

# Budget Deficit and External Debt in Jordan: Causality and Co-Integration Analysis

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## Abstract

This paper examines the relationship between budget deficit and external public debt in Jordan during 1992–2012. After reviewing major fiscal and monetary developments, we test for stationarity and co-integration of budget deficit and external debt. In addition, we test for the existence and direction of causality between debt and deficit. The findings of this paper provide evidence of neutrality hypotheses suggesting that there is no causality running from budget deficit to external debt and there is no causality running the other way round. Co-integration test supports the absence of long-run relationship. Empirical findings also suggest that fiscal decision makers may disregard external debt when setting budget constraints including taxes and non-interest spending. They also imply that budget constraints must rely on more important factors other than external debt when drawing fiscal policies. These factors may include good governance, tax reforms and lowering government spending on certain economic activities that have little significance on total output.

**Keywords:** budget deficit, external debt, causality, co-integration, Jordan

## 1. Introduction

In Jordan, as in most developing countries, economic activities of the public sector are fragmented and have little potential to enhance sustainable economic growth, yet alone carry out local proper fiscal or monetary policy. In some cases, damages caused by these policies are more than their benefits. However, as stated by Roubini and Sachs (1989), governments are not the monolithic entities of standard economic models that have full control of the policy instruments and that manage them according to stable and well-defined objectives. When power is dispersed through the alteration of political control over time, the likelihood of intertemporally inefficient budgetary policy is heightened.

Jordanian economy has been depending on foreign aid and borrowing from international creditors. At its best, the Jordanian economy is an aid-dependent economy. Several steps have been taken in order to decrease budget deficit by introducing some tax reforms and improving government collection of tax revenues. Fiscal policies have also been carried out to generate a structural change via privatization or the use of foreign aid to change the growing trend of the budget deficit.

This paper explores the relationship between the Jordanian budget deficit and external debt in order to contribute in advancing current fiscal policy and analyze public sector's vulnerability and avoid solvency problem which depends on Jordan's ability to pay external debt out of its own resources. The rest of the paper is divided into five sections. The next section reviews fiscal and monetary developments in Jordan over the past three decades, with emphasis on budget deficit and external debt. After a literature review, Section 4 introduces the methodology of the paper and defines the data sources. Section 5 specifies an econometric model for testing the relationship between budget deficit and external debt. In Section 6, we discuss empirical findings then we present our main conclusions and policy implications.

## 2. Recent Fiscal and Monetary Developments

The Jordanian government has been depending on foreign aid to finance its expenditure or to repay its foreign debt for many years. This has had a direct effect on interest rates, inflation, and the rate of economic growth. The Jordanian Ministry of Finance is responsible for formulating and monitoring fiscal policy. It is responsible for

managing the internal and external public debt. It is also entrusted to achieving integration between fiscal and monetary policies in order to serve the national economy, in cooperation and coordination with the Central Bank of Jordan and related institutions. The tax legislation was revised in 2009 when a new Income Tax Law (No. 28) and an amended Sales Tax Law (No. 29) were approved. The revised Income Tax Law introduced many positive structural changes simplifying the tax system. The revised law includes less elements of administrative discretion than the old law, such as the value of some penalties, the estimated tax liabilities to be included in administrative assessments sent to non-filers and stop-filers, etc. Two new by-laws related to the Income Tax Law No. 28 were issued in 2010, one exempting export profit from taxes and the other related to tax court procedures, (Sahurie et al., 2011).

The budget deficit, expressed in (positive) nominal terms, has been growing on unprecedented trend. It increased from JD119 million in 2000 to JD977 million in 2005 reaching JD1,446 million in 2010 and jumped to JD2,800 million in 2012. Its ratio to GDP has also increased dramatically, from 2.2% in 2000 to 14.3% in 2005 then to 14.8% in 2010 to reach 27.3% in 2012, as depicted in Figure 1 and Figure 2. External debt also had a positive trend over the study period. In nominal terms, it has been growing from JD5,043 million in 2000 to JD5,056 million in 2005 to slightly decrease to JD4,610 million in 2010 then increased to JD4,932 in 2012. Its ratio to GDP ranged between 48%–93% during 2002 and 2012, as shown in Figure 1 and Figure 2.

Recent transactions of the Jordanian economy with the rest of the world resulted in a deficit in the overall balance of the balance of payments amounting to JD2,701.4 million in 2012; up from JD824.3 million in 2011, which was reflected in the drop of net foreign assets of the banking system. Moreover, the performance of current transactions with the rest of the world resulted in a deficit in the current account amounting to JD3,979.1 million (18.1 percent of GDP). The capital and financial transactions resulted in a decline in net foreign assets by JD3,944.7 million. The current account registered a deficit of 18.1 percent of GDP in 2012, compared with a deficit of 12.0 percent of GDP in 2011, due to the following developments:

- An increase in the trade balance deficit by JD1,187.1 million, or 19.0 percent, to total JD7,448.8 million in 2012;
- A drop in the surplus of net current transfers by JD586.2 million to reach JD2,868.5 million. This decline was driven by the decrease in the surplus of net public current transfers (foreign grants) by JD383.8 million coupled with the decline in the surplus of net current transfers of the private sector by JD202.4 million, despite the increase in net workers' remittances, which went up by 4.5 percent, to stand at JD1,960.6 million;
- An increase in the deficit of the income account by JD86.1 million to stand at JD213.7 million; mainly due to the rise in the deficit of investment income by JD95.0 million;
- An increase in the surplus of the services account by JD342.9 million.

Consequently, the volume of current receipts amounted to JD13,483.9 million while the volume of current payments amounted to JD17,463.0 million. Accordingly, the coverage ratio of current receipts to current payments went down to stand at 77.2 percent in 2012, compared with 84.8 percent in 2011, (Central Bank of Jordan, 2013, pp. 75–77).

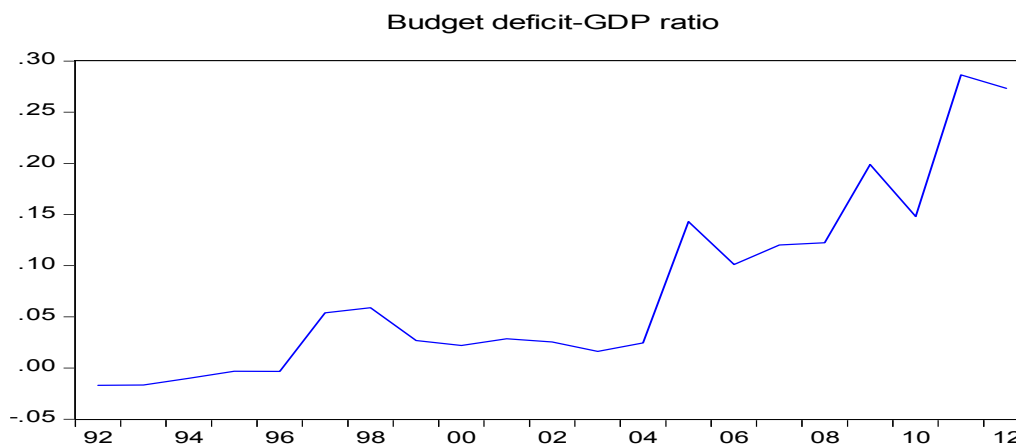


Figure 1. Growth rates of budget deficit-GDP ratio, 1992–2012

As Figure 1 shows, the ratio of budget deficit to GDP, expressed in positive terms, was increasing over time despite the small fluctuations in 1996, 2004 and 2010, with a generally high positive trend after 2004. The ratio of external debt to GDP, expressed in negative terms and shown in Figure 2, experienced almost similar trend.

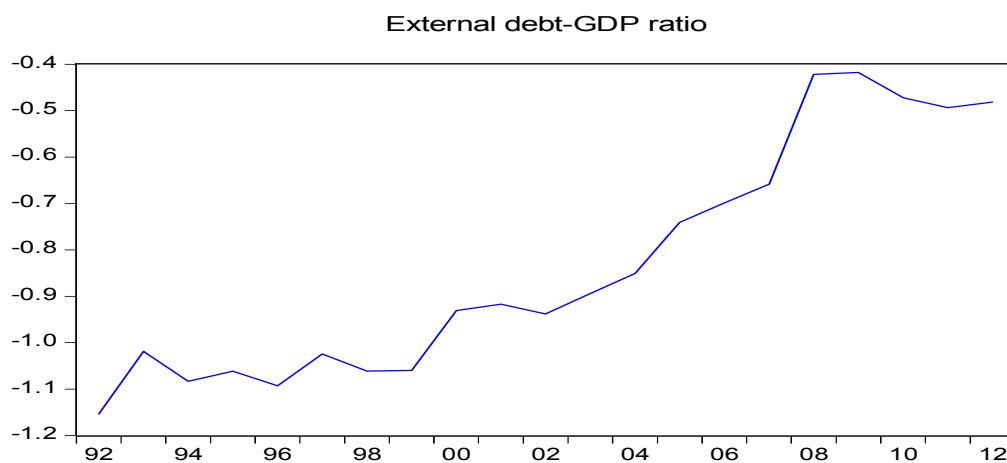


Figure 2. Growth rates of external debt-GDP ratio

### 3. Review of Literature

Since the early 1990s, there has been an important emergence of empirical studies which explored the issue of budget deficit and external debt. These studies have gained importance after the latest financial and debt crisis world-wide. Empirical tests were carried out on stationarity and co-integration techniques that explore the existence of a long-run equilibrium relationship among the fiscal variables, (Neaime, 2004).

The effect of budget deficit or certain economic variables were also investigated recently, Agarwal (2014) for India, Chihi and Normandin (2013) for some developing countries, Bayrak and Esen (2012) and Akçay et al. (2001) in case of Turkey, Qayyum and Haider (2012) for low-income countries, Greenidge et al. (2011) in the case of Barbados and Osinubi et al. (2010) for Nigeria. Qayyum et al. (2014) also presented a theoretical model for foreign aid, external debt and governance. They showed that external debt and foreign aid do not affect the growth rate of consumption but have level impact on consumption. They concluded that foreign aid encourages the economic growth but external debt creates a burden on the economy. Foreign aid does not affect investment directly but it has a direct positive impact on the savings in the economy. Foreign aid has a positive impact on economic growth and it is playing a constructive role in spurring the economic activity of an economy. External debt has a negative impact on economic growth and it is a burden that puts an economy into trouble. They recommended that developing countries should finance budget through foreign aid and do not depend on the external debt as it affects the economic activities adversely.

Much scholarly effort that investigated the role of external debt in the economic growth has concentrated upon whether external debt has a positive or negative role in economic growth. The outcome of the research that considered LDCs either reached to a negative impact or a weak positive impact under sound policy environment or good governance. Recent studies that explored the relationship between external debt and economic growth found that external debt had a negative impact on the economy. Examining the impact of external debt on economic growth in Pakistan over the period 1970–2009, Ramzan and Ahmad (2014) showed that external debt has a negative impact on growth, but this adverse effect can be reduced or even reversed in the presence of sound macroeconomic policy. They concluded that bilateral, and not the multilateral, component of the total external debt that retards growth. Exploring the nexus between external debt and export competitiveness, Ouyang and Rajan (2014) found that once external debt exceeds a certain threshold it is negatively associated with export growth. Furceri and Zdzienicka (2012) assessed the short and medium-term impact of debt crises on GDP. Using an unbalanced panel of 154 countries from 1970 to 2008, the paper shows that debt crises produce significant and long-lasting output losses, reducing output by about 10 percent after 8 years. The results also suggest that debt crises tend to be more detrimental than banking and currency crises.

On the other hand, several researchers have demonstrated the fragility of the claim, based on the sign and statistical significance of the aid-policy interaction term, that the evidence shows a positive role of LDC

government policies in the effect of aid on growth, Ram (2004), Bianconi and Fisher (2014) for indebted open economies, Brautigam and Knack (2004) for Sub-Saharan Africa and Clements et al. (2003) for low-income countries. More recently, Hansen and Headey (2010) investigated the short-run macroeconomic impact of aid in small developing countries by using a vector auto regression (VAR) model to study the impact of aid on net import (absorption) and domestic demand (spending). They found substantial differences between 'aid-dependent' and other countries that are more dependent on natural resources, tourism or financial services. In aid-dependent countries, aid absorption more or less equals spending, although only half of the aid flow is absorbed and spent. In the non-aid-dependent group, aid does not seem to be absorbed or spent in any systematic fashion.

Empirical evidence from several studies, including Doğan and Bilgili (2014), Oguro and Sato (2014), Nasir et al. (2012), Cui and Gong (2008), Rajan and Subramanian (2007), and Easterly (2003), supports the view that aid affects growth negatively or positively only in a good policy environment. Islam (2005) found that, on average, aid had little impact on economic growth, although a robust finding is that aid promotes growth only in a politically stable environment irrespective of the quality of the country's economic policies. Aid is ineffective in an unstable environment even in the presence of good policies. The results, however, indicate that policy is more effective in promoting growth when supported by increased aid flows rather than aid being more effective in good policy environment. Collier and Dollar (2002) developed a model of efficient aid in which flows respond to policy improvements and concluded that the effect of aid depends on the quality of policies. The main implication of this entire line of research is to suggest that a good aid policy should be based upon the ability of a country to achieve poverty-reduction and implement sound policies of the kind indicated by these scholars. Burnside and Dollar (2000) claimed that aid has a positive impact on growth in developing countries with good fiscal, monetary, and trade policies.

#### 4. Data and Methodology

##### 4.1 Data

Modeling the relationship between budget deficit and external debt is carried out on annual data which cover the period 1992–2012. The variables of the model may be defined in nominal terms or in real terms. However, following Bohn (2007) suggestion that financial variables are better deflated by suitable scale variables like GDP or population, this paper expresses both budget deficit and external debt by their ratios to GDP. To avoid inconsistency of data, all data are taken from one Jordanian official source: The Central Bank of Jordan (1995, 2003, 2008, 2014).

##### 4.2 Methodology

The methodology of this paper is of three folds. First, we investigated the existence of unit root in the variables of the model. Second, co-integration technique was used to test whether a long-run relationship exists between budget deficit and external debt. We checked for co-integration and determined the number of co-integrating equations using unrestricted co-integration rank test for both cases: Trace and Maximum Eigenvalue. Third, we applied Granger's causality test to determine the existence and direction of causality between budget deficit and external debt. The test of stationarity was carried out by applying both Augmented Dickey–Fuller (ADF) and the Phillips–Perron (PP) unit root tests including total budget deficit and total external debt, as well as the ratio of these variables to GDP. To determine the order of integration of the series, model (5) is modified to include second differences on lagged first and  $k$  lags of second differences. The critical values are taken from MacKinnon-Haug-Michelis (1999) using five different assumptions about the deterministic regressors in the co-integrating equation: none, constant, linear trend, constant and linear trend, and quadratic trend. The maximum lag length is automatically selected by the estimation method based on Schwarz Information Criterion (SIC) and Akaike Information Criterion (AIC) which gave similar conclusions. Causality tests are performed using the common Granger's causality test.

##### 4.3 The Model

Following Pesaran *et al.* (2001) and many others, we apply the following Auto Regressive Distributed Lag (ARDL) model using a constant without time trend:

$$\Delta BD_t = \alpha_0 + \sum_{i=1}^n \alpha_{1i} \Delta BD_{t-i} + \sum_{i=0}^m \alpha_{2i} \Delta ED_{t-i} + u_1 \quad (1)$$

$$\Delta ED_t = \beta_0 + \sum_{i=1}^n \beta_{1i} \Delta ED_{t-i} + \sum_{i=0}^m \beta_{2i} \Delta BD_{t-i} + u_2 \quad (2)$$

We also apply the following ARDL model using a constant and linear trend:

$$\Delta BD_t = \gamma_0 + \sum_{i=1}^n \gamma_{1i} \Delta BD_{t-i} + \sum_{i=0}^m \gamma_{2i} \Delta ED_{t-i} + \gamma_3 t + u_3 \quad (3)$$

$$\Delta ED_t = \delta_0 + \sum_{i=1}^n \delta_{1i} \Delta ED_{t-i} + \sum_{i=0}^m \delta_{2i} \Delta BD_{t-i} + \delta_3 t + u_4 \quad (4)$$

Where  $BD$  is the ratio of budget deficit to GDP,  $ED$  is the ratio of external debt to GDP, and  $\Delta$  is the first-difference operator. For simplicity,  $n$  and  $m$  represent the maximum number of lags, which is determined by the estimation method.  $\alpha$ ,  $\beta$ ,  $\gamma$  and  $\delta$  are coefficients to be estimated and  $u$ 's are stationary stochastic processes.

The application of ARDL model is based on three validations. First, ARDL model suggests that after specification of the order of the ARDL, one can estimate the level and first difference relationship between variables using ordinary least squares method. Second, the order of integration of appropriate variables may not necessarily be the same. Therefore, the ARDL technique has the advantage of not requiring a specific identification of the order of the underlying data. Third, this technique is suitable for small sample size (Pesaran et al., 2001).

## 5. Results and Discussion

We start with testing for the existence of unit root for the variables of the model. After that, we apply co-integration test to see if there are co-integrating equations and make use of the results of this test for model construction. We also apply Granger's causality test to examine the causal relationship between economic growth and energy consumption. Finally, we estimate the equations of the ARDL model under several assumptions.

### 5.1 Unit Root Test

The Augmented Dickey-Fuller (ADF) test constructs a parametric correction for higher-order correlation by assuming that the  $y$  series follows an  $AR(k)$  process and adding  $k$  lagged difference terms of the dependent variable  $y$  (without more exogenous variables, in our case) to the right-hand side of the regression equation:

$$\Delta y_t = \alpha + \beta y_{t-1} + \sum_{i=1}^k \gamma_i \Delta y_{t-i} + v_t \quad (5)$$

Where  $y$  is a vector of variables under study ( $BD$  and  $ED$  here),  $\Delta$  is first-difference operator, all small Greek letters are constant parameters to be estimated, and  $v$  is white noise error term. An important result obtained by Fuller is that the asymptotic distribution of the t-ratio for  $\beta$  is independent of the number of lagged first differences included in the ADF regression. For budget deficit ( $BD$ ), the ADF test is used in order to test the null hypothesis that the coefficient of lagged  $BD$  is zero which means that there is a unit root. The alternate hypothesis is that it is less than zero, i.e., there is no unit root. More formally we want to test the null hypothesis:  $H_0: \beta = 0$ , against the one-sided alternative  $H_1: \beta < 0$ , based on the following formulas:

$$\Delta BD_t = \beta BD_{t-1} + \sum_{i=1}^k \gamma_i \Delta BD_{t-i} + u_{16} \quad (6.1)$$

$$\Delta BD_t = \alpha + \beta BD_{t-1} + \sum_{i=1}^k \gamma_i \Delta BD_{t-i} + u_{16} \quad (6.2)$$

$$\Delta BD_t = \alpha + \beta BD_{t-1} + \sum_{i=1}^k \gamma_i \Delta BD_{t-i} + \delta t + u_{16} \quad (6.3)$$

For external debt ( $ED$ ), the ADF test is employed in order to test the null hypothesis:  $H_0: \zeta = 0$ , implying that the variable  $ED$  has a unit root against the one-sided alternative  $H_1: \zeta < 0$ , based on the following equations:

$$\Delta ED_t = \zeta ED_{t-1} + \sum_{i=1}^m \eta_i \Delta ED_{t-i} + u_{17} \quad (7.1)$$

$$\Delta ED_t = \varepsilon + \zeta ED_{t-1} + \sum_{i=1}^m \eta_i \Delta ED_{t-i} + u_{17} \quad (7.2)$$

$$\Delta ED_t = \varepsilon + \zeta ED_{t-1} + \sum_{i=1}^m \eta_i \Delta ED_{t-i} + \theta t + u_{17} \quad (7.3)$$

Where  $u_t$  is the error term which is assumed to be white noise,  $k$  and  $m$  are the maximum numbers of lags, and all other small Greek letters are coefficients to be estimated. The critical values are taken from MacKinnon et al. (1999) who provided response surface regression results for obtaining critical values for four different assumptions about the deterministic regressors in the co-integrating equation: none, constant, linear trend, and quadratic trend. The maximum lag length is automatically selected by the estimation method based on Schwarz Information Criterion (SIC).

The unit root tests on the budget deficit and external debt are performed including the three common options (a constant, a constant and a linear time trend, and neither) in the test regression. A unit root test for the first difference should be performed only if the variables in level have a unit root, which is the case for both  $BD$  and  $ED$  variables. The null hypothesis for a unit root for both budget deficit and external debt is not rejected, as

shown in Table 1, at the 0.05 significance level. Consequently it was necessary to apply ADF test for first differences. The results of the first differenced variables show that the ADF test statistics for both budget deficit and external debt are higher than their corresponding critical values at the 5% level of significance. It should be noted that Phillips-Perron (PP) test, not presented here, was also carried out and gave conclusions similar to that of ADF test.

Table 1. Results of augmented dickey-fuller unit root test

Variable	Lag length	ADF statistic	Critical value 5%	Probability	Conclusion
None (Equations 6.1 and 7.1)					
Budget deficit as % GDP					
Level	1 (4)	2.307632	-1.960171	0.9923	Unit root
First difference	0 (4)	-6.119835	-1.960171	0.0000	No unit root
External debt as % GDP					
Level	0 (4)	-1.119552	-1.959071	0.3570	Unit root
First difference	0 (4)	-4.262988	-1.960171	0.0002	No unit root
Constant (Equations 6.2 and 7.2)					
Budget deficit as % GDP					
Level	1 (4)	1.175340	-3.029970	0.9966	Unit root
First difference	0 (4)	-7.058259	-3.029970	0.0000	No unit root
External debt as % GDP					
Level	0 (4)	-0.520473	-3.020686	0.8676	Unit root
First difference	0 (4)	-4.768799	-3.029970	0.0014	No unit root
Constant and linear time trend (Equations 6.3 and 7.3)					
Budget deficit as % GDP					
Level	0 (4)	-2.413843	-3.658446	0.3620	Unit root
First difference	0 (4)	-7.611239	-3.673616	0.0000	No unit root
External debt as % GDP					
Level	0 (4)	-0.520473	-3.020686	0.8676	Unit root
First difference	0 (4)	-4.752072	-3.029970	0.0066	No unit root

Note. The maximum lag length, shown between parentheses, is automatically selected by the estimation method based on SIC. \* Probabilities and critical values calculated for 20 observations may not be accurate for small sample size.

### 5.2 Co-Integration Test

Since the unit root tests confirm that both budget deficit and external debt are non-stationary at level and stationary at first difference, then one must search for a long-run equilibrium relationship between them. The Johansen (1991, 1992) co-integration efficient maximum likelihood test is next used to test if they are bound by a long-run relationship. This paper applies the co-integration test to determine the number of co-integrating equations based on a modified form of model (5) to include  $k$  lags of second differences. That is,

$$\Delta^2 y_t = \lambda \Delta y_{t-1} + \sum_{i=1}^k \mu_i \Delta^2 y_{t-i} + e_t \quad (8)$$

Using Trace method, the results of co-integration test, based on model (8), do not reject the null hypotheses of no co-integration, as shown in Table 2. The results of unrestricted co-integration rank test using Maximum Eigenvalue method, shown in Table 3, are almost similar to those of Trace method. The null hypothesis of no co-integration is not rejected, at the 5% level of significant. In fact, all results under all available co-integration testing scenarios, summarised in Table 4 and Table 5, clearly confirm that there is no long-run relationship between budget deficit and external debt for Jordan's data. As Tables 5 and 6 indicate no co-integrating vector at the 0.05 level of significance between budget deficit and external debt the null hypothesis of no co-integration cannot be rejected. Thus, fiscal policy in Jordan need not to connect budget deficit with external debt since government spending and revenues are drifting apart and do not seem to converge to a long-run equilibrium relationship.

Table 2. Unrestricted co-integration rank test (trace)

Type of trend	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
No deterministic trend	None	0.300282	7.424976	12.32090	0.2848
	At most 1	0.033149	0.640505	4.129906	0.4840
No deterministic trend (restricted constant)	None	0.373302	10.76156	20.26184	0.5652
	At most 1	0.094355	1.883046	9.164546	0.8008
Linear deterministic trend	None	0.221667	4.915935	15.49471	0.8177
	At most 1	0.008100	0.154522	3.841466	0.6942
Linear deterministic trend (restricted)	None	0.343954	12.76055	25.87211	0.7567
	At most 1	0.221264	4.751578	12.51798	0.6323

Note. denotes rejection of the hypothesis at the 0.05 level, \*\*MacKinnon-Haug-Michelis (1999) p-values.

Trace test indicates no co-integration at the 0.05 level.

Table 3. Unrestricted co-integration rank test (maximum eigenvalue)

Type of trend	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
No deterministic trend	None	0.300282	6.784471	11.22480	0.2688
	At most 1	0.033149	0.640505	4.129906	0.4840
No deterministic trend (restricted constant)	None	0.373302	8.878518	15.89210	0.4470
	At most 1	0.094355	1.883046	9.164546	0.8008
Linear deterministic trend	None	0.221667	4.761412	14.26460	0.7716
	At most 1	0.008100	0.154522	3.841466	0.6942
Linear deterministic trend (restricted)	None	0.343954	8.008976	19.38704	0.8207
	At most 1	0.221264	4.751578	12.51798	0.6323

Note. denotes rejection of the hypothesis at the 0.05 level, \*\*MacKinnon-Haug-Michelis (1999) p-values.

Max-eigenvalue test indicates no co-integration at the 0.05 level.

Table 4. Selected (0.05 level) number of cointegrating relations by model

Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Trace	0	0	0	0	0
Max-Eigenvalue	0	0	0	0	0

Table 5. Information criteria by rank and model

Data Trend:	None	None	Linear	Linear	Quadratic
Rank or	No Intercept	Intercept	Intercept	Intercept	Intercept
No. of CEs	No Trend	No Trend	No Trend	Trend	Trend
Log Likelihood by Rank (rows) and Model (columns)					
0	54.37132	54.37132	57.29414	57.29414	59.32668
1	57.76356	58.81058	59.67484	61.29862	62.93359
2	58.08381	59.75210	59.75210	63.67441	63.67441
Akaike Information Criteria by Rank (rows) and Model (columns)					
0	-5.302244	-5.302244	-5.399383	-5.399383	-5.402808*
1	-5.238269	-5.243219	-5.228931	-5.294592	-5.361431
2	-4.850927	-4.816011	-4.816011	-5.018359	-5.018359
Schwarz Criteria by Rank (rows) and Model (columns)					
0	-5.103415*	-5.103415*	-5.101139	-5.101139	-5.005150
1	-4.840611	-4.795853	-4.731858	-4.747811	-4.764943
2	-4.254439	-4.120108	-4.120108	-4.223042	-4.223042

Note. \*Critical values based on MacKinnon-Haug-Michelis (1999).

### 5.3 Granger Causality Test

To determine the optimal solution of model equations, the test for the direction of causality is based on the assumption that the number of lags ranges from 1 to 2. Table 6 presents the results of testing Granger's causality that runs from budget deficit to external debt and the other way round. The results do not reject the null hypotheses of no causality. The results support the neutrality hypothesis which implies that changes in budget deficit are not caused by changes in external debt and external debt is not caused by budget deficit (both are expressed as percentages of GDP). When the two variables are expressed in their actual values (i.e. not as percentages of GDP), we obtain the same conclusion. The results of the latter are not shown here to avoid confusion in variables definitions. Therefore, any policy which aims to reduce budget deficit is expected to have a negligible effect on external debt and policies to decrease government external debt may not significantly cause budget deficit.

Table 6. Results of pairwise Granger causality test

Hypotheses	Observations	F-Statistic	Probability	Decision
H <sub>0</sub> : <i>BD</i> does not Granger cause <i>ED</i> H <sub>1</sub> : <i>ED</i> → <i>BD</i>	19	0.17031	0.8451	No causality
H <sub>0</sub> : <i>ED</i> does not Granger cause <i>BD</i> H <sub>1</sub> : <i>BD</i> → <i>ED</i>	19	1.34091	0.2932	No causality

Note. *BD* is budget deficit as % of GDP and *ED* is external debt as % of GDP.

## 6. Conclusions and Policy Implications

After highlighting the most recent monetary and fiscal developments in Jordan, the paper used an ARDL model to study the issue of budget deficit and external debt in Jordan, during 1992–2012. This has enabled us to reach some conclusions. First, fiscal decision makers may disregard external debt when setting budget constraints including taxes and non-interest spending. Second, budget constraints must rely on more important factors other than external debt when drawing fiscal policies. These factors may include good governance, tax reforms and lowering government spending on certain economic activities that have little significance on total output. Third, external debt is not caused by budget deficit but by other factors related to economic growth and, more likely, political factors.

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