Migration Letters

Volume: 21, No: S1(2024), pp. 561-574

ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)
www.migrationletters.com

Effect of Public Debt on the twin deficits using a Threshold time series model: Case Study of Jordan 1980-2020

Ikhlas Ahmed AlShawabkeh[1], Taleb Awad Warrad[2]

Abstract

This study examines the Effect of Public Debt on the twin deficits using the threshold time series model of the Jordanian economy from 1980-2020. The independent variables were relied upon: private saving, production gap, economic growth, trade openness, and budget deficit. In addition to public debt as a threshold variable. The results indicated that the optimal number of model systems is six systems only, which means that there are only five thresholds. The results also showed that three threshold values are significant, but there are two values of the threshold which are not significant, but there are two values of the threshold which are not significant. The results support the Keynesian view of the strong and positive relationship between the current account balance deficit, saving, budget deficit, and trade openness in Jordan during the period 1980-2020. Work must be done to reduce the budget deficit or to enhance saving and investment, or both in Jordan, which may help reduce the current account deficit. However, it requires radical reforms in the trade and financial sectors to achieve efficient markets. To increase external competitiveness, it is necessary to put in place incentive policies for production to increase exports to take advantage of trade liberalization policies in the field of specialization in production.

Keywords: *twin deficits, threshold Model, Jordanian economy, Public Debt, output Gap.*

1. Introduction

The term "twin deficit" appeared in the early eighties of the last century to describe the state of transition between the budget deficit and the current account deficit in the United States. It describes the budget deficit and the current account deficit. Economic literature has shown that the causal trends between the budget deficit and the current account deficit are not exclusive to us. In the 1990s, some European countries, such as Germany and Sweden, faced similar situations. Where the rise in the budget deficit was accompanied by an increase in the real value of their national currencies, which negatively affected the current accounts and the increase in the volume of public debt. Post situation over a specific period of time in developed countries may differ from the developing economy.

The growth of the budget deficit and the permanent current account deficit is important to the policy maker in Jordan; Freedom of trade, economic growth, and public debt are necessary to understand the link between the imbalance of the budget and the commercial account in the Jordanian economy. However, the budget and current account deficits and

[1] PhD student, School of Business, Department of Business Economics, University of Jordan, Jordan. Email: ikhlas.shawabkeh@gmail.com

[2] School of Business, Department of Business Economics, , University of Jordan, Email: t.awad@ju.edu.jo

their relationship to economic variables such as the output gap, trade openness, the interest rate on government bonds, the Saving and investment gap, and economic growth did not receive significant attention. This study attempts to explain the effect of Public Debt on the twin deficits using a threshold model in order to investigate this effect on the Jordanian economy.

The link between the current account deficit and the budget deficit (twin deficits) stimulated academic discussion and empirical testing in the 1980s and early 1990s. The traditional view (Keynesian absorption theory) indicated that when an economy is operating at or near full employment with other factors held constant, an increase in the budget deficit pushes the balance of payments into deficit through expansion of aggregate demand for goods and services including demand for imports. The traditional view claimed that the size of the budget deficit and its continuity had a profound impact on public debt, savings, capital formation, prices, income distribution, exchange rates, and international trade (Ncanywa & Letsoalo, 2019).

The potential effects of the public debt on the budget deficit and the current account balance deficit are still the subject of debate and controversy. Despite the increased use of more sophisticated time-series techniques, the implications of research findings on this topic are still fundamentally ambiguous. And that the relationship between public debt and the twin deficit is possible, but this relationship increases in the Jordanian economy, which suffers from a chronic budget deficit, a chronic deficit in the current account balance, and an increase in public debt, and this calls us to reveal the nature of the relationship between public debt and the twin deficit in Jordan.

This study aims to explore the role of public debt in the validity of the twin deficit in Jordan by identifying several periods of public debt (breaks) in the relationship between the budget deficit and the current account. twin deficits from the policymakers' point of view, an economy without twin deficits thrives more than an economy overwhelmed by deficits. The second objective of this study is to come up with appropriate policies to eliminate the vicious circle of public debt and the twin deficit and reduce the deficit in the Jordanian economy. In order to determine the critical public debt-to-GDP ratio that is considered to be of high or low value by applying the threshold model. The third objective of this study is to formulate appropriate policies for the Jordanian economy, which is facing huge problems in the budget and the current account deficit.

2. Theoretical framework

The balance of payments contains two main accounts the current account (or external account, current account balance) and the financial account. the current account balance measures the value of inflow and outflow of trade in goods and trade in services and net factor income (NFI) coming in or out of the country including remittances and net current transfers (NCT) which include international aid, grants, and donations. When a country has a deficit in the current account it should be balanced by a surplus in the financial account which includes foreign direct investment and portfolio investment (bonds, shares, equities). As for budget balance (or government balance, or fiscal balance), it shows the government revenues -mainly from taxes- and government expenditures.

The twin deficits hypothesis (TDH) or budget / current account deficit nexus was first raised in the 1980s in the United States during the presidency of Reagan. The two deficits moved together from 1981 until the early 1990s but after that, they moved apart (Sakyi, & Opoku, 2016). Twin deficits state that an increase in budget deficit worsens the current account deficit, a budget deficit means a decline in public savings led to the current account deficit which implies a transfer of wealth to foreigners and maybe a decrease in the living standards of future generations (Bird et al., 2019) theoretically the analysis of

this relationship derived from national income identity (NII) for an open economy as follow:

$Y = C + I + G + (X - M)$, ……. (1)

Where Y refers to the gross domestic product or national income which is the sum of C private (household) consumption expenditure, I investment expenditure, G government expenditures, (X – M) export minus import (net exports).

Expressing the previous equation differently:

$Y = C + S + T$,……..…… (2)

Where Y stands for GDP or national income, C is consumption, S is private savings and T is taxes. As known disposable income either goes to pay for consumption, (C) or to pay taxes (T), or is saved (S). By substituting Y in the first equation the result will be the following equation:

$S = G - T + NX + I$, …… (3)

By simplifying it:

$NX = (S - I) + (T - G)$,…….….... (4)

From equation 4, (X-M) is equivalent to the current account balance (CA), while (S-I) is private savings and (T-G) stands for public savings. The total private and public savings equals domestic national savings. Assuming Y is fixed (the economy at or close to potential output or full employment) and savings stay the same if the budget deficit (T-G) increases this means that according to the last equation, either investment I must decrease (crowding out) or net exports must decrease causing a current account deficit, therefore, a budget deficit can lead to current account deficit and causing a twin deficit.

Knowing that (T-G) stands for the budget deficit. assuming that the differences between S and I are constant over time, in this case, negative changes in (T-G) which mean a budget deficit could lead to negative changes in the current account side causing a current account deficit. Then a twin deficit hypothesis is confirmed.

The theoretical analysis for the twin deficit hypothesis is based on Keynesian absorption theory. According to this theory, an increase in the budget deficit (through unrestricted government borrowing) to finance its spending, that would increase domestic absorption and consequently increase imports which leads to a current account deficit. Based on this theory, the causal relationship runs from budget deficit to current account deficit. The government's excessive borrowing crowds out the financial resources available (private savings) in the economy which leads to increasing domestic interest rates, inducing foreign investments to benefit from the rising interest rates. That will eventually lead to the appreciation of the exchange rate which means that the import will become cheaper and the export will become more expensive causing a current account deficit (Sakyi, & Opoku, 2016).

Another theory that supports the twin deficit hypothesis is the Mundell-Fleming theory, which argues that increasing budget deficit will raise interest rates which induce capital inflows and eventually appreciation of the exchange rate and that will lead to an increased current account deficit, capital inflow will raise the nominal exchange rate if the exchange rate is fixed or will raise prices if the exchange rate is flexible (Bhat & Sharma, 2018).

The Ricardian Equivalence proposes under certain conditions, that there is no relationship between the two deficits, and when governments run a budget deficit by increasing spending or cutting taxes, the aggregate domestic demand will not be affected, due to the assumption that domestic citizen rational and they take into account the increasing public debt and expect an increase in the future taxes so they decide to decrease current

consumption and increase saving to meet their future obligations as a precautionary response or to smoothen the future consumption, consequently, there is no need to borrow from abroad since private saving increased enough to finance the domestic investments, and no current account deficit occurs, thus budget deficit does not cause current account deficit. Ricardian Equivalence led to the idea that public debt affects private sector expectation which eventually affects the twin deficit relationship. Referring to this explanation of Ricardian equivalence, unfortunately, few studies rise to explore the effect of public debt on the twin deficit, Sulikova, and Tykhonenko, (2017), even though public debt considers a very important variable to understand the relationship between the twin deficits, Furceri and Zdzienicka, (2020).

3. Literature review

Public debt, also known as government debt, national debt, and sovereign debt or indebtedness is the total amount of debt (liabilities) owed by the government to lenders whether they are inside the country (internal or domestic debt) or outside the country (external debt), domestic borrowing only transfers resources within the country i.e. domestic borrowing only change hands of money holder while the quantity of money is still the same inside the country, while external debt cause a transfer problem of resource outside the country as Keynes explain (referred to Rais and Anwar,2012) according to its duration it is divided to short term debt (less than one year), long term debt (more than ten years), medium term (between the two other types), it represents the accumulation of all prior deficit (permanent deficits) in a budget which represents the differences between the revenues and spending in a given year. The government can bring revenues by increasing taxes, printing money, or borrowing from domestic or external sources, if the government decides to borrow it creates liabilities for itself, (Rais and Anwar, 2012), Usually, the government creates debt by issuing bonds and bills or borrowing directly from organizations such as World Bank or international financial institutions and it's usually expressed as a ratio to the country's GDP (Bureau of Public Debt, 2010).

Sustainability of debt refers to the ability to meet all the country's current and future obligations without exceptional financing help or going into default (International Monetary Fund, 2020). There are many ways to measure the Sustainability of debt such as comparing the real interest rate on public debt and the growth rate of real gross domestic product (GDP), (AL-Hazaimeh and AL-Tarawneh, 2022). Borrowing is an essential tool for funding investments, and it is ordinary for the government to borrow, to meet their commitments, for example, on education, health care, infrastructure, defense, many goods, and services, and to raise expenditure during the stages of weak economic performances, though, high public debt can slow down economic growth, Jordan Strategy Forum, (2019). Economists do not consider public debt a major problem itself, but the real problem is its mismanagement and unsustainability of it, (Rais and Anwar, 2012).

According to Aleksandria and others, and I quote "indebtedness is a one of the most serious financial-monetary, balance of payment, developmental social and political problems of developing countries…. And it's become a major problem of economic development'' (Aleksandria, Dragan, Anastasia, 2014, 184), it turns out to be a globalized phenomenon addressing most of the countries around the world, debt serving (interest rate) has increased the budget deficit which causes more borrowing, which leads a tremendous literature to discuss the problem trying to analyze it in order to reduce its consequences. within this background, both the international monetary fund and world bank work together to help countries to reach their developments goals without accumulating a high level of debt, they come up with a tool called "Debt Sustainability Analysis (DSA)" to evaluate how a country's existing level of debt and potential borrowing affects its present and future ability to meet debt service obligations, (Jordan Strategy Forum, 2019).

It is important to understand that Ricardian equivalence was the reason behind assuming that twin relationships depend on the public debt-to-GDP ratio (Sulikova and Tykhonenko, 2017). Using public debt to the GDP threshold value in testing the twin deficit, this technique derived from the lead study conducted by Blanchard (1990) non-linear inverted U-shape that describes the relationship between the public debt to GDP ratio and economic growth, which has been tested deeply theoretically and empirically by referring to what is known as (Ricardian negative effect of public debt on economic growth) which states that there is a certain value of the public debt (threshold value) it turns out that the relationship between the growth and public debt to be positive below that threshold value of the public debt and became negative beyond it. They explained it by arguing that the economic agent anticipates a fiscal consolidation by increasing spending or cutting taxes when the country reaches a certain value of public debt to GDP ratio and expecting increasing in future taxation which leads them to save more now as a precautionary action to face the increase in taxation in the future, these private saving eventually increase investment and enhance economic growth. Blanchard's lead study was a motive for other studies to use the same technique in 21 investigating other economic relationships. Such analysis of the relationship between fiscal policy and the current account balance using the debt to GDP ratio, an investigation of the effect of fiscal stimuli at different levels of debt to GDP ratio on real GDP, investment, and current account balance, and finally some studies use the same technique in testing the validity of twin deficit using debt to GDP ratio, one common thing between all these studies is that they concentrate that debt considers a very important variable affecting the expectation of private sector and eventually affect their consumption and savings decisions, many researchers like Chung and Leeper(2007), Favero and Giavazzi (2007), Corsetti et al. (2012) and Favaro et al. (2011)and other researchers assert that the exclusion of debt as endogens variable or ignoring debt, in general, can lead to substantial biases in the estimated coefficient because the feedback from government debt to spending remains unaccounted for, Nickel and Tudyka, (2013).

4. Historical Background on Twin Deficit and Public Debt in Jordan

The Jordanian economy, like most developing countries, is characterized by a chronic deficit in its budget and current accounts, which are the main cause of all problems in the economy. Since its independence, the Kingdom relied on grants, aid, and loans to finance the budget, and formed a high percentage of budget resources. Appendix (1) shows that its percentage of local revenues reached (70.3%) during the period 1980-1989, then increased to (86.9%) during the period 1990-1999, then declined to (85.3%) during the period 2000-2009, and remained at (87.9%) during the period 2010-2020, which constitutes a fifth of the budget Almost now, and this is a high percentage that is problematic for the public budget. It accounted for 32.8%, 35.7%, 31.2%, and 25.1% of the GDP volume for the previous periods, respectively. The deficit ratio to public spending before grants and foreign aid was; An average of 43%, 16.7%, 22.2%, and 25.5% during the periods 1980-1989, 1990-1999, 2000-2009, and 2010-2020, respectively, representing 18.6%, 4.3%, 8.5%, and 15.2% of the volume of public spending after calculating grants and aid for the previous periods, respectively. The deficit-to-GDP ratio reached 17.5%, 6.4%, 7.6%, and 7.7% of GDP before grants and aid. And 7.6%, 1.7%, 2.9%, and 4.6% after calculating grants and aid for the above periods, respectively.

Table No. (1) in the appendix indicates a sharp decline in the current account during the eighties from what it was previously; The average negative annual deficit in the current account amounted to about 188.8 million dinars during the period 1990-1999, compared to an average of 3.18 million dinars during the period 1980-1989, compared to an average of 597.8 million dinars during the period 2000-2009, and compared to an average of 2169.8 million dinars during the period 2010- 2020. This indicates weak economic

growth and the depletion of the state's reserves until it reached the financial crisis in 1988 and 1989 when these reserves disappeared completely as a result of the high deficit in the current account starting from 1980 until it reached 99.9 million dinars in 1985; As a result of the small volume of exports and remittances of workers abroad. The crisis reached its climax in 1988 when the Jordanian government failed to fulfill its debt servicing obligations. This led to the depreciation of the Jordanian dinar in an attempt to reduce imports and support Jordanian exports to make them more competitive. On the other hand, the ratios of public debt to GDP fluctuated during the period (1980-2020), so that the average ratio of public debt to GDP was about (88.1%) during the period 1980-1989, compared to the average (140.1%) during the period 1990-1999, and against the average (77.9%) during the period 2000-2009, and against the average (74.1%) during the period 2010-2020.

In general, the high current account deficit and debt-to-GDP ratios during the period (1980-2020) are due to several reasons, including (a) external shocks of accumulation of scheduled and past due debt payments and high government interest payments (scheduled and past due) to foreigners and (b) the global recession which deteriorates terms of trade (lower export prices) in general and to the decline in external demand for exports as a result of the global financial crisis and the Corona pandemic crisis, and (c) the increase in the prices of imported commodities such as oil prices, and finally (d) the decrease in the level of capital inflows.

5. Theoretical background of the threshold model

Nonlinear time series are the most common and used time series in modeling time series of macroeconomic variables, whether at the financial or monetary level, as they allow modeling of mechanisms of phenomena such as asymmetry, threshold, and structural changes. In addition, nonlinear models allow describing of the various states and nature of the system in which these variables operate, as well as determining where their movement changes (average, variance) according to the system to which they belong. Asymmetry in time series such as asymmetry in the range between increasing and decreasing periods.

The threshold model is one of those models proposed by (Hansen 1996, 2000), which is a type of nonlinear model that contains system changes and in which variables exceed unknown thresholds over time, and of its advantages is that it provides tools for selecting optimal thresholds for the study, taking into account the dynamic factor and lag periods Which ultimately affects the estimated parameters. This model can also study phenomena that are affected by themselves and may not need explanatory variables, which means that the time series should be treated by itself, or through independent variables, especially when the phenomenon is unexplained.

So, if we assume the following model:

$$\boldsymbol{Y_t} = \boldsymbol{\alpha_0} + \boldsymbol{\alpha_1 X_t} + \boldsymbol{\alpha_2 Z_t} + \boldsymbol{\varepsilon_t} \qquad (1)$$

It is a simple linear model, where the behavior of the variable $\boldsymbol{Y_t}$ is constant (symmetric) over the period of the series because $\boldsymbol{\alpha_1}$ and $\boldsymbol{\alpha_2}$ are constant.

But if $\boldsymbol{\alpha_1}$ or $\boldsymbol{\alpha_2}$ their effect on the variable $\boldsymbol{Y_t}$, that is, the effect of one of them is not uniform during the period of the time series, to clarify more and according to the previous equation, where there are two explanatory variables that can be divided into two types. The first type: is the threshold variable whose parameter value affects the dependent variable according to each system. It is causal and not a fixed effect. What is the second type: are the variables that affect

The dependent variable of a fixed system is called the non-threshold variable.

If we assume that the variable Z_t is the threshold variable and that it affects the variable $\boldsymbol{Y_t}$ through two systems, through parameter $\boldsymbol{\alpha_2}$, then equation (1) is modified according to the following formula:

$$\boldsymbol{Y_t} = \{\boldsymbol{\alpha_0} + \boldsymbol{\alpha_1 X_t} + \boldsymbol{\alpha_{21} Z_t} + \boldsymbol{\varepsilon_t} \qquad \boldsymbol{if\ Z_t < c} \qquad (2)$$

$$\boldsymbol{Y_t} = \{\boldsymbol{\alpha_0} + \boldsymbol{\alpha_1 X_t} + \boldsymbol{\alpha_{22} Z_t} + \boldsymbol{\varepsilon_t} \qquad \boldsymbol{if\ Z_t \geq c}$$

The main idea of this model is based on generating different partial models through the basic model, that each of these new models works in a different space than the rest of the other models, and that these spaces are divided according to what is known as the threshold variable. That is, it has a state of decline and rise - which is the common case for most economic variables - Each of the consecutive observations can belong to a different partial model.

To estimate the model, we use the threshold variable and characterize the regression equation to estimate the parameters $\boldsymbol{\alpha_0}$, $\boldsymbol{\alpha_1}$. In addition to the parameters of the threshold variable $\boldsymbol{\alpha_{12}}$, $\boldsymbol{\alpha_{22}}$ and the value of the threshold (c), by means of nonlinear least squares as a natural approach to estimate the parameters of the model, which is what is known as the BreakPoint test (Hansen, 2011).

The Time series threshold model for twin deficit is as follows:

$$CA_{it} = \mu_i + \beta_1 BB_{t-1} I\ (DEBT_{t-1} \leq \gamma_1) + \beta_2 BB_{t-1} I\ (\gamma_1 < DEBT_{t-1} \leq \gamma_2) + \beta_3 BB_{t-1} I\ (DEBT_{t-1} > \gamma_2) + \theta_1 OG_{t-1} + \theta_2 TO_{t-1} + \theta_3 GDPG_{t-1} + \theta_4 SI_{t-1} + e_t$$

Where: CA is the current account as a percentage of real GDP, BB is the budget balance as a percentage of real GDP, DEBT is the real public debt as a percentage of real GDP (the real value of the threshold variable), OG is output gap as a percentage of real GDP, TO is trade openness as a percentage of real GDP, GDPG is the annual real GDP growth as a percentage, Saving and investment gap (private saving) (SI), γ_1 is the smaller estimated value of the threshold variable, γ_2 is the larger estimated value of the threshold variable, i determine the country and t determine the time, with $1 \leq i \leq n$, and $1 \leq t \leq T$, and there are two regression slopes estimates, β_1, and β_2. Every independent variable is lagged by one period to allow for a delayed response.

There is two estimated threshold value $\gamma 1$ and γ_2, which means there are three public debts to GDP intervals, i.e., the estimated value of the threshold variable gives different regimes of the relationship between the current account variable and budget balance variable, these regimes depend on whether the real threshold variable (the debt to GDP ratio which represented by DEBT in the last equation) is greater than or less than and equal to the estimated threshold value.

The direct impact of budget balance on current account balance depends on β_1 when the real value of public debt to GDP is under $\gamma 1$ i.e., regime 1. While the direct impact of budget balance on current account balance depends on β_2 when the real value of public debt to GDP is between γ_1 and γ_2 i.e., regime 2. And the direct impact of budget balance on current account balance depends on β_3 when the real value of public debt to GDP is bigger than γ_2 i.e., regime 3.

6. Study Analysis

This study relied on an annual time series from 1980 to 2020. These data were provided from three sources. First: the database of the World Bank on the website (www.albankaldawli.org), second: the database of the Central Bank of Jordan on the website (www.cbj.gov.jo), third: the database of the International Monetary Fund on the website (www.imf.org).

6.1 Unit root test

In the beginning, this study tests the degree of integration of all variables and the application of the Fuller and Dickey test (1981) to indicate whether the variables are static or not. The results of Table No. (1) Show that the budget deficit, the current account deficit, economic growth at constant prices, the broad money supply, and economic openness are I (0), while investment and the effective real exchange rate are I (1).

Table No (1): Unit root test (Augmented Dickey-Fuller)

Variable	level				First difference				Result
	Intercept		Intercept & Trend		Intercept		Intercept & Trend		
	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	
CA	-4.317	0.001	-4.524	0.004	-	-	-	-	I(0)
BB	-3.327	0.020	-3.314	0.079	-3.748	0.008	-3.682	0.034	I(1)
GDPG	-4.480	0.001	-4.442	0.005	-	-	-	-	I(0)
OG	-5.017	0.000	-5.012	0.001	-	-	-	-	I(0)
SI	-1.871	0.342	-1.881	0.645	-5.705	0.000	-5.609	0.000	I(1)
TO	-1.163	0.681	-1.613	0.770	-5.071	0.000	-5.042	0.001	I(1)
DEBT	-1.953	0.306	-2.455	0.347	-4.077	0.003	-3.504	0.041	I(1)

Source: Results were extracted through Eviews 12.0.

The results of the above table showed that the current account as a percentage of GDP (CA), the annual real GDP growth as a percentage (GDPG), and the output gap (OG) are stable on a level I (0), while budget balance as a percentage of GDP (BB), The trade openness as a percentage of GDP (TO), Saving and investment gap (private saving) (IS) and the real public debt as a percentage of GDP (DEBT) are stable on the first difference I (1).

6.2 Estimating the threshold model

Through the results of the unit root test, which proved the presence of structural points of refraction in the time series of the model, as we explained previously, and therefore the study will depend on the threshold regression model (TR), as it is one of the nonlinear models that can estimate the model with structural refractions.

In this part, the study will be the time series model with a threshold effect, and before estimating the model, we will perform the Perron-Bai test to determine the optimal number of systems for the model, and this is shown in Table No. (2):

Table No (2): Multiple breakpoint tests

Multiple breakpoint tests
Compare information criteria for 0 to M globally determined breaks
Sample: 1980 2020
Included observations: 41
Breaking variables: DEBT C
Break test options: Trimming 0.15, Max. breaks 5
Allow heterogeneous error distributions across breaks

Breaks	# of Coefs.	Sum of Sq. Resids.	Log-L	Schwarz* Criterion	LWZ* Criterion
0	2	824.2008	-119.6937	3.181992	3.280193
1	5	578.7851	-112.4473	3.100234	3.350763
2	8	442.8389	-106.9590	3.104233	3.514059
3	11	364.3155	-102.9577	3.180772	3.758194
4	14	279.8182	-97.54813	3.188617	3.943685
5	17	261.2181	-96.13804	3.391557	4.336694
* Minimum information criterion values displayed with shading					
Estimated break dates:					
1: 1995					
2: 1992, 2002					
3: 1992, 2005, 2013					
4: 1992, 1999, 2005, 2013					
5: 1986, 1992, 1999, 2005, 2013					

Source: Results were extracted through Eviews 12.0.

It is noted from the table above that at the level of significance of 5% that the optimal number of systems for the model is six systems only - which means that there are only five thresholds. Thus, will be estimated the time series model with a threshold effect, and this is shown in Table No. (3):

Table No (3): Estimated the model threshold effect

Dependent Variable: CA Method: Discrete Threshold Regression Sample: 1980 2020 Included observations: 41 Selection: Sequential evaluation, Trimming 0.15, Max. thresholds 5, Sig. level 0.05 Threshold variable: DEBT				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DEBT < 70.606999 -- 11 obs				
DEBT	0.440482	0.189257	2.327422	0.0283
C	22.50031	13.55609	1.659794	0.1094
70.606999 <= DEBT < 77.431999 -- 6 obs				
DEBT	-1.405439	0.853042	-1.647562	0.1120
C	97.68979	63.87402	1.529413	0.1387

77.431999 <= DEBT < 87.977999 -- 6 obs				
DEBT	1.663417	0.716065	2.322995	0.0286
C	-135.9695	57.58221	-2.361310	0.0263
87.977999 <= DEBT < 107.75999 -- 6 obs				
DEBT	0.823085	0.344105	2.391961	0.0246
C	-80.17970	32.34212	-2.479111	0.0203
107.75999 <= DEBT < 127.60599 -- 6 obs				
DEBT	-0.235975	0.262959	-0.897383	0.3781
C	24.17418	29.49371	0.819638	0.4202
127.60599 <= DEBT -- 6 obs				
DEBT	0.048183	0.045639	1.055732	0.3012
C	-18.89914	8.541178	-2.212709	0.0363
Non-Threshold Variables				
GDPG	-0.367009	0.164109	-2.236370	0.0324
BB	0.399867	0.193002	2.071822	0.0464
OG	-1.478039	0.661324	2.234970	0.0346
SI	0.216204	0.082448	2.622295	0.0126
TO	0.112646	0.038348	2.937481	0.0061
R-squared	0.632765	Mean dependent var		-6.871976
Adjusted R-squared	0.412424	S.D. dependent var		4.546343
S.E. of regression	3.484932	Akaike info criterion		5.620566
Sum squared resid	303.6187	Schwarz criterion		6.289277
F-statistic	2.871752	Hannan-Quinn criter.		5.864073
Prob(F-statistic)	0.009570	Durbin-Watson stat		2.093120

Source: Results were extracted through Eviews 12.0.

It is noted from the results above that there are three threshold values (C) which are significant, but there are two values of the threshold (C) which are not significant, but there are two values of the threshold (C) which are not significant. Whereas, the value of (C_1) is (DEBT < 70.6), and the value of (C_1) before reaching the threshold amount is (0.441), which is statistically significant, and the value of (C_2) is (70.6 <= DEBT < 77.4), and the value of (C_2) before reaching the threshold amount is (0.441), which is not statistically significant, and the value of (C_3) is (77.4 <= DEBT < 87.9), and the value of (C_3) before reaching the threshold amount is (0.441), which is statistically significant, and the value of (C_4) is (87.9 <= DEBT < 107.7), and the value of (C_4) before reaching the threshold amount is (0.441), which is statistically significant, and the value of (C_5) is

(107.7 <= DEBT < 127.6), and the value of (C_5) before reaching the threshold amount is (0.441), which is not statistically significant, Finally the value of (C_6) is (127.6 <= DEBT), and the value of (C_6) before reaching the threshold amount is (0.441), which is not statistically significant, and This means that the current account has a positive impact on public debt, However, this effect varies according to the ratio of domestic public debt to GDP.

Whereas, before reaching the level of (70.6%) as the ratio of domestic public debt to GDP, the effect of debt will be largely positive, as an increase in the ratio of public debt to GDP by one unit will lead to an increase in the current account by 20.0, but this is before Skip the threshold level. However, after passing the level (40.79%) as the ratio of domestic public debt to GDP (threshold level) and reaching the level (77.431999), there will be no effect of the public debt on the current account. While after passing the level of (77.431999%) as the ratio of domestic public debt to the GDP (threshold level) and reaching the level (87.977999), the effect of the public debt will also be positive, while after passing the level (87.977999%) as the ratio of the domestic public debt to the GDP (threshold level) and reaching the level (107.75999 There will be no effect of the public debt on the current account, just as after passing the level (107.75999%) as the ratio of domestic public debt to GDP (threshold level) and reaching the level (127.60599), there will be no effect of public debt on the account Finally, after counting the level of (127.60599%) as the ratio of domestic public debt to GDP (threshold level), there will be no effect of public debt on the current account.

The results support the Keynesian view of the strong and positive relationship between the current account balance deficit and savings, the budget deficit, and trade openness in Jordan during the period 1980-2020. The results showed that an increase in private savings by (1%) would lead to an increase in the current account deficit by (0.216), while an increase in the budget deficit by (1%) will lead to an increase in the current account deficit by (0.399). In addition, the effect of trade openness on the current account increases the deficit in the current account by (0.113). In addition, an increase in economic growth or the output gap by (1%) leads to a decrease in the current account deficit by (-0.367), and (-1.478) respectively.

6.3 Diagnostic tests

To ensure the validity of the assumptions on which the appropriate analysis is based, the researcher conducted a set of statistical tests to ensure that, these tests are the Normal Distribution test, the Heteroscedasticity test, and finally the Serial Correlation test.

6.3.1 Normal Distribution

Table No. (4) Refers to a set of tests that were conducted for the normal distribution of the data of this study, which is the Skewness and Kurtosis test to ensure that the residuals are distributed normally, as it represents the normal distribution of the residuals (Residuals) is one of the assumptions of proper regression analysis. The null hypothesis (H0) of these tests indicates that the data are distributed normally, while the alternative hypothesis (H1) indicates that the data is not distributed normally.

Table No. (4): Results of normal distribution tests

Variables	test value	Results
Skewness	-0.319931	normally distributed
Kurtosis	2.165286	normally distributed

Source: Eviews 12.0

It is noted from the results in Table No. (4) That the data related to the variables in the (Skewness & Kurtosis) test are distributed normally, as the statistical values of the test were less than the value (2) and close to zero. According to the theory of central tendency,

which states that if the sample size is greater than (30) and has an arithmetic mean (μ) and a variance (σ2), the distribution of the sample mean approaches a normal distribution (Kauffman & Lloyd, 2017).

6.3.2 Heteroscedasticity

To ensure that there is no difference in the variance between the regression errors, the researcher used the Breusch- Pagan test. The null hypothesis (H0) in this test indicates that there is no difference in the mean-variance or regression, while the alternative hypothesis (H1) indicates that there is a difference in the mean-variance or regression. It is noted from the results in Table No. (5) that the significance value based on the (Breusch- Pagan test) test amounted to (0.1528), which is greater than 5%, and this indicates the acceptance of the null hypothesis, meaning that there is no difference in the variance in the regression errors of the data of this study, which is one of the important assumptions for the regression analysis.

Table No. (5): Results of Heteroscedasticity tests

Test	Ch-squire	Probability
Breusch- Pagan test	46.028131	0.1528

Source: Eviews 12.0

6.3.3 Autocorrelation

To ensure that the data of this study are free from the problem of Autocorrelation between the values of the variables in the different periods, the researcher worked on conducting the (Wooldridge test) test. The results indicated that the value of the Wooldridge test is less than 5%. as shown in Table No. (6), and this means that there is no Autocorrelation between the values of variables in different periods.

Table 4.6: Results of Heteroscedasticity tests

F- Statistic	Value	probability	Value
	47.4185		0.0061

Source: E-views 12.0

7. Conclusion

The study aimed to test the effect of public debt on the double deficit using the threshold time series model for the Jordanian economy for the period from 1980-2020 taken from the data of the Central Bank of Jordan, the World Bank, and the International Monetary Fund. Since the results of the unit root of the series are integral (0)I and (1)I, the model was estimated using the threshold time series model methodology. The results indicated that the optimal number of model systems is six systems only, which means that there are only five thresholds. The results also showed that there are three threshold values (C) that are significant, but there are two values of the threshold (C) that are not significant, but there are two values of the threshold (C) that are not significant. Whereas, the value of (C1) is (DEBT < 70.6), and the value of (C1) before reaching the threshold amount is (0.441), which is statistically significant, and the value of (C2) is (70.6 <= DEBT < 77.4), and the value of (C2) before reaching the threshold amount is (0.441), which is not statistically significant, and the value of (C3) is (77.4 <= DEBT < 87.9), and the value of (C3) before reaching the threshold amount is (0.441), which is statistically significant, and the value of (C4) is (87.9 <= DEBT < 107.7), and the value of (C4) before reaching the threshold amount is (0.441), which is statistically significant, and the value of (C5) is (107.7 <= DEBT < 127.6), and the value of (C5) before reaching the threshold amount is (0.441), which is not statistically significant, Finally the value of (C6) is (127.6 <=

DEBT), and the value of (C6) before reaching the threshold amount is (0.441), which is not statistically significant, and This means that the current account has a positive impact on public debt, However, this effect varies according to the ratio of domestic public debt to GDP.

The results support the Keynesian view of the strong and positive relationship between the current account balance deficit, saving-investment, budget deficit and trade openness in Jordan during the period 1980-2020. Work must be done to reduce the budget deficit or to enhance saving and investment, or both in Jordan, which may help reduce the current account deficit. However, it requires radical reforms in the trade and financial sectors to achieve efficient markets. In order to increase external competitiveness, it is necessary to put in place incentive policies for production to increase exports in order to take advantage of trade liberalization policies in the field of specialization in production.

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