models and got successful. These studies are very much related with the present research. So the same variables has employed in this research. Below mentioned equation (1) is the original model of the research:

$$Real\ GDP\ Growth\ Rate = \beta_o + \beta_1 Budget\ Deficit + \beta_2 Exports + \beta_3 Imports + \beta_4 External Debts + \mu \qquad (1)$$

From this particular model we can develop the ARDL model. In order to develop the ARDL model, the selection of optimum numbers of lag is mandatory. First we start with six lag and with six lag periods the new model may be written as:

$$\begin{aligned} &D(Gdp)\ C\ D(Gdp(-1))\ D(Gdp(-2))\ D(Gdp(-3))\ D(Gdp(-4))\ D(Gdp(-5))\ D(Gdp(-6))\ D(Budgetdeficit(-1))\ D(Budgetdeficit(-2)) \\ &D(Budgetdeficit(-3))\ D(Budgetdeficit(-4))\ D(Budgetdeficit(-5))\ D(Budgetdeficit(-6))\ D(Imports(-1))\ D(Imports(-2)) \\ &D(Imports(-3))\ D(Imports(-4))\ D(Imports(-5))\ D(Imports(-6))\ D(Exports(-1))\ D(Exports(-2))\ D(Exports(-3))\ D(Exports(-4)) \\ &D(Exports(-5))\ D(Exports(-6))\ D(Externaldebts(-1))\ D(Externaldebts(-2))\ D(Externaldebts(-3))\ D(Externaldebts(-4)) \\ &D(Externaldebts(-5))\ D(Externaldebts(-6))\ Budgetdeficit(-1)\ Imports(-1)\ Exports(-1)\ Externaldebts(-1) \end{aligned} \qquad (2)$$

In the above model D(GDP) is the dependent variable and all others are independent variables of the model having lags six. While *Budget deficit(-1), Imports(-1), Exports(-1)* and *External debts(-1)* is the long run model. Overall this model can be called the standard ARDL model having four independent variables and each variable having six lags.

Table 3 Summary Results of Estimation Equation (2)

Lags	AIC	SIC
6	1.986	2.595

Source: Author's Calculations.

The detailed results of standard ARDL model with lag six can be seen in appendix-I. The values of AIC and SIC has been considered for the time being in table 3. The value of AIC is 1.986 and value of SIC is 2.595. As we are interested to select the optimum number of lags after employing six lags now we can estimate the equation (1) for four lag period. The standard ARDL model having the four lag period may be written as:

$$\begin{aligned} &D(Gdp)\ C\ D(Gdp(-1))\ D(Gdp(-2))\ D(Gdp(-3))\ D(Gdp(-4))\ D(Budgetdeficit(-1))\ D(Budgetdeficit(-2)) \\ &D(Budgetdeficit(-3))\ D(Budgetdeficit(-4))\ D(Imports(-1))\ D(Imports(-2))\ D(Imports(-3)) \\ &D(Imports(-4))\ D(Exports(-1))\ D(Exports(-2))\ D(Exports(-3))\ D(Exports(-4))\ D(Externaldebts(-1)) \\ &D(Externaldebts(-2))\ D(Externaldebts(-3))\ D(Externaldebts(-4))\ Budgetdeficit(-1)\ Imports(-1)\ Exports(-1) \\ &Externaldebts\ (-1) \end{aligned} \qquad (3)$$

In the above equation (3) standard ARDL model having four lag periods has been presented with the combination of dependent and independent variables. The equation has been estimated, values of AIC and SIC presented in table 4 and detailed results may be verified by appendix-II.

Table 4 Summary Results of Estimation Equation (3)

Lags	AIC	SIC
4	1.872	2.304

Source: Author's Calculations

In the above table 4 values of AIC and SIC with four numbers of lags have been represented which are lower than the values of AIC and SIC with the six lags presented in table 3. But still we have to develop the standard ARDL model having two lags for final decision about the lag selection as bellow.

$$D(Gdp)\ C\ D(Gdp(-1))\ D(Gdp(-2))\ D(Budgetdeficit(-1))\ D(Budgetdeficit(-2))\ D(Imports(-1))\ D(Imports(-2))\ D(Exports(-1))\ D(Exports(-2))\ D(Externaldebts(-1))\ D(Externaldebts(-2))\ Budgetdeficit(-1)\ Imports(-1)\ Exports(-1)\ Externaldebts(-1) \quad (4)$$

The standard ARDL model with lag two has been represented in above equation (4) where again the D(GDP) is the dependent variable. This equation has been estimated and values of AIC and SIC is as under in table 5.

Table 5 Summary Results of Estimation Equation (4)

Lags	AIC	SIC
2	1.759	2.016

Source: Author's Calculations

Table 5 shows the values of AIC and SIC which are 1.759 and 2.016 respectively which are quite low. While comparing the values of AIC and SIC of six, four and lags periods, the values of AIC and SIC are the lowest while employing two numbers of lag. Literature on the time series stated that "*lower the value, better the model all the time*". So on the basis of this model having two numbers of lag is the best model out of all the three models and can be used for further proceedings.

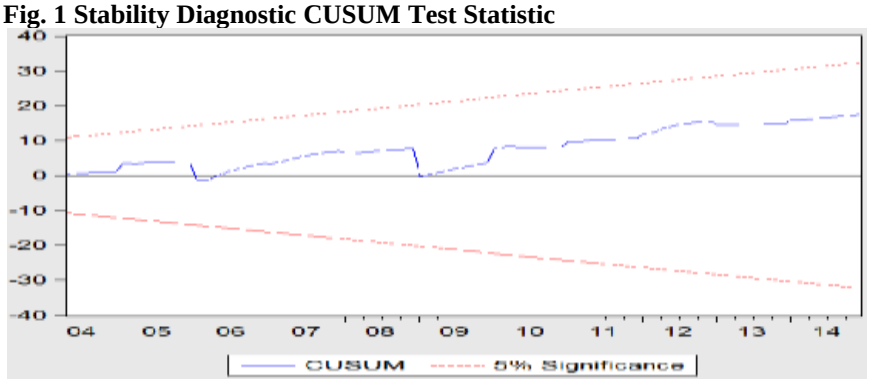
As the lag two model is best advised by AIC and SIC criterions. Further serial correlation and stability of this model has been tested using Breusch-Godfrey Serial Correlation LM test and CUSUM test statistics presented in table 6 and figure 1 respectively.

Table 6 Summary Results of Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.475	Prob.F(2,172)	0.6227
Obs*R-squared	1.038	Prob. Chi-Square (2)	0.5950

Source: Author's Calculations

Fig. 1 Stability Diagnostic CUSUM Test Statistic



Source: Author's own calculations

The results of Breusch-Godfrey serial correlation LM test presented in table 6 stated that the model is free of serial correlation or auto correlation as the corresponding probability value of observed R square which is 0.5950, is greater than five percent. Further stability diagnostic CUSUM test statistic confirmed the stability as well as the estimated line exists between the two red lines which have been shown in the above figure 1.

In all the above three equations we have estimated our four variables such as *Budget deficit(-1), Imports(-1), Exports(-1)* and *External debts(-1)* without first difference. These variables can also be seen in the estimated results of appendices I to III. This is our long run model. In order to check that whether these variables have long run association ship or not, bound test statistic has been incorporated. While reviewing the model showed in appendix-III, one can say that C is the C1, D(GDP(-1)) is C2, D(GDP(-2)) is the C3 and so on Budget deficit(-1) is the C12, Imports(-1) is C13, Exports(-1) is C14 and External debts(-1) is C15. By utilizing

this information WALD test statistic has been employed to check the long run associations among these variables. Under our WALD model having unrestricted intercept and having no trend, null hypothesis is that C(12)=C(13)=C(14)=C(15)=0.

Table 7 Summary Results of Wald Test

F-statistic	1.500	Lower Bound Value	2.649
Chi-Square	6.000	Upper Bound Value	3.805

Source: Author's Calculations

From the Pesaran table critical values has been taken for bound testing. Table 7 summarizes the whole results of WALD test and detailed results may be verified by appendix-V. The lower bond value is 2.649 and upper bound value is 3.805. The value of F-statistic which is less than upper bound value could not rejects the null hypothesis, confirmed that there is no long run association ships among the variables such as Budget deficit(-1), Imports(-1), Exports(-1) and External debts(-1). In other words all these variables not move together in the long run.

If we rewrite the original long run model presented in equation (1),

$$Real\ GDP\ Growth\ Rate = \beta_o + \beta_1 Budget\ Deficit + \beta_2 Exports + \beta_3 Imports + \beta_4 ExternalDebts + \mu$$

In this model all the five variables such GDP, Budget Deficit, Imports, Exports and External Debts have long run association ships. Further we can develop the model in order to settle the short run and long run issues. The above mentioned model has been estimated and detailed results may be verified with appendix-VI. Here our target is to take the residuals of this long run model for further analysis. For this purpose a new variable has been added in the original long run mode named as Error Correction Term (ETC). After inclusion of ECT the best model having lag two may be written as:

$$D(Gdp)\ C\ D(Gdp(-1))\ D(Gdp(-2))\ D(Budgetdeficit(-1))\ D(Budgetdeficit(-2))\ D(Imports(-1))\ D(Imports(-2))\ D(Exports(-1))\ D(Exports(-2))\ D(Externaldebts(-1))\ D(Externaldebts(-2))\ ECT(-1) \quad (5)$$

In the above equation (5) best model having lag two has been written in addition of ECT lag one and has been estimated. The condition here which must be fulfilled is that the coefficient of ECT might be negative and it must be the significant. Detailed results can be verified by appendix-VII where C, D(GDP(-1)), D(Gdp(-2)), D(Budget deficit(-1)), D(Budget deficit(-2)), D(Imports(-1)), D(Imports(-2)), D(Exports(-1)), D(Exports(-2)), D(External debts(-1)) And D(External debts(-2)) are the short run coefficients.

Table 8 Summary Results of Estimation Equation (5)

	ECT	
Lags	Coefficient	Probability
2	-0.649460	0.00008

Source: Author's Calculations

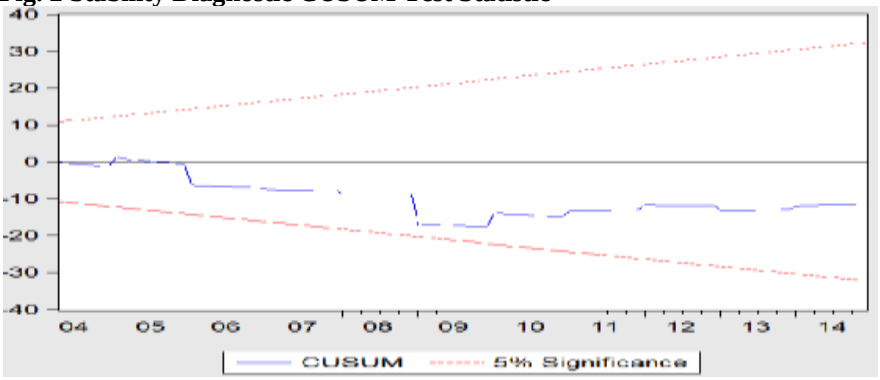
A summary result of estimation equation (5) has been presented above. Here the coefficient of ECT is -0.649460 and the corresponding probability value is less than five percent which is significant. ECT is actually the speed of adjustment. The value of ECT which is 64.94 percent showed that the speed of adjustment towards the long run equilibrium is 64.94 percent. Generally the error correction term specifies that how long it will take to get better if there is a deviation in the long run relations because of any shocks. In other words the whole system gets back the long run equilibrium at the speed of 64.94 percent. Further again serial correlation and stability of the model (5) has been tested using Breusch-Godfrey Serial Correlation LM test and CUSUM test statistics summarized in table 9 and figure 2.

Table 9 Summary Results of Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.1470	Prob.F(2,172)	0.8633
Obs*R-squared	0.3171	Prob. Chi-Square (2)	0.8534

Source: Author's Calculations

Fig. 2 Stability Diagnostic CUSUM Test Statistic



Source: Author's Calculations

The results of Breusch-Godfrey serial correlation LM test presented in table 9 stated that the model is free of serial correlation or auto correlation as the corresponding probability value of observed R square (Chi-Square (2) which is 0.8534, is greater than five percent. Further stability diagnostic CUSUM test statistic confirmed the stability as well as the estimated line exists between the two red lines which have been shown in the above figure 2. So this model can be used for further forecasting and economic analysis.

Table 10 Results of Pairwise Granger Causality

Pairwise Granger Causality Tests
Date: 04/24/15 Time: 08:11
Sample: 1999M01 2014M12
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
BUDGETDEFICIT does not Granger Cause GDP	191	2.98614	0.0856
GDP does not Granger Cause BUDGETDEFICIT		3.30770	0.0705
IMPORTS does not Granger Cause GDP	191	0.65900	0.4179
GDP does not Granger Cause IMPORTS		0.04836	0.8262
EXPORTS does not Granger Cause GDP	191	4.34625	0.0224
GDP does not Granger Cause EXPORTS		4.33439	0.0225
EXTERNALDEBTS does not Granger Cause GDP	191	1.19522	0.2757
GDP does not Granger Cause EXTERNALDEBTS		3.36049	0.0184
IMPORTS does not Granger Cause BUDGETDEFICIT	191	0.68365	0.4094
BUDGETDEFICIT does not Granger Cause IMPORTS		0.43932	0.5083
EXPORTS does not Granger Cause BUDGETDEFICIT	191	4.28010	0.0399
BUDGETDEFICIT does not Granger Cause EXPORTS		0.80168	0.3717
EXTERNALDEBTS does not Granger Cause BUDGETDEFICIT	191	4.47345	0.0357
BUDGETDEFICIT does not Granger Cause EXTERNALDEBTS		0.23910	0.6254
EXPORTS does not Granger Cause IMPORTS	191	0.21240	0.6454
IMPORTS does not Granger Cause EXPORTS		2.30188	0.1309
EXTERNALDEBTS does not Granger Cause IMPORTS	191	2.00047	0.1589
IMPORTS does not Granger Cause EXTERNALDEBTS		0.22580	0.6352
EXTERNALDEBTS does not Granger Cause EXPORTS	191	1.15631	0.2836
EXPORTS does not Granger Cause EXTERNALDEBTS		2.86263	0.0923

Source: Author's Calculations using E-Views

The results of Pairwise Granger Causality test statistic has been presented in table 10 having lag one. Any null hypothesis may only be rejected when the corresponding probability value of F-statistic is significant (less than 5 percent). First null hypothesis is that Budget Deficit does not cause Granger Cause GDP. On the basis of results of corresponding probability values of F-statistic we cannot reject the null hypothesis, rather then we accept the null hypothesis. Second, third and fourth null hypothesis also repeat the same story by rejecting the null hypothesis that is GDP does not Granger Cause Budget Deficit, Imports does not Granger Cause GDP, and GDP does not Granger Cause Imports. However bidirectional causality may be found among the fifth and sixth hypothesis where both the variables are significant. After rejecting the both null hypothesis one can say that Exports does Granger Cause Budget Deficit and Budget Deficit does Granger Cause Exports. One-way causation may be found among the Exports & Budget Deficit, GDP & External Debts and External Debts & Budget Deficit where Exports does Granger Cause Budget Deficit, GDP does Granger Cause External Debts and External Debts does Granger Cause Budget Deficit accordingly. Further External Debts & Exports, Exports

& External Debts, External Debts & Imports, Imports & External Debts, Exports & Imports, Imports & Exports does not Granger Cause each other.

V. Conclusion

In this study the behavior of some macroeconomic variables GDP, Budget Deficit, Exports, Imports and External Debts have been examined and their short run and long run association ships have been assessed using ARDL approach. Results explain that all the five variables such GDP, Budget Deficit, Imports, Exports and External Debts are not bound and move together and have no long run association ships among them. The empirical results of Pairwise Granger Causality stated the bidirectional relationship among the Budget Deficit and Exports while one-way causation found among the Exports & Budget Deficit, GDP & External Debts and Budget Deficit & External Debts but there is no causality from GDP to Budget Deficit, External Debts to Exports, Exports to External Debts, External Debts to Imports and Imports to Exports.

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Appendices

Appendix-I Estimated Result of Standard ARDL Having Lag 6

Dependent Variable: D(GDP)
Method: Least Squares
Date: 03/29/15 Time: 22:51
Sample (adjusted): 1999M08 2014M12
Included observations: 185 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.593162	1.411894	1.836655	0.0682
D(GDP(-1))	-0.037828	0.088227	-0.428759	0.6687
D(GDP(-2))	-0.037828	0.088227	-0.428759	0.6687
D(GDP(-3))	-0.037828	0.088227	-0.428759	0.6687
D(GDP(-4))	-0.037828	0.088227	-0.428759	0.6687

D(GDP(-5))	-0.037828	0.088227	-0.428759	0.6687
D(GDP(-6))	-0.037828	0.088227	-0.428759	0.6687
D(BUDGETDEFICIT(-1))	0.052804	0.081909	0.644670	0.5201
D(BUDGETDEFICIT(-2))	0.052804	0.081909	0.644670	0.5201
D(BUDGETDEFICIT(-3))	0.052804	0.081909	0.644670	0.5201
D(BUDGETDEFICIT(-4))	0.052804	0.081909	0.644670	0.5201
D(BUDGETDEFICIT(-5))	0.052804	0.081909	0.644670	0.5201
D(BUDGETDEFICIT(-6))	0.052804	0.081909	0.644670	0.5201
D(IMPORTS(-1))	-0.012976	0.078162	-0.166008	0.8684
D(IMPORTS(-2))	-0.012976	0.078162	-0.166008	0.8684
D(IMPORTS(-3))	-0.012976	0.078162	-0.166008	0.8684
D(IMPORTS(-4))	-0.012976	0.078162	-0.166008	0.8684
D(IMPORTS(-5))	-0.012976	0.078162	-0.166008	0.8684
D(IMPORTS(-6))	-0.012976	0.078162	-0.166008	0.8684
D(EXPORTS(-1))	-0.003710	0.101845	-0.036428	0.9710
D(EXPORTS(-2))	-0.003710	0.101845	-0.036428	0.9710
D(EXPORTS(-3))	-0.003710	0.101845	-0.036428	0.9710
D(EXPORTS(-4))	-0.003710	0.101845	-0.036428	0.9710
D(EXPORTS(-5))	-0.003710	0.101845	-0.036428	0.9710
D(EXPORTS(-6))	-0.003710	0.101845	-0.036428	0.9710
D(EXTERNALDEBTS(-1))	0.001499	0.036105	0.041505	0.9669
D(EXTERNALDEBTS(-2))	0.001499	0.036105	0.041505	0.9669
D(EXTERNALDEBTS(-3))	0.001499	0.036105	0.041505	0.9669
D(EXTERNALDEBTS(-4))	0.001499	0.036105	0.041505	0.9669
D(EXTERNALDEBTS(-5))	0.001499	0.036105	0.041505	0.9669
D(EXTERNALDEBTS(-6))	0.001499	0.036105	0.041505	0.9669
BUDGETDEFICIT(-1)	-0.091123	0.039661	-2.297545	0.0230
IMPORTS(-1)	0.011348	0.018585	0.610588	0.5424
EXPORTS(-1)	0.027214	0.040941	0.664716	0.5073
EXTERNALDEBTS(-1)	-0.017271	0.011168	-1.546497	0.1241

R-squared	0.046327	Mean dependent var	-0.000432
Adjusted R-squared	-0.169839	S.D. dependent var	0.555067
S.E. of regression	0.600356	Akaike info criterion	1.986070
Sum squared resid	54.06409	Schwarz criterion	2.595326
Log likelihood	-148.7115	Hannan-Quinn criter.	2.232986
F-statistic	0.214311	Durbin-Watson stat	2.009468
Prob(F-statistic)	0.999999		

Appendix-II Estimated Result of Standard ARDL Having Lag 4

Dependent Variable: D(GDP)
Method: Least Squares
Date: 03/29/15 Time: 22:58
Sample (adjusted): 1999M06 2014M12
Included observations: 187 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.074642	1.238676	1.674886	0.0959
D(GDP(-1))	-0.031525	0.085055	-0.370640	0.7114
D(GDP(-2))	-0.031525	0.085055	-0.370640	0.7114
D(GDP(-3))	-0.031525	0.085055	-0.370640	0.7114
D(GDP(-4))	-0.031525	0.085055	-0.370640	0.7114
D(BUDGETDEFICIT(-1))	0.043229	0.078643	0.549686	0.5833
D(BUDGETDEFICIT(-2))	0.043229	0.078643	0.549686	0.5833
D(BUDGETDEFICIT(-3))	0.043229	0.078643	0.549686	0.5833
D(BUDGETDEFICIT(-4))	0.043229	0.078643	0.549686	0.5833
D(IMPORTS(-1))	-0.009653	0.075374	-0.128066	0.8983
D(IMPORTS(-2))	-0.009653	0.075374	-0.128066	0.8983
D(IMPORTS(-3))	-0.009653	0.075374	-0.128066	0.8983
D(IMPORTS(-4))	-0.009653	0.075374	-0.128066	0.8983
D(EXPORTS(-1))	-0.004072	0.097727	-0.041670	0.9668
D(EXPORTS(-2))	-0.004072	0.097727	-0.041670	0.9668
D(EXPORTS(-3))	-0.004072	0.097727	-0.041670	0.9668
D(EXPORTS(-4))	-0.004072	0.097727	-0.041670	0.9668
D(EXTERNALDEBTS(-1))	0.000788	0.034782	0.022644	0.9820
D(EXTERNALDEBTS(-2))	0.000788	0.034782	0.022644	0.9820
D(EXTERNALDEBTS(-3))	0.000788	0.034782	0.022644	0.9820
D(EXTERNALDEBTS(-4))	0.000788	0.034782	0.022644	0.9820
BUDGETDEFICIT(-1)	-0.074038	0.034617	-2.138786	0.0340
IMPORTS(-1)	0.007881	0.017136	0.459902	0.6462
EXPORTS(-1)	0.024180	0.035895	0.673631	0.5015
EXTERNALDEBTS(-1)	-0.013425	0.010020	-1.339760	0.1822

R-squared	0.038651	Mean dependent var	-0.000428
Adjusted R-squared	-0.103771	S.D. dependent var	0.552075
S.E. of regression	0.580013	Akaike info criterion	1.872335
Sum squared resid	54.49923	Schwarz criterion	2.304301
Log likelihood	-150.0633	Hannan-Quinn criter.	2.047368
F-statistic	0.271383	Durbin-Watson stat	2.006284
Prob(F-statistic)	0.999773		

Appendix-III Estimated Result of Standard ARDL Having Lag 2

Dependent Variable: D(GDP)
Method: Least Squares
Date: 03/29/15 Time: 23:00
Sample (adjusted): 1999M04 2014M12
Included observations: 189 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.724498	1.108151	1.556194	0.1215
D(GDP(-1))	-0.027155	0.082174	-0.330461	0.7414
D(GDP(-2))	-0.027155	0.082174	-0.330461	0.7414
D(BUDGETDEFICIT(-1))	0.036628	0.075758	0.483487	0.6294
D(BUDGETDEFICIT(-	0.036628	0.075758	0.483487	0.6294

2))				
D(IMPORTS(-1))	-0.007410	0.072826	-0.101752	0.9191
D(IMPORTS(-2))	-0.007410	0.072826	-0.101752	0.9191
D(EXPORTS(-1))	-0.004099	0.094111	-0.043551	0.9653
D(EXPORTS(-2))	-0.004099	0.094111	-0.043551	0.9653
D(EXTERNALDEBTS(-1))	0.000353	0.033584	0.010500	0.9916
D(EXTERNALDEBTS(-2))	0.000353	0.033584	0.010500	0.9916
BUDGETDEFICIT(-1)	-0.062396	0.030820	-2.024483	0.0444
IMPORTS(-1)	0.005550	0.015950	0.347972	0.7283
EXPORTS(-1)	0.021759	0.032058	0.678733	0.4982
EXTERNALDEBTS(-1)	-0.010829	0.009128	-1.186295	0.2371

R-squared	0.033336	Mean dependent var	-0.000423
Adjusted R-squared	-0.044441	S.D. dependent var	0.549131
S.E. of regression	0.561200	Akaike info criterion	1.758560
Sum squared resid	54.80051	Schwarz criterion	2.015841
Log likelihood	-151.1839	Hannan-Quinn criter.	1.862791
F-statistic	0.428613	Durbin-Watson stat	2.004492
Prob(F-statistic)	0.963887		

Appendix-IV Results of Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.475036	Prob. F(2,172)	0.6227
Obs*R-squared	1.038239	Prob. Chi-Square(2)	0.5950

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/29/15 Time: 23:12
Sample: 1999M04 2014M12
Included observations: 189
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.687423	2.814787	-0.599485	0.5496
D(GDP(-1))	-0.004368	2.229514	-0.001959	0.9984
D(GDP(-2))	1.174651	1.602796	0.732876	0.4646
D(BUDGETDEFICIT(-1))	-0.066988	0.123809	-0.541058	0.5892
D(BUDGETDEFICIT(-2))	-0.066988	0.103168	-0.649308	0.5170
D(IMPORTS(-1))	0.004339	0.073443	0.059077	0.9530
D(IMPORTS(-2))	0.004339	0.073907	0.058706	0.9533
D(EXPORTS(-1))	0.025587	0.100932	0.253511	0.8002
D(EXPORTS(-2))	0.025587	0.099136	0.258103	0.7966
D(EXTERNALDEBTS(-1))	-0.012359	0.037961	-0.325567	0.7451
D(EXTERNALDEBTS(-2))	-0.012359	0.037718	-0.327658	0.7436
BUDGETDEFICIT(-1)	0.062019	0.099175	0.625355	0.5326
IMPORTS(-1)	-0.004260	0.017700	-0.240684	0.8101
EXPORTS(-1)	-0.023102	0.046725	-0.494431	0.6216
EXTERNALDEBTS(-1)	0.010208	0.018413	0.554404	0.5800
RESID(-1)	-4.93E-12	2.227985	-2.21E-12	1.0000

RESID(-2)	-1.179019	1.644420	-0.716982	0.4744

R-squared	0.005493	Mean dependent var	-1.20E-16
Adjusted R-squared	-0.087019	S.D. dependent var	0.539900
S.E. of regression	0.562901	Akaike info criterion	1.774215
Sum squared resid	54.49947	Schwarz criterion	2.065801
Log likelihood	-150.6633	Hannan-Quinn criter.	1.892344
F-statistic	0.059379	Durbin-Watson stat	2.006344
Prob(F-statistic)	1.000000		

Appendix-V Results of Wald Test

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	1.500145	(4, 174)	0.2042
Chi-square	6.000580	4	0.1991

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(12)	-0.062396	0.030820
C(13)	0.005550	0.015950
C(14)	0.021759	0.032058
C(15)	-0.010829	0.009128

Restrictions are linear in coefficients.

Appendix-VI Result of Long Run Original Equation (1)

Dependent Variable: GDP
Method: Least Squares
Date: 03/29/15 Time: 23:48
Sample: 1999M01 2014M12
Included observations: 192

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.372260	2.810910	0.488191	0.6260
BUDGETDEFICIT	0.242074	0.077794	3.111719	0.0022
EXPORTS	-0.813258	0.081127	-10.02445	0.0000
IMPORTS	0.023257	0.041634	0.558600	0.5771
EXTERNALDEBTS	0.037237	0.023504	1.584306	0.1148

R-squared	0.426163	Mean dependent var	4.333125
Adjusted R-squared	0.413889	S.D. dependent var	1.986609
S.E. of regression	1.520906	Akaike info criterion	3.702186
Sum squared resid	432.5600	Schwarz criterion	3.787017
Log likelihood	-350.4099	Hannan-Quinn criter.	3.736543
F-statistic	34.71918	Durbin-Watson stat	0.135292
Prob(F-statistic)	0.000000		

Appendix-VII Result of Estimation Equation (5)

Dependent Variable: D(GDP)
Method: Least Squares
Date: 03/30/15 Time: 00:02
Sample (adjusted): 1999M04 2014M12
Included observations: 189 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.002638	0.041757	-0.063173	0.9497
D(GDP(-1))	0.018915	0.082773	0.228514	0.8195
D(GDP(-2))	0.018915	0.082773	0.228514	0.8195
D(BUDGETDEFICIT(-1))	0.004270	0.073929	0.057757	0.9540
D(BUDGETDEFICIT(-2))	0.004270	0.073929	0.057757	0.9540
D(IMPORTS(-1))	-0.001625	0.072238	-0.022493	0.9821
D(IMPORTS(-2))	-0.001625	0.072238	-0.022493	0.9821
D(EXPORTS(-1))	0.008766	0.091958	0.095324	0.9242
D(EXPORTS(-2))	0.008766	0.091958	0.095324	0.9242
D(EXTERNALDEBTS(-1))	-0.004848	0.033393	-0.145192	0.8847
D(EXTERNALDEBTS(-2))	-0.004848	0.033393	-0.145192	0.8847
ECT(-1)	-0.649460	0.077328	-8.398766	0.0008

R-squared	0.010924	Mean dependent var	-0.000423
Adjusted R-squared	-0.050544	S.D. dependent var	0.549131
S.E. of regression	0.562837	Akaike info criterion	1.749735
Sum squared resid	56.07109	Schwarz criterion	1.955560
Log likelihood	-153.3499	Hannan-Quinn criter.	1.833119
F-statistic	0.177715	Durbin-Watson stat	2.001413
Prob(F-statistic)	0.998520		

Appendix-VIII Results of Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.147079	Prob. F(2,175)	0.8633
Obs*R-squared	0.317156	Prob. Chi-Square(2)	0.8534

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 03/30/15 Time: 00:09
Sample: 1999M04 2014M12
Included observations: 189
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000230	0.042288	0.005441	0.9957
D(GDP(-1))	-0.044030	3.899233	-0.011292	0.9910
D(GDP(-2))	1.119402	2.864076	0.390842	0.6964
D(BUDGETDEFICIT(-1))	0.011988	0.079889	0.150060	0.8809
D(BUDGETDEFICIT(-2))	0.011988	0.085607	0.140037	0.8888
D(IMPORTS(-1))	0.000476	0.072618	0.006550	0.9948

D(IMPORTS(-2))	0.000476	0.072740	0.006539	0.9948
D(EXPORTS(-1))	-0.036724	0.131746	-0.278751	0.7808
D(EXPORTS(-2))	-0.036724	0.118471	-0.309985	0.7569
D(EXTERNALDEBTS(-1))	0.000830	0.033722	0.024623	0.9804
D(EXTERNALDEBTS(-2))	0.000830	0.037338	0.022238	0.9823
ECT(-1)	0.040704	0.113443	0.358809	0.7202
RESID(-1)	-9.69E-13	3.977506	-2.43E-13	1.0000
RESID(-2)	-1.163432	2.925180	-0.397730	0.6913

R-squared	0.001678	Mean dependent var	3.11E-17
Adjusted R-squared	-0.072483	S.D. dependent var	0.546123
S.E. of regression	0.565569	Akaike info criterion	1.769219
Sum squared resid	55.97700	Schwarz criterion	2.009349
Log likelihood	-153.1912	Hannan-Quinn criter.	1.866501
F-statistic	0.022627	Durbin-Watson stat	2.001924
Prob(F-statistic)	1.000000		