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Debt-Growth Nexus in Jordan: New Evidence Using Dynamic Threshold Analysis

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ABSTRACT

This paper examines the government debt and economic growth nexus in Jordan from 1990 to 2017 by estimating the debt-growth threshold, using the time series dynamic threshold estimation technique. The empirical results reveal that a threshold effect exists in the gross government debt and economic growth relationship. More precisely, the findings demonstrate that the explanatory variables respond differently under the upper and lower regimes to attain economic growth in Jordan, indicating that the relationship between gross government debt and economic growth is contingent on the debt-to-GDP ratio. Importantly, policymakers should reduce the debt-to-GDP ratio through efficient allocation of financial sources by reducing government-funded programs to attain a higher growth rate and curb the effects of shocks such as the financial crisis.

ملخص

يبحث هذا المقال في العلاقة بين الديْن الحكومي والنمو الاقتصادي في الأردن في الفترة ما بين عامي 1990 و 2017 من خلال تقدير عتبة نمو الديْن، باستخدام تقنية التنبؤ بالعتبات الديناميكية للسلاسل الزمنية. وتكشف النتائج التجريبية عن وجود تأثير عتبة معينة في العلاقة بين إجمالي الديْن الحكومي والنمو الاقتصادي. وبتعبير أدق، توضح النتائج أن المتغيرات التفسيرية تستجيب بشكل مختلف في ظل النظامين الأعلى والأدنى لتحقيق النمو الاقتصادي في الأردن، مما يشير إلى أن العلاقة بين إجمالي الديْن الحكومي والنمو الاقتصادي تتوقف على نسبة الديْن إلى الناتج المحلي

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الإجمالي. والأهم من ذلك، يجب على صناع السياسات خفض نسبة الدين إلى الناتج المحلي الإجمالي من خلال التخصيص الفعال للمصادر المالية عن طريق تقليل البرامج التي تمولها الحكومة لتحقيق معدل نمو أعلى والحد من آثار الصدمات مثل الأزمة المالية. الكلمات الدلالية: الدين الحكومي؛ النمو الاقتصادي؛ تأثيرات العتبة؛ الأردن.

Cet article examine le lien entre la dette publique et la croissance économique en Jordanie de 1990 à 2017 en estimant le seuil de croissance de la dette, en utilisant la technique d'estimation du seuil dynamique des séries chronologiques. Les résultats empiriques révèlent qu'il existe un effet de seuil dans la relation entre la dette publique brute et la croissance économique. Plus précisément, les résultats montrent que les variables explicatives réagissent différemment sous les régimes supérieur et inférieur pour atteindre la croissance économique en Jordanie, ce qui indique que la relation entre la dette publique brute et la croissance économique dépend du ratio de la dette au PIB. Il est important que les décideurs politiques réduisent le ratio de la dette au PIB par une allocation efficace des sources financières en réduisant les programmes financés par le gouvernement pour atteindre un taux de croissance plus élevé et freiner les effets de chocs tels que la crise financière.

Keywords: Government Debt; Economic Growth; Threshold Effects; Jordan.

JEL Classification: E62; H63; N15; C24

1. Introduction

Government debt accumulation is considered one of the most critical economic issues in Jordan. The long-term effects of government debt accumulation on economic growth have started to impose even greater pressure on Jordan policymakers to sustain economic growth and curb the chronic budget deficit's adverse effects on economic growth. Budget deficits have considered an essential issue in government finance choices when taking the level of economic growth into account (Raji et al., 2014). After the last financial crisis, many countries directed substantial attention toward their governments' debt, which led to an increased number of studies conducted to estimate the relationship

between government debt and economic growth (Tuffour, 2012; Zouhaier and Fatma, 2014; Al-Zeaud, 2014; Akram, 2015; Spilioti and Vamvoukas, 2015; Fincke and Greiner 2015; Muye et al., 2017; Elghouty 2018; Al-Tamimi and Jaradat 2019; Chkiriba and Oumansour 2019).

Theoretically, a shortage of collectible government revenue or government spending expansion requires the government to borrow from different sources to finance budget deficits. However, the adverse effects of budget deficits may weaken development strategies because of limited financial sources. Consequently, such circumstances may deter the overall economic growth of a country. However, policymakers are obligated to counteract these negative effects by expanding the country's infrastructure by building sanitation facilities, roads, hospitals, schools, and other items with modest collectible government revenues. An easy strategy to finance these expansion projects is borrowing from internal and external resources such as the World Bank (WB) and the International Money Fund (IMF). However, borrowing from either of these sources negatively affects economic growth as external debt has a currency risk because it tends to cause an appreciation of the exchange rate. On the other hand, internal debt has an interest rate risk. As the ability of any country to borrow is growing over time, especially countries categorized as low-income countries and those with a low level of debt, government debt may potentially encumber the long-term budget balance. Therefore, evaluating government debt accumulation and economic growth nexus is essential to establish an effective policy.

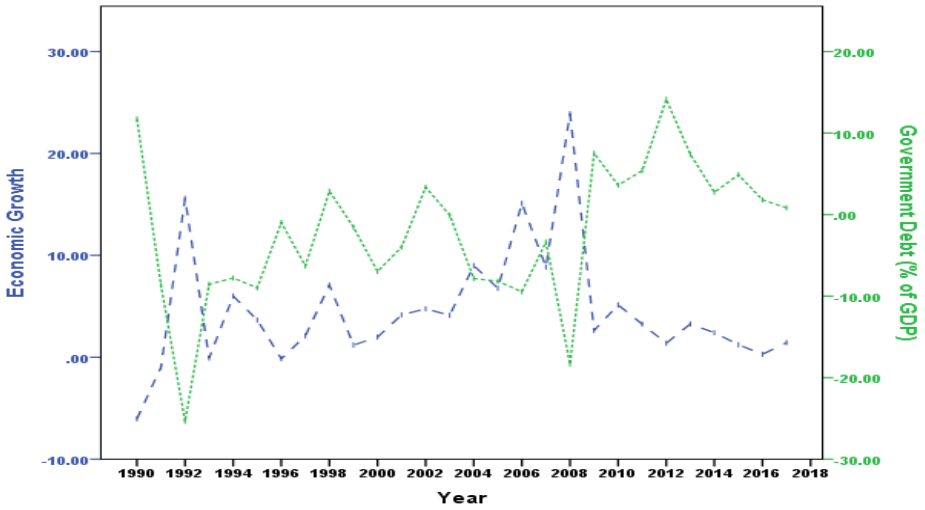
As a small open economy, Jordan began reforming its financial sector in the late 1980s with the aid of the structural adjustment programs (SAPs) adopted in Jordan under the IMF and the WB support. The main goal of SAPs is to promote long-term economic growth in developing economies by controlling borrowing based on a country's budget imbalances in both the short- and medium-term. Such reforms boosted economic growth in Jordan throughout the 1990s. Nonetheless, Jordan's economic growth rate has underperformed and fluctuated compared to those in other developing countries. The global financial crisis in 2007-2008 significantly affected Jordan because of the country's high interdependence with the U.S. in terms of financial assistance, which put

pressure on the Jordanian economy due to the loss of financial aid[5]. As a developing country, Jordan's debt-to-gross domestic product (GDP) ratio is high and concerning compared to those in other developing countries such as Morocco and Tunisia**.** Over the last decades, the average debt-to-GDP ratio has been approximately 79.01% in Jordan, 23% higher than that in Morocco and 30% higher than that in Tunisia. A widespread view among researchers studying debt accumulation effects on economic growth in Jordan is that broad government interventions, the low quality of fiscal policies adopted by the government, such as expansion of government spending compared to that in other developing countries, and limited natural resources are the main reasons for government debt accumulation in Jordan.

Jordan has experienced vast development of its infrastructure, including roads, schools, hospitals, and sanitation facilities, which has been linked to expansion of government spending. Consequently, government spending expansion has resulted in debt accumulation. Figure 1 shows the overall picture in Jordan: a non-linear relationship between economic growth and government debt. The government debt has reached approximately 103.7% of the GDP on average over the last three decades. Throughout 1990-1999, the trend for gross government debt as a percentage of the GDP fluctuated, with no clear pattern or responsiveness to economic growth changes. During the financial crisis, government debt growth decreased by approximately 18% of the GDP on average, which resulted in a sharp increase in the GDP per capita growth rate to approximately 23%. Interestingly, a decrease in debt accumulation sometimes leads to economic growth acceleration, as observed between 1992 and 2006. Overall, the relationship between gross government debt and economic growth is non-linear. Reinhart and Rogoff (2010) indicated that both developed and developing countries are highly concerned with their levels of debt and suggested that government debt as a percentage of the GDP should not exceed 60% in developing countries aiming to achieve greater economic growth; exceeding this threshold will increase the financial burden on these countries because of debt repayment requirements, which tend to slow economic growth.

[5] In 1961, congress passed the Foreign Assistance Act, reorganizing U.S. foreign assistance programs and separating military and non-military aid. Egypt, Jordan, Iraq, Israel and Lebanon are among the recipient countries in MENA.

Figure 1: The Trend of the Government Debt and Economic Growth in Jordan (Annual Growth).



Source: World Development Indicators (WDI) database.

These data regarding gross government debt and economic growth raise concerns about the debt-to-GDP threshold, sustaining economic growth in Jordan. It is also relevant to ask, what is the optimum level of government debt that can maintain economic growth in Jordan over the period from 1990 to 2017? Thus, this paper aimed to address this issue. Given this backdrop, this paper contributes to the existing literature in two aspects. First, in terms of the policy, this paper can directly help fiscal policymakers in Jordan. Overall, no fixed threshold exists for the debt-to-GDP ratio in Jordan, dependent on the budget balance. Jordan is vulnerable to many crucial economic shocks. Therefore, identifying the debt-to-GDP threshold level can minimize the adverse effects of over-borrowing in Jordan by providing signals for policymakers to manage debt accumulation. Second, the present paper is novel because it adopts the regression model proposed by Hansen (2000) to capture the dynamics between the debt-to-GDP threshold and economic growth and determine a reliable optimum debt-to-GDP threshold. The optimum gross government debt-to-GDP level for Jordan has not previously been addressed to the best of our knowledge. Moreover, this paper also provides insight into other explanatory variables and investigates their impact on economic growth in Jordan.

This paper is prepared as follows. Sections 2 reviews the literature on government debt and economic growth relationship. Section 3 discusses the methodology and describes the data. Section 4 is devoted to discussing the empirical results. Finally, the last section presents a summary of the findings and conclusions.

2. Literature Review

New classical economists argue that budget deficits require a government to borrow from internal and external resources to finance the deficits. Accordingly, external debt will deter economic growth by crowding out the investment sector. On the other hand, Keynes argues that fiscal policy is responsible for growth in any economy, where foreign assistance or investment tends to boost growth. Finally, the Ricardian equivalence hypothesis indicates that government debt has no real effect on economic growth because when a government borrows money, it must repay the borrowed funds in the future by raising taxes above the normal level; thus, the impact of debt accumulation on growth will be neutralized (Ricardo, 1817).

Several empirical macroeconomic studies have provided inconsistent or even contradictory results regarding the relationship between government debt and economic growth in developed and developing countries. However, most of the recent macroeconomic studies on the government debt and economic growth nexus have confirmed that both variables are linked non-linearly, where the effect of government debt on economic growth may differ up to a certain level of debt (See Pattillo et al., 2003; Kumar and Woo, 2010 and Cordella et al., 2010). Thus, a level of secured debt that can engender higher economic growth should exist. Therefore, if a country borrows without any limit, then economic growth will decline as the debt exceeds the certain limit known as the Laffer curve, as shown in Figure 2.

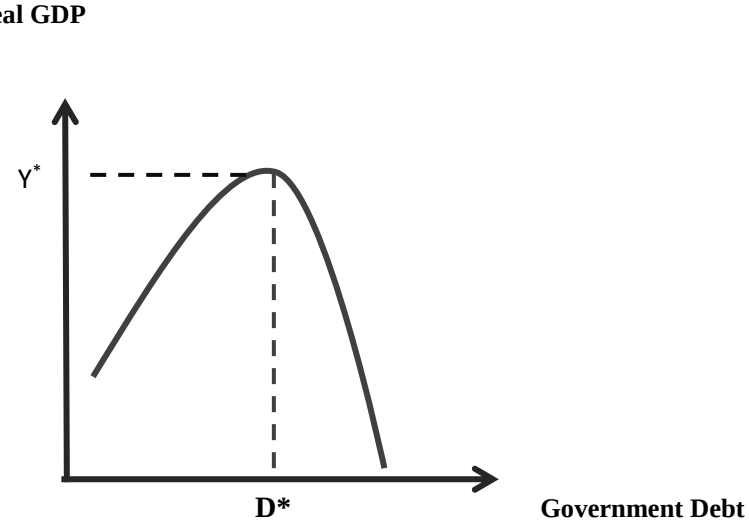


Figure 2: Laffer curve.

As shown in Figure 2, government debt (D) will increase growth (Y) to a certain point at which the economic growth score is maximal (Y*). Therefore, at the top economic growth curve, government debt's marginal productivity is equal to private-sector debt's marginal productivity. The economic contribution of increased government debt will be equal to zero. After the top point (D*), the effect of the law of diminishing returns will lead to a situation in which increasing government debt accumulation any further will slow down the economic growth rate. Consequently, reducing debt accumulation will be critical to attaining a higher rate of economic growth.

Many studies have examined the relationship between government debt and economic growth. For example, Mousa and Shawawreh (2017) examined the relationship between gross government debt and Jordan's economic growth from 2000 to 2015. The scholars used the least squares method in their analysis and found that government debt harms Jordan's economic growth, especially external debt. Similarly, Al-Tamimi and Jaradat (2019) maintained that external debt was negatively linked to Jordan's economic growth. Moreover, Abu-Karaki et al. (2016) examined the effect of domestic debt on economic growth from 2000 to 2014 in Jordan using the ordinary least square (OLS) technique. They contended that Jordan's economic growth arose from domestic debt stock, and that domestic debt servicing has a real negative effect on economic growth.

In Egypt, Elmahdy and Torayeh (2009) evaluated the government debt and economic growth relationship throughout 1981-2006 using the Error Correction Model (ECM). They hold that government debt tends to decrease economic growth. Likewise, Chkiriba and Oumansour (2019) examined the effect of external debt on Morocco's economic growth from 1988 to 2016 using auto regressive distributed lags (ARDL). The scholars defended that external debt has a strong negative association with economic growth. For Nigeria, Egbetunde (2012) used a vector autoregressive (VAR) to examine the causal relationship between government debt and economic growth from 1970 to 2010. The estimated results revealed a bi-directional causality relationship between government debt and economic growth. Furthermore, Spilioti and Vamvoukas (2015) examined the relationship between government debt and per capita growth over the Greek economy's 1970-2009 period. The results concluded that there is a statistically significant positive correlation between government debt and economic growth.

Another study by Nantwi and Erickson (2016) used Johansen cointegration and the vector error correction model (VECM) to empirically evaluate the causal relationship between government debt and economic growth in Ghana from 1970 to 2012. The results revealed a positive and statistically significant long-term nexus between government debt and economic growth. Additionally, a bidirectional Granger causality relationship was found between government debt and economic growth in the short-term. In Saudi Arabia, Muye et al. (2017) evaluated the effect of government debt on economic growth from 1969 to 2013 using the ARDL approach. The findings revealed that economic growth arises from government debt. Bal and Rath (2014) examined the effect of government debt on economic growth in India from 1980 to 2011 using the ARDL approach and emphasized that government debt has a significant negative impact on economic growth in India. Furthermore, in the study of five major South Asian economies, Shastri and Mohapatra (2018) used panel ARDL estimator to confirm that there is a positive long-run relationship between fiscal balances to the increasing public debt ratio, which indicate that public debt is an important variable in affecting economic growth of these economies.

Interestingly, some studied have examined the threshold value of the debt-to-GDP ratio, which can maintain economic growth, rather than investigating the effect of government debt on economic growth. For

example, Maghyereh et al. (2002) estimated the external debt and economic growth relationship in Jordan from 1970 to 2000 using the OLS method. The results revealed that the external debt-to-GDP ratio was 53%, and above this value, external debt would negatively affect economic growth. Moreover, Tuffour (2012) evaluated the external debt and economic growth relationship in Ghana from 1970 to 2009 using the least square (LS) method. The results showed that the external debt-to-GDP threshold was 46.2%, which could maintain economic growth, and that exceeding this threshold would deter economic growth. Nasa (2009) examined the threshold value for debt that could maintain growth in 56 countries of heavily indebted countries with low to medium income from 1970 to 2000 by utilizing the Hansen threshold model. The findings revealed that the debt-to-GDP threshold value that could maintain economic growth was 45%, and that exceeding this threshold value would slow economic growth.

Similarly, Kumar and Woo (2010) evaluated the relationship between government debt and economic growth in 38 developed and developing countries from 1970 to 2007. Empirical results from the analysis indicated an inverse relationship between initial debt levels and subsequent growth. The results emphasized that a 10% increase in the debt-to-GDP ratio would reduce the real per capita GDP by 0.2%. Moreover, Reinhart and Rogoff (2010) estimated the relationship between government debt and economic growth in 44 developed and developing countries using data from approximately 2 centuries. The scholars specified that exceeding a 90% debt-to-GDP ratio could dampen economic growth in advanced and emerging market economies. In comparison, a debt-to-GDP ratio of 60% was required for developing countries. Cordella et al. (2010) showed that debt overhang occurs when the current net value of debt exceeds 20% to 25% of the GDP in countries with good policies and institutions. On the other hand, government debt has only a marginal effect on economic growth at approximately 70% to 80% of the GDP. Besides, overhang and irrelevance thresholds level of debt-to- GDP ratio were lower (10% to 15% and 15% to 35%, respectively) for countries with low-quality policies and institutions.

For the Nigerian economy, Ezezbalisi et al. (2011) found a negative relationship between external debt and economic growth. The results emphasized that a 1% increase in external debt stock tends to slow

economic growth by 0.027% of the GDP. Herndon and Pollin (2013) reexamined the results of Reinhart and Rogoff (2010) and concluded that coding errors, selective exclusion of available data, and unconventional weighting of summary statistics led to errors that inaccurately represented the relationship between government debt and GDP growth among 20 advanced economies. The authors showed that the average real GDP growth rate for countries carrying a government debt-to-GDP ratio greater than 90% was actually 2.2% rather than 0.1% as reported by Reinhart and Rogoff, indicating that the average GDP growth with a government debt-to-GDP threshold above 90% is not significantly different from that with a lower government debt-to-GDP threshold. Moreover, Wright and Grenade (2014) revealed a non-linear relationship between debt and growth using a panel OLS method and threshold dynamics in 13 Caribbean countries. The results indicated that the debt-to-GDP threshold was 61%. Furthermore, economic growth reacts negatively when the debt-to-GDP threshold is exceeded.

Based on the above backdrop, there is no fixed debt-to-GDP threshold for the developing countries. Therefore, to avoid conjecture, it is necessary to estimate the debt-to-GDP threshold value for Jordan, because it has different income levels and the development stage.

3. Data and Methodology

3.1 Model Specification

To empirically estimate the gross government debt and economic growth nexus, this paper follows Clements et al. (2003), Cordella et al. (2005), and Caner et al. (2010). The empirical economic growth model is expressed as in the following regression:

$$rgdpc_t = \delta rgdpc_{t-1} + \beta_1 Capital_t + \beta_2 GEX_t + \beta_3 Open_t + \beta_4 Debt_t + \beta_4 Inf_t + e_t \quad (1)$$

where $rgdpc_t$ is the real GDP per capita used to measure economic growth, the control variables are capital ($Capital_t$) is the physical capital,, government expenditure (GEX_t) reflects a government policy, trade openness ($Open_t$) measures the economic independence, Debt ($Debt_t$) is government debt serves as a control variable in estimating the effect of government debt on economic growth as in Mankiw et al. (1992), and inflation rate (Inf_t) is a proxy for macroeconomic stability.

Finally, $rgdpc_{t-1}$ is included as a control variable to capture the dynamic effects of the model with one lag.

3.2 Data and Variable Descriptions

This paper utilizes time-series data reflecting annual frequencies from 1990 to 2017. The real gross domestic product per capita is expressed in U.S. dollars as a measurement for economic growth. Meanwhile, for explanatory variables, total investment as a percentage of GDP is used as a proxy for physical capital (*K*), government expenditure (*GEX*) is the total government expenditure as a percentage of GDP, government Debt (*Debt*) is the total debt as a percentage of the GDP, trade openness (*Open*) is the sum of exports plus imports as a percentage of the GDP, and inflation rate (*Inf*) is the annual percentages of average consumer prices. All variables are transformed into natural logarithms to reduce variations in the variables except inflation rate variable. All the data were obtained from the World Development Indicators (WDI) database.

3.3 Methodology Selection

The threshold model is considered an essential model for estimating many economic issues, and more recently, the threshold model has been exceedingly utilized in many macroeconomic studies (Lee and Wang, 2015). Consequently, to estimate the non-linear behavior of the debt-to-GDP ratio in its relationship with economic growth, this paper employs the threshold regression approach suggested by Hansen (2000). The model in Equation (1) can be written based on threshold regression as follows:

$$rgdpc_t = \mu_i + \beta_1 X_t\, I(Debt_t \leq \lambda) + \beta_2 X_t\, I(Debt_t \geq \lambda) + e_t \qquad (2)$$

where $rgdpc_t$ is the log of the real gross domestic product per capita as a proxy for economic growth, $X_{,t}$ is a vector of the control variables (physical capital, government expenditure, trade openness and inflation rate), $Debt_t$ is a threshold variable that divides the sample into upper and lower regimes, λ is an unknown threshold parameter, I(.) is an indicator function that takes a value of 1 if the argument in the indicator function is valid and 0 otherwise, μ_i is the individual effect, and e_t represents disturbance. Equation (2) can be rewritten as two equations, where the

first equation describes the lower regime threshold and the second equation represents the upper regime threshold:

$$rgdpc_t = \mu_i + \beta_1 X_t\, I(Debt_t \leq \lambda) \quad (3)$$

$$rgdpc_t = \mu_i + \beta_2 X_t\, I(Debt_t \geq \lambda) \quad (4)$$

This methodology enables examining differentiating effects of government debt on economic growth in lower and upper regimes depending on whether the threshold variable is smaller or greater than the threshold value γ. Coefficients β_1 and β_2 indicate the considered effects in lower and higher regimes, respectively. To carry out the dynamic threshold regression, we have to test the linearity's null hypothesis against the threshold model in Equation (1), where the null hypothesis is H_0: b_1=b_2. According to Hansen (1996) and (2000), there is a problem executing the LM and Wald test statistics under the null hypothesis because of the λ parameter is not specified. Meanwhile, inferences were implemented by calculating a LM or Wald statistic for each potential value of λ. Thereafter, the inferences depend on the least upper bound of the Wald or LM for all potential λs (Law et al., 2013). As a consequence, the inferences were conducted via a model depending on bootstrapping whose validity and properties were developed by Hansen (1996) because the tabulations were not possible. Once the value of λ was obtained, the slope parameters $\hat{\beta}(\hat{\lambda})$ and $\hat{\gamma}(\hat{\lambda})$ could also obtained.

4. Empirical Results

As shown in Table 1, the descriptive statistics for each variable utilized in the model. It quite clear that the time series is free from any extreme values, which may affect the significance of the estimated results via examining the mean, standard deviation, minimum, and maximum of each variable of the sample. Table 2 shows the correlation matrix of the variables utilized in the estimation, respectively.

Table 1: Descriptive and Summary Statistics for Jordan, 1990-2017

Variables	Measurement	Mean	Std. Dev.	Minimum	Maximum
GDP per capita	US$ dollar	3083.54	433.52	2364.03	3764.78
Investment	% of GDP	26.059	5.239	19.243	36.632
G.Expenditure	% of GDP	22.062	0.607	21.141	23.024
Government debt	% of GDP	108.092	36.398	60.244	219.734
Trade openness	% of GDP	122.760	15.494	90.913	149.453
Inflation rate	%	4.499	4.575	-0.407	21.094

Table 2: Correlations between Variables for Jordan, 1990-2017

	GDP per capita	Capital	EXP	Debt	Open-ness	INF
GDP per capita	1.000					
Capital	-0.1987	1.000				
EXP	-0.5934	0.6394	1.000			
Debt	-0.8171	0.2808	0.6510	1.000		
Openness	0.0315	0.7273	0.5954	0.2947	1.000	
INF	0.2979	0.2617	0.0103	-0.0271	0.5223	1.0000

Note: GDP per capita = economic growth, Capital = gross investment, EXP= gross government expenditure as a % of the GDP, Debt= gross government debt as a % of the GDP, Openness= the terms of trade as a % of the GDP and INF= annual percentages of average consumer prices.

Table 3 shows the results from using Equation (2) for dynamic threshold estimation. The statistical significance of the threshold estimate was evaluated by the p-value calculated utilizing the bootstrap method with 1000 replications and a 15% trimming percentage. As shown in Table 3, the bootstrap p-values indicate that the test of no threshold effect can be rejected. Consequently, the time series is split into two regimes. The point estimate of the value of the debt-to-GDP threshold is 4.602 or 99.86%, with a corresponding 95% confidence interval of [4.601, 4.669] for the model, which is considered greater higher than the debt-to-GDP thresholds computed by Reinhart and Rogoff (2010) and Caner et al. (2010) for developing countries.

Table 3: Threshold Estimations of the Debt-to-GDP Ratio, 1990-2017

Threshold Estimates of Debt-to-GDP Values Government Debt as a percentage of the GDP = $\mathbf{Log}Debt_t$ Economic Growth = $Logrgdpc_t$	
LM Test For No Threshold	14.544
Bootstrap P-value	0.026
Threshold Estimate	4.602
95% Confidence Interval	[4.601601,4.669516]

As reported in Table 4, the empirical results of dynamic threshold estimation demonstrate the debt-to-GDP ratio's effect under the lower and upper regimes. Overall, the coefficient estimates of the explanatory variables are significant and positive for promoting growth below the threshold value. In contrast, when exceeding the debt-to-GDP ratio's threshold value, the effects of the explanatory variables on growth become insignificant and negative. The above findings demonstrate that economic growth reacts differently to explanatory variables for different debt-to-GDP threshold values.

First and foremost, government debt has a significant positive effect on economic growth below the debt-to-GDP threshold value. In contrast, when exceeding the debt-to-GDP threshold value, the impact of government debt on economic growth diminishes to be negatively significant. This finding agrees with the Laffer curve, where government debt has a positive effect on economic growth up to a certain secure level. Therefore, the over-borrowing tends to enlarge the effects of higher long-term debt service and repayment on economic growth.

Table 4: Regression Results using Government Debt (Debt) as a Threshold Variable. Dependent Variable: Economic Growth.

	Linear Model	Threshold Model Government Debt = Debt	
	OLS Without Threshold	Regime 1 Debt $\leq$ 4.602	Regime 2 Debt > 4.602
Constant	1.2938***	-0.0390	8.6357***
	(0.3434)	(0.2905)	(1.2026)
Investment	0.0067	0.1239***	-0.1065
	(0.0335)	(0.0247)	(0.0729)
G.Expenditure	-0.1142	0.0256	-0.3353
	(0.1511)	(0.0384)	(0.2258)
Public Debt	-0.1210*** (0.0410)	0.0730** (0.0306)	-0.2214** (0.0710)
Trade openness	0.0462	-0.0663	0.3886
	(0.1048)	(0.0323)	(0.2143)
Inflation rate	0.5660*** (0.1426)	1.004 *** (0.0521)	0.3886 (0.2143)
$\mathbf{rgdpc_{t-1}}$	0.9276***	0.9440***	0.2421
	(0.1440)	(0.0800)	(0.1235)
R-Square	0.9953	0.9992	0.9782
Heteroskedasticity Test (p-value)	0.2659	–	–
No. Observations	28	17	11

Notes: The standard errors are reported in parentheses (White-corrected for heteroskedasticity). The results correspond to the trimming percentage of 15%. ** Indicates significance at the 5% level. *** Indicates significance at the 1% level.

Furthermore, investment has a significant positive association with economic growth below the debt-to-GDP threshold value, consistent with the theory. However, the effect is a negative and insignificant determinant when exceeding the debt-to-GDP threshold value. The negative impact is that the debt burden requires the government to

impose more taxes to serve debt, which tends to diminish capital return and lead to crowd-out private investment. On the other hand, the results reveal that below the debt-to-GDP threshold level, the coefficient of government expenditure is a positive and statistically insignificant determinant of economic growth. It is negative and insignificant when exceeding the debt-to-GDP threshold level, consistent with Maghyereh et al. (2002). A high tax rate can distort the economy and reduce the efficient allocation of resources.

Interestingly, the empirical findings highlight that trade openness has an insignificant negative correlation with economic growth in lower regime; meanwhile, in the upper regime, it has an insignificant positive impact on economic growth. The plausible explanation is because of trade barriers (Obeid and Awad, 2018). Moreover, the inflation rate coefficient enters positively and significant determinant for macroeconomic stability below the debt-to-GDP threshold level, which in contrast to the result of (Maghyereh et al. 2002). However, the inflation rate at the upper regime has a lower positive insignificant effect on economic growth beyond the debt-to-GDP threshold value.

Finally, the lag of the dependent variable (GDP per capita) coefficients is statistically significant. It positively affects economic growth below the deb-to-GDP threshold value, which is consistent with theoretical arguments. In contrast, it has an insignificant and lower positive effect when the debt-to-GDP ratio exceeds the threshold value compared to when it is lower than the threshold level. These findings indicate that debt accumulation can affect the GDP per capita when debts include private savings, internal interest rates, and inflow investments. Overall, economic growth has a closer link with the debt-to-GDP ratio. Thus, the debt-to-GDP threshold value plays a crucial role in promoting economic growth and ensuring efficient borrowing.

5. Conclusions

Recently, researchers' focus shifted towards identifying the debt-to-GDP threshold level, which can maintain growth regarding determining the effect of government debt on economic growth. This paper evaluated the gross government debt and economic growth nexus in Jordan from 1990 to 2017 by estimating whether a debt-to-GDP threshold exists for Jordan's case. This paper's novel contribution is using the regression model proposed by Hansen (2000) to capture the non-linear dynamics

effects of government debt on economic growth and provide a reliable debt-to-GDP threshold. The empirical results showed a significant debt-to-GDP threshold level in the relationship between government debt and economic growth in Jordan estimated by 99.86% of GDP, which is higher than the debt-to-GDP threshold computed by Maghyereh et al. (2002). Furthermore, exceeding the debt-to-GDP ratio definitely harms economic growth. Notably, the explanatory variables react differently under the upper and lower regimes. Arguably, government debt and economic growth relationship are contingent on the debt-to-GDP ratio. Jordan relied on debt accumulation to finance the budget balance deficit and not for funding productive expansionary projects. This paper finds that government debt is a potent variable in attaining economic growth if used in expansionary productive projects and limited with the optimal secure level.

This paper's policy implications are that increasing government debt to motivate economic growth is not a wise policy choice for Jordan. Therefore, reducing the debt-to-GDP ratio seems to enhance Jordanian economic performance; the average debt-to-GDP ratio of approximately 108% throughout the study appears to support this view. Hence, policymakers may eventually improve growth by reducing the debt-to-GDP ratio through efficient allocation of financial sources by reducing unproductive governent-funded programs. This strategy is crucial to attain a higher growth rate and must use timely austerity measures to curb shocks' effects, such as the financial crisis. Overall, the ambiguity regarding the estimations in Jordan is plausible because the financial sector's development in Jordan did not reach a sustainable debt level yet.

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