Measuring Jordan's Ability to Pay Its Public Debts

KHALED I BATAYNEH[1] (*Corresponding author*) and HEL AJMI JAMEEL AL-DHAIMESH[2]

[1] Assistant Professor, Department of Economics, Faculty of Economics and Administrative Sciences, The Hashemite University, Jordan, e-mail: kbatayneh@hu.edu.jo

[2] Professor, Department of Economics, Faculty of Economics and Administrative Sciences, The Hashemite University, Jordan, e-mail: hail_jemel@yahoo.com

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ABSTRACT

Many developed and developing countries resort to internal and external borrowing for the purpose of using it to finance the deficit in the public budget, the deficit in the current balance (the trade deficit), or for other purposes. International standards have specified that the ratio of public debt to GDP should not exceed 60% for developing countries and more than that for developed countries. The optimal use of loans, such as using them in productive investment projects or reforming the country's infrastructure, increases national exports and the gross domestic product, and this would lead to a decrease in the deficit in the public budget and the current balance, and thus lead to decreasing debt or limiting its increase. This study main goal is to measure Jordan's ability to reduce or pay off its public debts by examining the impact of some of macroeconomic variables such as (public budget deficit, trade deficit private domestic investment and foreign reserves) on public debt for the period 1997-2019. The empirical results were depending on an autoregressive distributed lag (ARDL) bound approach of testing. The advantage of using ARDL model is to capture short – and long – run impacts. Empirical findings confirmed that economic growth, budget deficit, trade deficit and foreign reserves have positive effect on public debt, which means that an increase in these variables will lead to worsen public debt. While domestic private investment has a negative impact on public debt, which means an increase in domestic private investment leads to reduce public debt. Accordingly, the study found that Jordan's ability to repay or reduce its debts is weak. The study recommended that policy makers in Jordan should adopt an effective economic policies and procedures that will help to encourage domestic private investment, reduce the budget deficit, increase exports and reduce imports in order to reduce public debt.

INTRODUCTION

Public debt is one of the significant indicators upon which explaining the slowdown in economic growth after the financial crisis in 2008 and the European sovereign debt crisis depends. The rise in public debt is a source of concern for developing countries, especially Jordan, one of the developing countries with

limited economic and financial resources. Accordingly, the public debt has become a direct burden on its economy. The public debt in Jordan has doubled significantly during the period between 1997 and 2019, reaching about 5.912 billion dinars in 1997 to about 30.076 billion dinars in 2019, which represents 96% of the GDP. The public debt ratio in Jordan exceeded the global percentage and the permissible percentage in the Jordanian public debt law of 60%. World Bank studies confirmed that public debt threshold should not exceed 77% for a long time in developed countries and 64% for developing and emerging countries. Therefore, an arising in these percent leads to a deceleration in economic growth.

Jordan's total public debt is divided into external debt and domestic debt, where the government borrows from external sources such as banks, international financial and monetary institutions in addition to foreign countries. As for domestic borrowing, the government obtains it mainly through the national banking sector. Jordan's dependence on external borrowing was greater than its internal debt before 2008, as external borrowing amounted to 59% of total borrowing in 2007, while domestic borrowing amounted to 41% of total borrowing for the same year. Since 2008, Jordan started to depend more on domestic borrowing than external borrowing. Domestic debt reduces the weakness of the country facing external and domestic shocks and the implementation of a monetary policy facing periodic fluctuations. Therefore, the evidence is in favor of the domestic public debt, and this can be verified through the experience of developing countries such as China, India and Chile (Fseifes and Warrad 2020). It is expected that the Jordanian public debt will continue to rise during the coming period, as a result of the Jordanian government's announcement of agreeing on credits from the International Monetary Fund in the amount of $ 1.3 billion under the so-called "economic reform program" agreed upon between the two. The increase in debt will exacerbate the budget deficit due to the increase in interest and installments debts that Jordan must pay each year, and interest payments on public debt have increased from 12.3% of total domestic revenues in 2012 to 14% in 2018. Interest payments to public debt also increased from 9.4% of current spending to 13% during the same period, and the public debt interest paid by Jordan amounting to 1.5 billion dinars is a major reason for the deficit in the public budget (Jordan Strategy, 2019). Also, the debt increased at a rate of more than 90% annually during the period 2009-2019, which was the reason for the decline in growth in GDP at rates ranging between 5.2% -1.9%. International Monetary Fund indicated that the public debt in Jordan is still high and growth trends are decreasing during the twenty-year period when the public debt has increased. Some studies have showed that the increase in public debt generally and domestic debt particularly leads to a decline in investment as consequence of the government crowding out the private sector over the funds existed with local banks and financial organizations. On the contrary, public debt may be beneficial to a country if it uses borrowed money to finance projects and economic productive activities that would achieve economic development in the desired manner.

Thus, the main aim of this study is to shed light on Jordan's ability to pay its public debts by examining the effect of each of the economic growth rate, private budget deficit, trade deficit, private domestic investment, and foreign reserves on domestic debt, external debt and total debt in Jordan for the period 1997- 2019. The rest of the paper is set up as follows: section 2 illustrates the literature review; section 3 describes data and the econometric methodology. Section 4 gives a report about the study results. and the last section, section 5, appears the conclusions and recommendations.

1. LITERATURE REVIEW

The economic literature has ascribed the reasons for the increase in the state's public debt to three main factors, including: political, institutional, structural, and macroeconomic variables. A study done by Edwards and Tabellini (1991) on group of 21 LCDs, concluded that political instability and political polarization have a significant role in illustrating cross the differences of country especially in government borrowing and fiscal shortfalls. Their suggestion is that the large budget deficit is related to more politically unstable countries. In many cases, political instability leads to frequent government changes and thus reduces the possibility of re-election of the current policy maker, which may in turn negatively affect the economic policies currently taken.

Institutional and structural variables have great impact on public debt. Lavigne (2011) indicates that institutional stability such as the disappearing of government's corruption and quality of the bureaucracy

have a big influence on the public debt. Cooray et al. (2016) affirmed that a higher level of corruptions causes to a higher level of public debt. Also, it was a link between structural variables and the growth of public debt. Creel et al. (2012) argued that population ageing put upward pressures on government expenditures and public debt through age-related health care and public pension expenditures. Veiga and Veiga (2014) showed that expenditures structure and revenues has an effect on the level of public debt, and higher unemployment rates lead to a higher public debt levels. As for the macroeconomic aspect and its role in influencing the public debt, many countries often resort to borrowing money to finance their profit or service projects, such as financing infrastructure projects (i.e., roads, transportations, etc.), as well as human resource development projects (such as education, health, ... and others).

Some developed countries may resort to borrowing to finance their advanced social safety net programs such as social security insurance, unemployment insurance, health care and others to achieve economic, political, and social stability. Its indebtedness may increase due to the increase in its expenditures on these programs to avoid resorting to distorting tax fluctuations (Barro, 1979). Government borrowing allows governments to reduce the tax burden and redistribute it to future generations over time (Cukierman and Meltzer, 1989).

Since this empirical study focuses on the macroeconomic variables in determining Jordan' ability to pay off its large public debt, we will concentrate on reviewing some of the empirical studies introduced in the literature.

Reinhart and Rogoff (2010b) suggested that there is a probable bi-directional causality between debt and economic growth. They argue that high debt causes higher taxes and/or lower government spending, which affects negatively economic growth, while the duration of low growth may cause high deficits and accumulation of debt. Dereje (2013) used panel data for selected eight heavily indebted poor African countries to investigate whether external debt has any effects on economic growth. His study results confirm that external debt has an influence on economic growth through the debt crowding out effect rather than debt overhang. Al-Zeaud (2014) used OLS regression model to check the effect of public debt on the growth of economy for Jordan. The results showed that population growth and public debt have a significant positive impact on economic growth. Panizza and Presbitero (2014) apply an instrumental variable approach to test whether public debt has a causal effect on economic growth in a sample of OECD countries. They found that there is no evidence that public debt owning a causal impact on economic growth is significant regarding to the fact that the negative correlation between debt and growth is sometimes used to justifying policies that infer debt has a negative causal effect on economic growth.

Also, a study by Siddique et al. (2015) uses panel data for 40 highly indebted poor countries to analyze to what extent the external debt burden has an impact on a country's growth of GDP. Their results show that there is short and long run negative correlation between external debt and economic growth, which means that a reduction in external debt leads to an increase in the performance of economic growth in selected indebted countries. Huang et al. (2016) establish their results in three methods. First, local public debt is conversely correlated with the city-level investment ratio of domestic private manufacturing companies. Second, local public debt has a larger negative impact on investment by private companies in industries more dependent on external funding. Finally, in cities with high government debt, firm-level investment is more sensitive to internal funding, also when this sensitivity is estimated jointly with the firm's likelihood of being credit-constrained. Jacobo and Jalile (2017) test the impact of government debt on GDP in sixteen Latin American countries. The short-run impact of debt on GDP growth is positive, but beyond public debt-to-GDP ratios between 64 and 71% government debt to-GDP ratios would have a negative effect on economic growth. Gómez-Puig and Sosvilla-Rivero (2017) use ARDL Model to examine the short and long run impact of public debt on economic growth for eleven central and peripheral countries of the euro area (EA). The findings indicate a significant negative impact on the long-run performance of EA member states, but short-run influence may be positive depending on the country. A study by Lau et al. (2019) shows the existence of asymmetric effect of public debt on private investment in Malaysia by using nonlinear autoregressive distributed lags (NARDL) estimation. Results appear some evidence of asymmetrical impact in private investment–public debt nexus in both the long- and short-run. There is evidence of long-run asymmetry between private investment and total public debt, external debt, and federal government debt. In the short run, asymmetric relationship exists between private investment and domestic debt, external debt, and federal government debt. The study concluded that higher public debt crowds out private

investment. Onafowora and Owoye (2019) use a structural vector autoregression generalized economic growth model to test the impact of external public debt-to-GDP ratio on per capita GDP growth, investment, trade openness, exchange rate, and inflation in Nigeria. The findings show that external debt has long-lived negative influences on economic growth and investment. Fseifes and Warrad (2020) examine the long-run corrolation between public debt and economic growth in Jordan using a fully modified ordinary least squares (FM-OLS) method. Findings appear an evidence of non-linearity between public debt and economic growth in the long-run, only with debt exceeding 78 percent of GDP. This result approves an inverted U-shaped curve in the debt-growth relationship in Jordan. In other words, the direction of the effect of public debt on economic growth converts smoothly from positive to negative depending on the debt level. Saungweme and Odhiambo (2020). The study uses autoregressive distributed lag (ARDL) technique to examine the impact of total public debt on economic growth and the relative impact of domestic and foreign public debt on economic growth in South Africa. The results suggest that there is a short and long run statistically significant negative impact of total public debt on economic growth. Moreover, the results confirm that domestic public debt and economic growth have positive correlation in the short run only. Furthermore, foreign public debt has a long-run negative effect on economic growth. Besnik Fetai et al. (2020) try to identify and determine the threshold values or the extent to which public debt-to-GDP ratio has a positive effect on economic growth, and beyond which point debt-to-GDP ratio has a negative effect on the economic growth in European transition countries. Their study uses different econometric models and techniques such as pooled OLS, fixed and random effects models, GMM (Generalized Method of Moments), and bootstrap method in order to determine threshold values of public debt-to-GDP ratio. The results show that at low level of public debt- to-GDP, ratio has a positive effect on economic growth, whereas beyond a certain turning point a negative effect on growth prevails in the European transition countries. Abd Rahman et al. (2019) examine whether there exists a mutual consent on the effects of public debt on the economic growth of a country or group of economies. The authors tackle thirty-three articles to be reviewed. They found that there is no mutual consent on the relationship between public debt and economic growth. The relationship can be positive, negative, or even non-linear.

Most of the previous studies tried to analyze the influence of public debt on economic growth in growing and developed countries alike. Therefore, they did not try to deal with measuring the extent of these countries' ability to pay their public debt. Thus, the objectives of this study are to identify the factors affecting the determination of Jordan's ability to pay its public debt by using new econometric techniques. The results and recommendations could help the government to take appropriate policy decisions to reduce its public debt and achieve desired economic growth.

The study's null hypotheses have been developed as follows:

- There is no statistically significant impact on the economic growth rate, budget deficit, trade deficit, domestic private investment, and foreign reserves on domestic debt.
- There is no statistically significant impact on the economic growth rate, budget deficit, trade deficit, domestic private investment, and foreign reserves on external debt.
- There is no statistically significant impact on the economic growth rate, budget deficit, trade deficit, domestic private investment, and foreign reserves on public debt.

2. DATA AND METHODOLOGY

2.1. Data

To evaluate the impact of macroeconomic variables on debt, the model consists of three dependent variables, which are domestic debt (DD), external debt (EX) and total debt (TOD) and five independent variables including: real GDP (RP), budget deficit (BD), trade deficit (TD), investment (I) and foreign reserves (FR). All variables are converted to natural logarithms. All variables are based on yearly data covering period from 1997 to 2019. Choosing this period span was based on the availability of accurate data. The data were obtained from the Central Bank of Jordan. The time series data descriptions and sources are provided in Table 1. Also, all the variables are depicted in Figure 1, and descriptive statistics for all variables are appeared in Table 1.
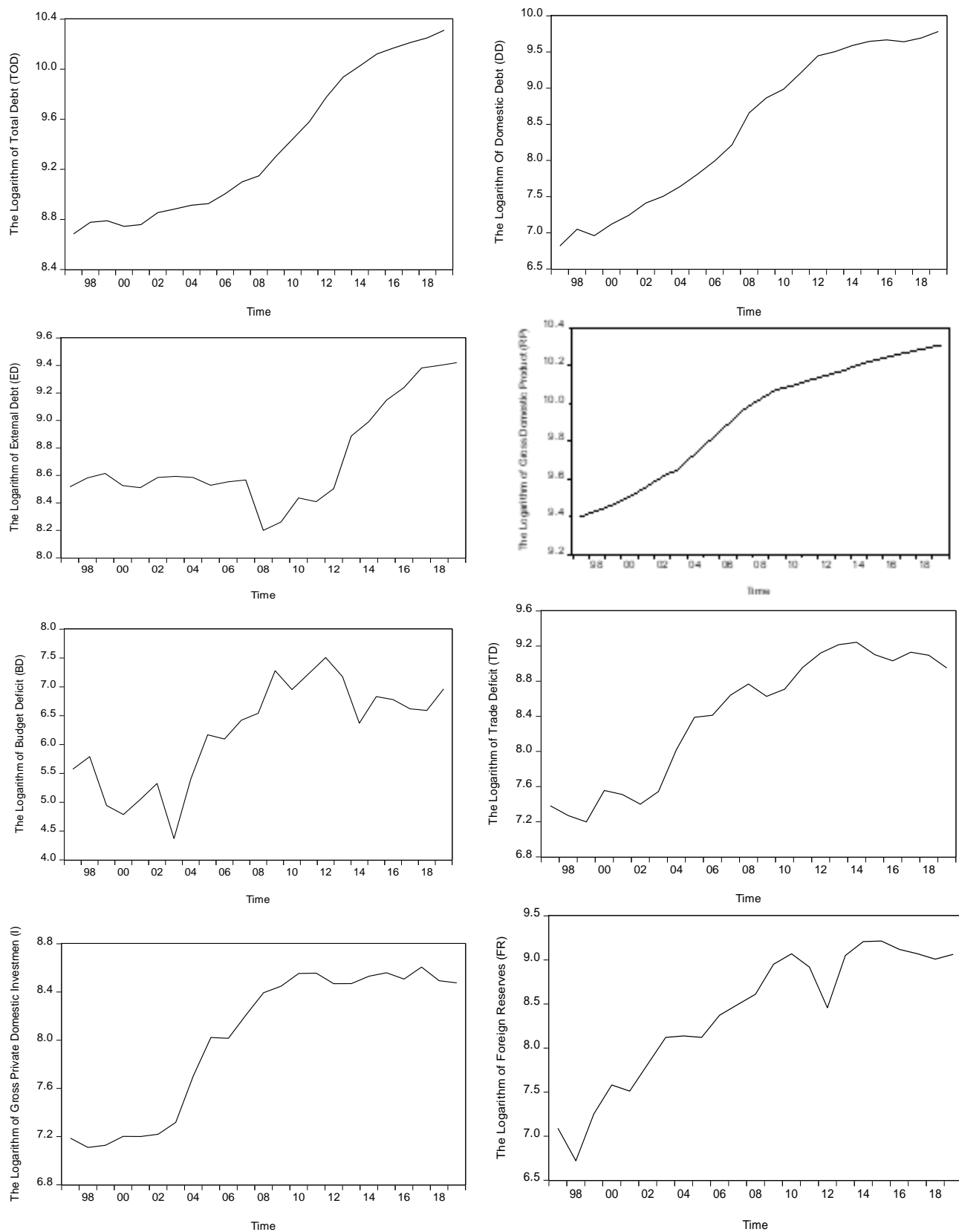
Figure 1. Plot of the Sample Series.

Source: Data from CBJ.

Table 1. Basic Data Descriptive Statistics

Variables Descriptive	LDD	LED	LTOD	LRP	LBD	LTD	LI	LFR
Mean	8.454	8.71	9.378	9.922	6.206	8.402	8.016	8.389
Maximum	9.783	9.42	10.31	10.31	7.508	9.242	8.605	9.213
Minimum	6.818	8.19	8.684	9.399	4.369	7.197	7.109	6.720
Std. Dev.	1.077	0.36	0.589	0.314	0.892	0.735	0.595	0.752

Source: own processing.

2.2. Methodology

The empirical estimation results for short-run and long-run relationship between debt and macroeconomics variables involved is based on Autoregressive Distributed Lag (ARDL)/bounds testing cointegration procedure. ARDL technique has some advantages such as: (i) it is a suitable technique for small sample size study (Pesaran et al., 2001); (ii) it is desirable technique when dealing with variables that are combined with different order, I(0), I(1) or combination of the both; (iii)) it gives unbiased estimates of the long-run model and valid statistics even when some of the regressors are endogenous (Harris and Sollis, 2003).

This study divides the empirical works to three main groups: first, the impact of the independent variables mentioned above on the domestic debt; second, the impact of the independent variables on the external debt; and third, the impact of independent variables on the total debt.
The following three ARDL base models will be estimated to check if there is any significant evidence of long-run relationship among the variables included in this study.

$$\Delta lnDD_t = a_0 + \alpha_1 LnDD_{t-1} + \alpha_2 LnRP_{t-1} + \alpha_3 LnBD_{t-1} + \alpha_4 LnTD_{t-1} + \alpha_5 LnI_{t-1} + \alpha_6 LnFR_{t-1} + \sum_{i=0}^{n} \beta \Delta LnDD_{t-i} + \sum_{i=0}^{n} \gamma \Delta LnRP_{t-i} + \sum_{i=0}^{n} \delta \Delta LnBD_{t-i} + \sum_{i=0}^{n} \varphi \Delta LnTD_{t-i} + \sum_{i=0}^{n} \rho \Delta LnI_{t-i} + \sum_{i=0}^{n} \pi \Delta LnFR_{t-i} + \mu_t \quad (1)$$

$$\Delta lnED_t = a_0 + \alpha_1 LnED_{t-1} + \alpha_2 LnRP_{t-1} + \alpha_3 LnBD_{t-1} + \alpha_4 LnTD_{t-1} + \alpha_5 LnI_{t-1} + \alpha_6 LnFR_{t-1} + \sum_{i=0}^{n} \beta \Delta LnED_{t-i} + \sum_{i=0}^{n} \gamma \Delta LnRP_{t-i} + \sum_{i=0}^{n} \delta \Delta LnBD_{t-i} + \sum_{i=0}^{n} \varphi \Delta LnTD_{t-i} + \sum_{i=0}^{n} \rho \Delta LnI_{t-i} + \sum_{i=0}^{n} \pi \Delta LnFR_{t-i} + \mu_t \quad (2)$$

$$\Delta lnTOD_t = a_0 + \alpha_1 LnTOD_{t-1} + \alpha_2 LnRP_{t-1} + \alpha_3 LnBD_{t-1} + \alpha_4 LnTD_{t-1} + \alpha_5 LnI_{t-1} + \alpha_6 LnFR_{t-1} + \sum_{i=0}^{n} \beta \Delta LnTOD_{t-i} + \sum_{i=0}^{n} \gamma \Delta LnRP_{t-i} + \sum_{i=0}^{n} \delta \Delta LnBD_{t-i} + \sum_{i=0}^{n} \varphi \Delta LnTD_{t-i} + \sum_{i=0}^{n} \rho \Delta LnI_{t-i} + \sum_{i=0}^{n} \pi \Delta LnFR_{t-i} + \mu_t \quad (3)$$

Where, Δ is first difference operator, α_i are the long run multipliers, a_0 is the intercept and μ_t is white noise error term.

The cointegration test finding for the long-run relationship using ARDL model includes performing the F test on the null hypothesis: H₀: α₁=α₂=α₃=α₄=α₅=α₆ = 0.

The existence of long-run relationship between variables depends on the value of F-Bound testing result. If the result shows that a computed F-statistic value is bigger than upper critical bounds value, then the long-run relationship between variables is accepted. If the result of computed F-statistic value is less than the lower critical bounds value, then no long-run relationship between variables is accepted. If the result of computed F statistic value is between upper and lower critical value, then the decision regarding long-run relationship is inconclusive.

The study paper also uses the unrestricted error correction version of ARDL approach to analyze the short-run effect by appreciating the following equations:

$$\Delta LnDD_t = \alpha_1 + \sum_{i=1}^{n} \beta \Delta LnDD_{t-i} + \sum_{i=0}^{n} \gamma \Delta LnRP_{t-i} + \sum_{i=0}^{n} \delta LnBD_{t-i} + \sum_{i=0}^{n} \varphi LnTD_{t-i} + \sum_{i=0}^{n} \rho \Delta LnI_{t-i} + \sum_{i=0}^{n} \pi \Delta LnFR_{t-i} + \psi ECM_{t-1} + \mu_t \quad (4)$$

$$\Delta LnED_t = \alpha_1 + \sum_{i=1}^{n} \beta \Delta LnED_{t-i} + \sum_{i=0}^{n} \gamma \Delta LnRP_{t-i} + \sum_{i=0}^{n} \delta LnBD_{t-i} +$$
$$\sum_{i=0}^{n} \varphi LnTD_{t-i} + \sum_{i=0}^{n} \rho \Delta LnI_{t-i} + \sum_{i=0}^{n} \pi \Delta LnFR_{t-i} +$$
$$\psi ECM_{t-1} + \mu_t \tag{5}$$

$$\Delta LnTOD_t = \alpha_1 + \sum_{i=1}^{n} \beta \Delta LnTOD_{t-i} + \sum_{i=0}^{n} \gamma \Delta LnRP_{t-i} + \sum_{i=0}^{n} \delta LnBD_{t-i} +$$
$$\sum_{i=0}^{n} \varphi LnTD_{t-i} + \sum_{i=0}^{n} \rho \Delta LnI_{t-i} + \sum_{i=0}^{n} \pi \Delta LnFR_{t-i} +$$
$$\psi ECM_{t-1} + \mu_t \tag{6}$$

Where $\beta, \gamma, \delta, \varphi, \rho, \pi$ are the short-run dynamic coefficients of the model's convergence to equilibrium, ψ is the speed of adjustment and ECM_{t-1} is the error correction term and measuring the deviations of $lnDD_t$, $lnED_t$, $lnTOD_t$ from their long-run values.

3. EMPIRICAL RESULTS AND ANALYSIS

This part represents three experimental analyses for the impact of economic growth, budget deficit, trade deficit, investment, and foreign reserves on domestic, external, and total debt. We will start with domestic debt analysis and move to external debt analysis and, finally, total debt analysis.

3.1 Unit Root Test

Before proceeding further, we need to examine time series data used in this analysis for stationarity. Therefore, unit root tests were used to test for stationarity. The findings were based on two tests: first one is the augmented Dickey-Fuller (AD-F) test and the second one is Phillips-Perron unit root test. The results shown in Table (2) confirmed that all variables included in this study are non-stationary in their level form, but they are stationary in their first difference form. This means that all variables are integrated of order one I (1). Based on these findings and since our study's sample is small set chosen ARDL model will be the right and an appropriate econometric technique to discover short-and long-run relationship between dependent variable and independent variables under this study.

Table 2. Results for Unit Root Test

Variables	ADF		PP		Order of integration
	Level				
	Intercept	With Trend	Intercept	With Trend	
LDD	-0.716	-2.710	-1.021	-0.834	I(1)
LED	0.243	-0.928	0.243	0.991	I(1)
LTOD	0.204	-2.501	0.633	-1.770	I(1)
LRP	-2.314	-1.367	-1.709	-0.244	I(1)
LBD	-1.182	-2.385	-1.129	-2.162	I(1)
LTD	-1.384	-0.005	-1.198	-0.850	I(1)
LI	-1.218	0.348-	-1.185	-0.740	I(1)
LFR	-1.553	-1.819	-2.507	-1.474	I(1)
	First Difference				
ΔLDD	-3.236**	-3.231**	-3.270**	-3.341***	-
ΔLED	-3.676**	-4.053**	-3.651**	-4.045**	-
ΔLTOD	-2.995***	-3.451***	-3.001***	-3.457***	-
ΔLRP	-2.890***	-7.259*	-2.885***	-3.554***	-
ΔLBD	-5.182*	-5.040*	-5.182*	-5.040*	-
ΔLTD	-3.776**	-4.052**	-3.354**	-3.713**	-
ΔLI	-3.083**	-3.421***	-3.083**	-3.421***	-
ΔLFR	-5.473*	-4.223**	-5.532*	-17.109*	-

Notes: *, ** and *** indicate 1%, 5% and 10% significance levels respectively. Δ is first difference.

Source: own processing.

3.2 Domestic Debt Model Analysis

This part discusses empirical analysis for equations (1 and 4).

3.2.1 Cointegration Test

Based on Akaike Information Criterion (AKC), a maximum 1 lag is picked for the conditional ARDL model in base model in equation (1). The results for equation (1), which investigates the existence of long-run cointegration correlation between domestic debt, economic growth, budget deficit, trade deficit, investment and foreign reserves is reported in table 3. Since the value of computed F-statistic (8.527) surpasses the upper bound 6.37 at 1 significant percent level, this will confirm the existence of the long-run correlation among variables mentioned in equation 1.

Table 3. Cointegration Test Result Based on ARDL Bounds Test. (LDD)

F- Bounds Test	1% Critical Value		5% Critical value		10% Critical value	
F- Statistic = 8.527	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	4.537	6.37	3.125	4.608	2.578	3.858

Note: Calculated F-statistic based on Wald test = 8.527. The critical values are obtained from Perasan et al. (2001), Table CI (III), p. 300, case III: unrestricted intercept and no trend with n = 50.

Source: own processing.

3.2.2 Long- run Analysis

The long-run relationship estimated coefficients are presented in Table 4. Results show that real GDP, budget deficit, trade deficit and foreign reserves have a highly significant positive influence on domestic debt, while the study's result shows that there is a very significant negative impact of investment on domestic debt. For the economic growth, the impact is significant at 1 percent level in which an increase in GDP by 1% leads to increasing domestic debt by 2.0%. For the budget deficit, trade deficit and foreign reserves an increase in 1% in any of them leads to an increase in domestic debt by about 0.20%, 0.75% and 0.30% respectively. As for investment, an increase in investment by 1% leads to a decline in domestic debt by about 1%.

Table 4. The Long-Run Relationship Estimated Coefficients, of ARDL Model, Based on AIC (1,1,0,1,1,1). Dependent variable is LDD

Variable	Coefficients	t-ratio	P- value
LGDP	2.021	4.831*	0.001
LBD	0.195	3.384*	0.005
LTD	0.746	5.294*	0.000
LI	-1.003	-4.367*	0.001
LFR	0.329	2.908**	0.014
INTERCEPT	-13.392	-4.907*	0.000

Note * Significant at 1%, ** Significant at 5%.

Source: own processing.

3.2.3 Short-run Analysis

The short-run dynamic findings of the impact of economic growth, budget deficit, trade deficit, investment and foreign reserves on domestic debt are described in table 5. Findings show that budget deficit, trade deficit and foreign reserves have positively significant short-run effects on domestic deficit. An increase in budget deficit, trade deficit and foreign reserves by 1% causes an increase in domestic debt by about 0.15%, 0.38% and 0.18% respectively, while economic growth and investment have negatively significant effects on domestic debt. Results show that an increase in economic growth and investment by 1% leads to decreasing domestic debt by about 5.6% and 0.40% respectively. Table 5 also appears the equilibrium error correction coefficient (ECM) which is estimated about -0.85, and it is highly statistically significant at 1 percent level, with the correct sign (negative sign). The ECM (-1) measures the pace of adjustment to equilibrium after one shock. Result confirms that 85 percent of disequilibria from the previous year's shock converge back to the long-run equilibrium in the current year. Results of residual diagnostic tests such as normality, serial correlation and heteroscedasticity are reported in Table 5. Results affirmed that they performed very well. The stability test such as cumulative sum of recursive residual (CUSUM) is conducted to check the stability of the goodness of fit for ARDL model and it is reported in Figure 2. The result shows that the model is stable. R-squared result is also reported in table 5, which is a measure of fit that points how much of the independent variables could explain the variation of dependent variable in a regression model. The R-squared result reveals that 88% of the data fit the regression model.

Table 5. Error Correction Representation for the ARDL Model – Selected Based on AIC (1,1,0,1,1,1). Dependent Variable is DLDD.

Variables	Coefficients	t-ratio	P- value
DLRP	-5.625	-4.631*	0.000
DLBD	0.163	5.372*	0.000
DLTD	0.382	4.310*	0.000
DLI	-0.397	-2.890*	0.014
DLFR	0.115	2.342**	0.039
INTERCEPT	-11.377	-8.601*	0.000
ECM (-1)	-0.847	-8.627*	0.000
Cointegrating equation $LDD_t = -13.39 + 2.02LRP_t + 0.19LBD_t + 0.74LTD_t - 1.00LI_t + 0.32LFR + \varepsilon_t$ T-Ratio[Prob] -4.90* [0.00] 4.83* [0.00] 5.372* [0.00] 4.310* [0.00] -4.367* [0.00] 2.908** [0.014]			
R-square	0.880		
Adjusted R-square	0.771		
DW	2.350		
Residual Diagnostic tests for the estimated model			
Serial Correlation of Residuals F- Statistic	2.145 p-value [0.177]		
Normality J-B Value	0.345 p-value [0.841]		
Heteroscedasticity Test of Residuals	0.063 p-value [0.803]		

Note: * Significant at 1%, ** Significant at 5%.

Source: own processing.

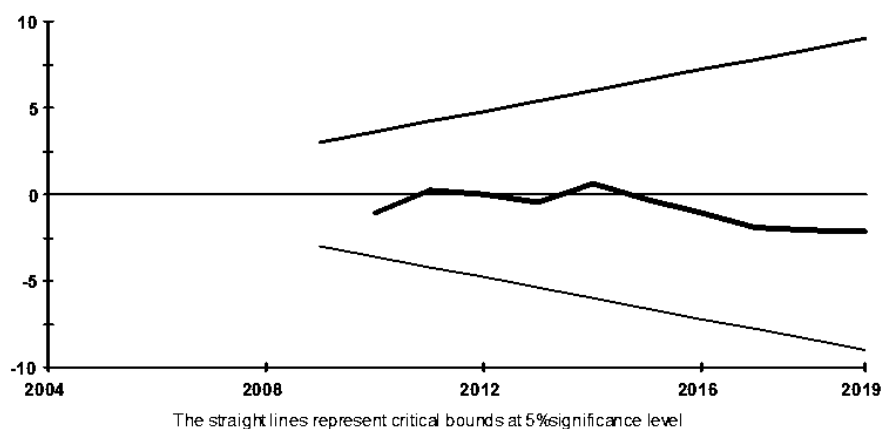The straight lines represent critical bounds at 5% significance level

Figure 2. Plot of Cumulative Sum of Recursive Residuals.

Source: own processing.

The above-mentioned analyses regarding long-run results indicated that an increase in the economic growth, budget deficit, trade deficit and foreign reserves will not result in a decrease in the demotic debt in Jordan. Rather, the increase in these variables required more domestic debt for the purpose of financing them, which means that Jordan's strength is represented in a real increase in the domestic product and a decrease in the budget deficit, and the trade balance will not contribute to reducing the domestic debt in Jordan. Short-run results came the same as long-run results. An increase in domestic debt was associated with an increase in budget and trade deficits and foreign reserves, which means that the increase in domestic debt was used to finance government expenditures as well as imports. The increase in foreign reserves in Jordan may have played a significant role in encouraging financial institutions and the private sector in increasing the government's opportunity to obtain more loans. As for the negative short-run effect of real GDP and investment on domestic debt, the results are consistent with economic logic: an increase in investment and real GDP leads to an increase in the ability of Jordan to pay off and reduce its domestic debt.

3.3 External Debt Model

This part presents an empirical analysis for equations (2 and 5).

3.3.1 Cointegration Test

Based on Akaike Information Criterion (AKC), a maximum 1 lag is chosen for the conditional ARDL model in equation (2). Equation (2) investigates the existence of long-run cointegration correlation between domestic debt, economic growth, budget deficit, trade deficit, investment, and foreign reserves. Results shown in table 6 show that the value of computed F-statistic is 2.00 less than lower bound 2.578 at 10 significant percent level. This will confirm that there is no long-run corrolation between variables included in equation 2.

Table 6. ARDL Bounds Test for the Existence of Cointegration. (LED)

F- Bounds Test	1% Critical Value		5% Critical value		10% Critical value	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F- Statistic = 2.00	4.537	6.37	3.125	4.608	2.578	3.858

Note: Calculated F-statistic (Wald test) = 2.00. The critical values are obtained from Pesaran et al. (2001), Table CI (III), p. 300, case III: unrestricted intercept and no trend with n = 30.

Source: own processing.

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3.3.2 Long- run Analysis

The coefficients estimated of the long-run relationship is presented in table 7. Results show that real GDP, budget deficit, trade deficit, investment and foreign reserves do not have any significant impact on external debt.

Table 7. The Long-Run Relationship Estimated Coefficients of ARDL Model, Based on AIC (1,0,1,0,0,0). Dependent variable is LED

Variable	Coefficients	t-ratio	P- value
LRP	5.7293	1.1916	.253
LBD	-2.9156	-.63886	.533
LTD	-2.3547	-.52960	.605
LI	8.0361	-.66124	.519
LFR	-3.7833	-.66124	.519
INTERCEPT	-43.4083	-.92226	.372

Source: own processing.

3.3.3 Short-run Analysis

The short-run dynamic findings of the impact of economic growth, budget deficit, trade deficit, investment and foreign reserves on external debt are reported in table 8. Results show that budget deficit and foreign reserves have a positively significant short-run impacts on external debt. Budget deficit effect on external debt is significant at 5 percent level, but foreign reserves effect is significant at 10 percent level, which is somehow weak. An increase in budget deficit by 1% leads to increase in external debt by about 0.23 %, while an increase in foreign reserves by 1% leads to increase in external debt by about 0.43%. Regarding the impact of investment, results show that effect is negative, and it is statistically significant at 5 percent level. An increase in investment by 1% leads to a decrease in external debt by 0.90%. As for the short-run impact of economic growth and trade deficit on external debt, results confirm that there are no significant impacts.   Table 8 also reports the equilibrium error correction coefficient (ECM). The result shows the sign of the coefficient is positive instead of negative and statistically insignificant. Diagnostic tests for the residual of the regression model specification such as normality, serial correlation and heteroscedasticity are also reported in Table 8. All diagnostic Tests results for the residuals are performed very well. The cumulative sum of recursive residual (CUSUM) to check for the stability of ARDL model is shown in Figure 3. The result indicates that the model is stable. The R-squared result reveals that 79% of the data fit the regression model.

Table 8. Error Correction Representation for the ARDL Model – Selected Based on AIC (1, 0,1, 0,0,0). Dependent Variable is DLED

Variable	Coefficients	t-ratio	P- value
DLRP	-0.643	-0.583	0.568
DLBD	0.229	2.212**	0.047
DLTD	0.264	1.226	0.239
DLI	-0.902	-2.602**	0.020
DLFR	0.425	1.852***	0.088
ECM (-1)	0.112	0.529	0.605
R-square	0.787		
Adjusted R-square	0.766		
DW	2.191		
Residual Diagnostic tests for the estimated model			
Serial Correlation of Residuals F- Statistic	0.438 p-value [0.519]		

| Normality J-B Value | 1.265 p-value [0.255] | | |
| Heteroscedasticity Test of Residuals | 0.238 p-value [0.631] | | |

Note: ** Significant at 5%, *** Significant at 10%.
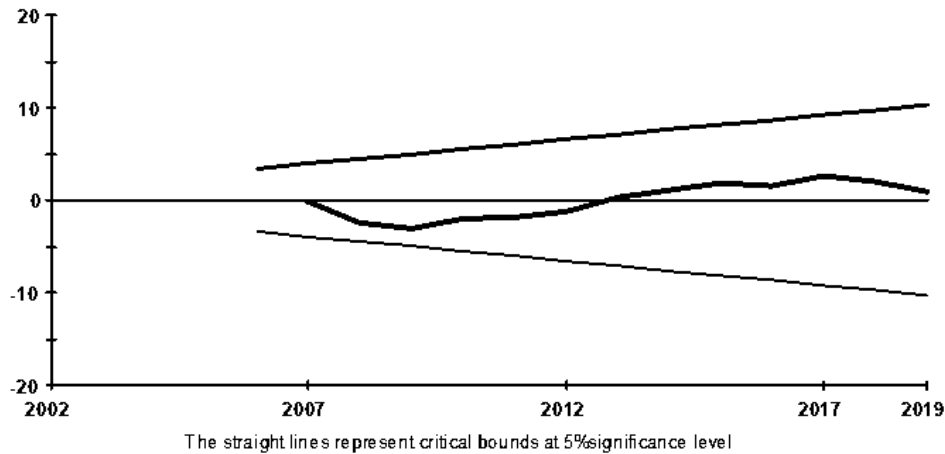
Source: own processing.

Figure 3. Plot of Cumulative Sum of Recursive Residuals.

Source: own processing.

The above-mentioned analyses regarding the impacts of independent economic variables included in this study on external debt in the long– and short– run show: first regarding long–run impacts, results indicated that there are no significant effects of all independent economic variables included in the model on external dept. Second, regarding short– run impacts, results indicate that the economic growth did not play any significant role in reducing external debt; trade deficit does not have any impact on external debt; budget deficit and foreign reserves have significant impact on increasing external debt, which means that Jordan's government used increased external debt to finance government expenditures. The increase in foreign reserves in Jordan may have played a significant role in encouraging international financial institutions in increasing the government's opportunity to obtain more loans. Results also indicated that investment is the only variable with a major role in reducing external debt.

3.4 Total Debt Model

This part discusses empirical analysis for equations (3 and 6).

3.4.1 Cointegration Test

Based on Akaike Information Criterion (AKC), a maximum 1 lag is chosen for the conditional ARDL model in equation (3). Equation (3) investigates the existence of long-run cointegration relation between total debt, economic growth, budget deficit, trade deficit, investment and foreign reserves. Results reported in Table 9 show that the value of calculated F-statistic is 14.62, which considers greater than the upper bound 6.37 at 1 significant percent level. This result affirms that there is long-run relationship among variables included in equation 3.

Table 9. ARDL Bounds Test for the Existence of Cointegration. (LTOD)

F- Bounds Test	1% Critical Value		5% Critical value		10% Critical value	
F- Statistic =	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
14.620	4.59	6.368	3.276	4.63	2.752	3.994

Note: Calculated F-statistic (Wald test) = 14.620. The critical values are obtained from Pesaran et al. (2001), Table CI (III), p. 300, case III: unrestricted intercept and no trend with n = 50.

Source: own processing.

3.4.2 Long- run Analysis

The long-run relationship estimated coefficients for equation 3 is reported in Table 10. Findings appear that real GDP and trade deficit do not have any long-run effect on total debt, while budget deficit and foreign reserves have significant positive effects on total debt. Results show that an increase in budget deficit by 1% increases total debt by 1.81%. Regarding GDP and trade deficit, results show no long-run effects on total debt. Investment effect on total debt was the most significant variable. The results show that there is a negative significant long-run impact of investment on total debt. The coefficient indicates that an increase in investment by 1% decreases total debt by about 4.55 %. Results for foreign reserves show positive impact on total debt, but they are significant at 10% level.

Table 10. The Long-Run Relationship Estimated Coefficients of ARDL Model, based on AIC (1,0,1,0,1,1). Dependent variable is LTOD

Variable	Coefficients	t-ratio	P- value
LRP	2.142	1.324	0.210
LBD	1.808	2.434**	0.032
LTD	0.501	1.121	0.284
LI	-4.547	-2.818**	0.016
LFR	1.422	1.818***	0.094
INTERCEPT	-2.131	-0.182	0.859

Note ** Significant at 5%, *** Significant at 10%.

Source: own processing.

3.4.3 Short-run Analysis

The short-run dynamic analysis results came the same as long-run results for all variables (economic growth, budget deficit, trade deficit, investment, and foreign reserves). Table 11 reports these short-run results. As for economic growth and trade deficit, results show that there is no significant impact of both variables on total debt. Results show that budget deficit and foreign reserves have positive and significant short-run effects on total debt deficit. Budget deficit impact on external debt is significant at 5 percent level, but foreign reserves effect is significant at 10 percent level, which is somehow weak. An increase in budget deficit by 1% causes to an increase in external debt by about 0.11 %, while an increase in foreign reserves by 1% causes to an increase in external debt by about 0.06%. Concerning the effect of investment on total debt, results show that the impact is negative, and it is statistically significant at 5 percent level. An increase in investment by 1% leads to a decrease in external debt by 0.31%. For the short-run effect of economic growth and trade deficit on external debt, results show that there are no significant effects. Table 11 also reports the equilibrium error correction coefficient (ECM). The result shows the sign of the coefficient is negative and statistically significant at 5% level. Diagnostic tests for the residual of the regression model specification such as normality, serial correlation and heteroscedasticity are also reported in Table 11. All diagnostic Tests results for the residuals are performed very well. The cumulative sum of recursive residual (CUSUM) to check for the stability of ARDL model is shown in Figure 4. The result indicates that the model is stable. The R-squared result reveals that 90% of the data fit the regression model.

Table 11. Error Correction Representation for the ARDL Model – Selected Based on AIC (1,0, 1,0, 1,1). Dependent Variable is DLTOD.

Variable	Coefficients	t-ratio	P- value
DLRP	0.222	1.001	0.333
DLBD	0.115	5.100*	0.000
DLTD	0.052	1.164	0.262
DLI	-0.314	-3.580*	0.003
DLFR	0.058	2.035**	0.050
ECM (-1)	-0.103	-2.734**	0.015
Cointegrating equation $LTOD_t$ = -2.31+ 2.14LRP_t + 1.80LBD_t +0.50TD_t - 4.54LI_t +1.42LFR+ ε_t T-Ratio[Prob] -0.18[0.86] 1.32[0.21] 2.43**[0.03] 1.12[0.28]-2.81**[0.01] 1.82***[0.94]			
R-square	0.899		
Adjusted R-square	0.823		
DW	2.55		
Residual Diagnostic tests for the estimated model			
Serial Correlation of Residuals- F- Statistic	1.748 p-value [0.213]		
Normality J-B Value	0.821 p-value [.663]		
Heteroscedasticity Test of Residuals	0.578 p-value [.456]		

Note: * Significant at 1%, ** Significant at 5%.

Source: own processing.

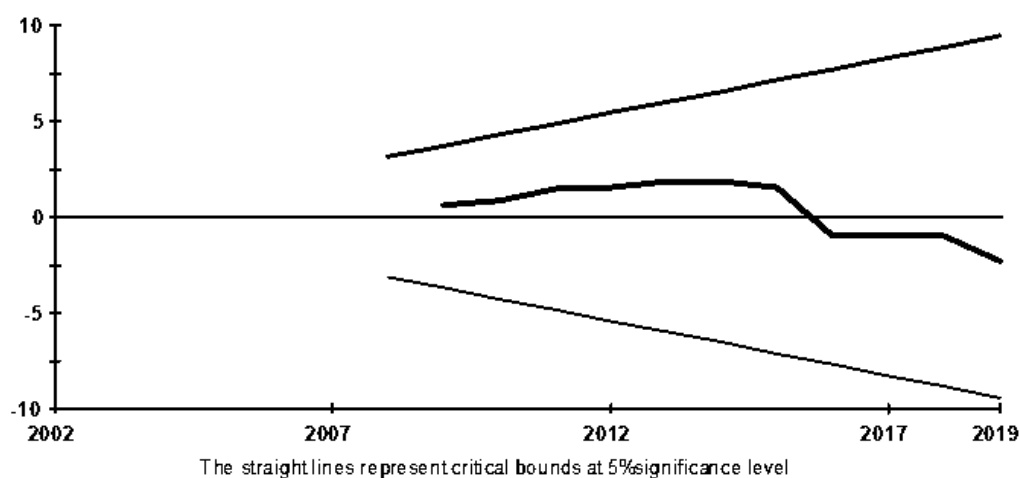The straight lines represent critical bounds at 5% significance level

Figure 4. Plot of Cumulative Sum of Recursive Residuals.

Source: own processing.

The analyses mentioned above based on the impact of independent economic variables involved in this study on total debt (in the long and short run) appears that: the growth of the economy did not play any role in reducing total debt; trade deficit does not have any role in increasing or decreasing total debt; budget deficit and foreign reserves played major role in increasing total debt for the reasons mentioned early; and investment was the main factor in reducing total public debt.

CONCLUSIONS

The major goal of this study is to determine the extent of Jordan's ability to pay off its debts by using ARDL model during the 1997-2019. The findings of all regression's analyses are as follows:

- Lon-run relationships clear in all analysis except in section 4.2 which is relevant to the log-run relationship between all independent variables involved in this study and dependent variable (external debt).
- The most significant variable that appears to have a significant long – and short – run positive impact on domestic, external and total debt is the budget deficit. This means budget deficit causes more debt, except the long-run relationship in the model of section 4.2 since the result does not show any significant long-run relationship between all independent variables (GDP, budget deficit, trade deficit, investment and foreign reserve) and dependent variable (external debt).
- The most significant variable which appears to have a significant long – and short – run negative impact on debt (domestic, external and total debt) is investment. This means that an increase in investment causes domestic, external and total debt to fall, except long-run relationship in section 4.2 since the result does not show any significant long-run relationship in the analyses.
- Trade deficit has a significant positive long- and short – run impact on domestic debt only. This means that an increase in trade deficit leads to an increase in domestic debt.
- Economic growth has a significant positive long-run effect on external debt and total debt. Also, it has a significant positive short-run impact on total debt only. But regarding results found in domestic debt model, economic growth has a significant negative short-run impact on domestic debt.
- Foreign reserve has a significant positive long-run effect on domestic and total debt, and it has a significant positive short-run effect on domestic, external, and total debt. This means that an increase in foreign reserve causes an increase in debt.
- All Diagnostic tests for the residual and stability in all models were checked, results confirm that the models are stable and performed well.
- In general, domestic investment is the only variable that participates in reducing debt. On the other side, foreign reserve, trade, and budget deficits participate in increasing debt. Economic growth does not play any role in reducing the eternal debt in the long-run, but it does reduce domestic debt in the short-run.

RECOMMENDATIONS

Based on the findings of this study, we suggest some recommendations that we believe will help in reducing debt in Jordan:

- Emphasis on increasing domestic investment in Jordan due to its positive impact in reducing debts. This could be done by adopting a strategy to make the savings growth rate grow at a pace commensurate with the required increase in investment.
- The necessity of adopting a government plan to reduce the percentage of debts to the domestic product over time. This could be done by the use of public debt to increase investment and achieve higher economic growth.
- Developing a strategy to stimulate and increase the growth rate of national exports at a rate more than the growth rates of imports in order to reduce the trade balance deficit and thus reduce debts.
- The need for the government to reduce the budget deficit in order to decrease debts. This could be done by putting pressure on non-productive expenditures.
- Allocating an annual margin from foreign reserves to pay off the debt burdens, which could be sufficient to reduce the debt over time without affecting the domestic liquidity of money.

Future experimental studies may focus on the impact of the institutional and structural factors on public debt in Jordan.

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