External Debt and Budget Deficit in Iraq: Causality and Co-Integration Approach

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Abstract :

This study examines the effect of external debt on budget deficit in Iraq over the period of (2004-2020)**.** __Problem statement:__ The budget deficit and its negative consequences are one of the structural imbalances suffered by the Iraqi economy; it is considered one of the main economic problems due to the mismanagement of public revenues to cover expenses. __Hypothesis__, it's expected that there is a negative relationship between public budget deficit and external debt as Iraqi government may utilize its external debt to improve public budget imbalances. __Significance of the Study:__ The public budget is regarded as one of the most significant aspects of the state's economic and external balances. The external debt is one of the macroeconomic variables which affects deficit and surplus of the public budget. __Methodology__ The study focuses on analyzing the impact of the external debt on the budget deficit as well as addressing the existence and direction of causality between them by applying the Autoregressive Distributed Lag (ARDL) approach. __Findings:__ The study found that there is bidirectional causality between public budget deficit and external debt. The study also found a negative relationship between external debt and public budget deficit in long-run. __Recommendation__: To stimulate economy in general and improve state budget and pay back external debt together fiscal policy makers should consider financial resources other than focusing on oil sector merely. Thus, calling for economic diversifications, incurring infrastructure and productivity improvement spending, corruption reduction, and transparency promotions are in paramount.

Keywords : Budget deficit, external debt, ARDL, Iraqi Economy

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الدين الخارجي وعجز الميزانية في نهج السببية والتكامل المشترك في العراق

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المستخلص :

تبحث هذه الدراسة أثر الدين الخارجي على عجز الموازنة العامة في العراق خلال الفترة (2004-2020).

المشكلة البحث: عجز الموازنة وتداعياته السلبية هي أحد الاختلالات الهيكلية التي يعاني منها الاقتصاد العراقي وتعتبر واحدة من المشاكل الاقتصادية الرئيسية بسبب سوء إدارة الإيرادات العامة لتغطية النفقات. وهكذا، استخدمت الدولة الدين الخارجي باعتبارها إحدى آليات تمويل عجز الموازنة العامة، مما أدى إلى زيادة حجم الدين العام في العراق سواء الداخلي أو الخارجي. أهمية الدراسة: تعتبر الموازنة العامة من أهم جوانب التوازنات الاقتصادية والخارجية للدولة. كما ان الدين الخارجي هو أحد متغيرات الاقتصاد الكلي التي تتأثر بالعجز والفائض في الموازنة العامة. تتركز هذه الدراسة على تحليل أثر الدين الخارجي على عجز الموازنة. المنهجية: لتحقيق هدف الدراسة تم استخدام منهج الانحدار الذاتي (ARDL). النتائج: وجدت الدراسة أن هناك علاقة سببية ثنائية الاتجاه بين عجز الموازنة العامة والدين الخارجي. وجدت الدراسة ايضا وجود علاقة سلبية بين الدين الخارجي وعجز الموازنة العامة على المدى الطويل. توصية: تحفيز الاقتصاد بشكل عام وتحسين ميزانية الدولة وسداد الديون الخارجية معًا، ويجب على صانعي السياسات المالية النظر في الموارد المالية بخلاف التركيز على قطاع النفط فقط. وبالتالي، الدعوة إلى التنويع الاقتصادي، وتحمل الإنفاق على البنية التحتية وتحسين الإنتاجية، والحد من الفساد، وتعزيز الشفافية لها أهمية قصوى.

الكلمات المفتاحية : عجز الموازنة الدين الخارجي , الاقتصاد العراقي

1. Introduction

The world debt and financial crisis from the early 1980s accelerate an important emergence of empirical researches that investigate the issue of budget deficit and external debt due to sustainability of public debt and budget deficit especially in developing countries. The phenomenon of budget deficit and external debt received much attention since then in the world economy. Such phenomenon has been a topic of interest after the latest financial and debt crisis world-wide more specifically in the existence of Coronavirus pandemic. Much of the macroeconomic instability that beset many developing countries, including Iraq especially after 2003, such as debt crisis, low investment and poor growth performance, has been attributed to the persistent of budget deficit.

Iraq is undergoing perhaps its most serious economic, financial, and political crisis from 2003 and onwards. Its economy suffers from a continuous increase in budget deficit due to expansionary fiscal policy, which indeed, does not incurred to infrastructure and productivity improvements, for instance, a massive public spending is allocated for non-productive activities from the eight-year Iran-Iraq war followed by the Kuwait invasion, second Gulf war, and the US-British coalition military invasion to ISIS fighting and Coronavirus crisis. Notwithstanding, a high proportion of government allocutions are allocated for military and security spending in Iraq, its adverse repercussions on external debt and budget deficit and overall economic growth is well-established in the literature (see foe instance Karagöl, 2006; Ahmed, 2012; Shahbaz *et al*, 2016; Compton and Paterson, 2015; Ahmad *et al*, 2015;and Abbas and Wizarat, 2018).

Iraq as a mono- oil economy, which 95 percent of its total annual revenues come merely from oil exports, has uncertain public revenues due to oil price volatility affected by external shocks. It means that, any negative external shocks that causes oil price to decline diminishes public revenues dramatically and makes economy to be extremely delicate and fragile. Thus, in this context, Iraqi government to be able to maintain its financial sustainability has to look for other financial sources such as internal and external debts. Moreover, Iraqi government allocates over 70 percent of its expenditure to finance current expenses rather than investment expenses, that a count for less than 30 present of total public expenditures, and pays approximately IQD 60 trillion annually for wages and salaries without encouraging economic productivity, consequently, Iraq experiences a prolonged situation of a budget deficit and builds a massive debt load. Thus, the objective of this paper is to identify the relationship between budget deficit and external debt by implementing Cointegration and Causality methodology

first and then determine the impact of external debt on budget deficit in Iraq as an effort to fill the research gap regarding Iraq.

The rest of the paper is structured as follow: after providing an introduction in section one, section two presents a review of the literature. Section three is allocated for Data Description and Research Methodology. In section four, results and discussions of the study is explained and followed my conclusion and recommendations.

2. Literature Review

Overabundances of empirical studies have examined the effect of both external debt and budget deficit on other macroeconomic variables especially their impact on economic growth is well discussed. External debt can be regarded as one crucial aspect that is very prominent in the process of economic growth, but its impact on economic growth is a subject to debate between scholars and policy-makers due to its inconclusive results. Indeed, external debt can promote or limit the economic growth (Rahman *et al*, 2012; Saifuddin, 2016; Yusuf and Mohd, 2021; Panizza & Presbitero, 2013; Abbas & Christensen, 2007). Some prior studies find the positive effects of external debt on economic growth, for instance, Saifuddin (2016) find an indirect positive effect on growth analyzing public debt, which is combined with external and domestic debt.

A conventional view suggests that public debt has a negative effect on economic growth. According to (Mhlaba and Phiri, 2019) public debt can crowd-out private investment and threaten economic growth through higher long-term interest rates, higher inflation, and higher future distortionary taxation. It's clear that, reasonable borrowings to finance infrastructure development are crucial to faster economic growth. However, excess borrowings without acceptable planning for investment may lead to heavy debt burden and interest payment, which in turn may create several unwelcomed effects for the economy (Joy & Panda, 2019). In recent study (Yusuf and Mohd, 2021) have investigate the effect of external and domestic debt on Nigeria's economic growth applying the Autoregressive Distributed Lag technique on annual data from 1980 to 2018, they have found that external debt constituted an impediment to long-term growth while its short-term effect was growth enhancing. In terms of domestic debt, they have realized a significant positive impact on long-term growth while its short-term effect was negative. The authors suggest that to improve long-term economic growth, expand the revenue base, and strengthen the capacity to repay outstanding debts when due, government should direct the borrowed funds to the diversification of the productive base in the economy. Several other scholars, instead of external debt,

have studied the effect of budget deficit on economic growth, but still its role in growth is controversial. On the one hand, Odhiambo *et al.* (2013) imply that budget deficits could help economic growth because it help to increase the efficiency of restructuring, and provide more resources to invest in education, infrastructure, and social welfare, thereby promoting economic growth. On the other hand, the persistent of budget deficit could be seen as a source of macroeconomic instability in many developing countries such as debt crisis, high rate of inflation, low investment and poor growth performance (Chimobi and Igwe, 2010). Moreover, in Iraq, a recent study have been implemented by Saud *et al.* (2021) who examine the effects of budget deficit on economic growth utilizing ARDL and OLS methodologies. They find a weak significant positive impact of the budget deficit on economic growth in short-run, but the in long-run, the ARDL results declare that the accumulated budget deficit has a strong negative impact on the GDP. They have conclude their research with a set of recommendations including the necessity of Iraqi economy to diversify its source of revenues as oil revenues are not reluctant to provide a stable and sufficient fund to cover the budget deficit.

Although studies on the nexus between budget deficit and external debt across countries are innumerable (for example see Beaugrand *et al*, 2002; Folorunso, 2013; Shahateet *et al*, 2014; Al-Qudah, & Jaradat, 2018), the empirical studies that dwell on this topic relating to Iraq are still scanty. Saima and Uddin (2017) investigate the relationship between budget deficit and public debt in Bangladesh over the period 1995 to 2015 by employing Johansen Cointegration technique and Vector Error Correction Model (VECM) to show the long run and short run relationship between the two variables respectively. Cointegration test results reveal the presence of long run equilibrium relationships between the two variables. The Vector Error Correction Model (VECM) shows a negative relationship between budget deficit and public debt, as well as provides evidence for having a unidirectional causality running from public debt to budget deficit but not in the way round. Such findings are almost the same with what has been found by Folorunso (2013) in Nigeria, but with positive relationship between budget deficit and public debt. In contrast, Shahateet *et al.* (2014) find neutral hypotheses suggesting the absence causality running from budget deficit to external debt and there is no causality running the other way round in Jordan. Their findings suggest that fiscal decision makers may disregard external debt in setting budget constrains including taxes and non-interest spending. In a recent study in Iraq, Jauda and Saleh (2020) apply the autoregressive distributive lag (ARDL) approach to explore the impact of budget deficit on public debt over the period 2003-2016, find a long-run and short-run relationships between public debt

and budget deficit, but the study has serious problems in the specification of the model employed and reporting their results.

3. Theoretical Framework

The primary objective of the theoretical framework used in this paper is to comprehend the underlying principles of the subject. In this section the necessary theoretical framework for both variables are presented.

3.1 Debt Definition

Debt is defined as a financial resource used by an organization that neither belongs to its shareholders nor is contributed to by the organization's owners.

The phrase "public debt" refers to borrowings made by the government of a nation; these borrowings may be made from within the nation (internal debt), from abroad (external debt), or from both. When spending exceeds existing revenue, the government must borrow money.

A portion of a nation's debt is owing to foreign lenders such as commercial banks, governments, or international financial institutions (Manasseh, 2022). According to theories, the economy will suffer if external debt grows quickly and becomes unmanageable. External debt is a global issue that is permissible to a certain amount and under specific limits. (Mengste, 2022).

3.2 Budget deficit

An overrun in spending over income results in a budget deficit, which can be a sign of a nation's financial stability. The phrase is frequently used to describe government spending rather than that companies or people. Budget deficits have an impact on the total amount a nation owes to creditors, the total of its annual budget deficits, and the national debt. A budget deficit may result in increased borrowing, greater interest costs, and insufficient reinvestment, all of which reduce revenue for the next year. In terms of the theoretical framework, understanding the relationship between external debt and a government budget deficit has been explained in many schools of thought: Keynesian, Neoclassical and Ricardian theories (Bernheim, 1989). A description of each school of thought's views about the relationship between external debt and budget deficit is discussed in this section.

3.3 Classical theory on public debt and budget deficit:-

Early classical economists opposed public debt in the nineteenth and early twentieth centuries, mostly because they did not believe that the government should play a role in economic activity. Regarding the effects of public debt, David Ricardo, Adam Smith, and David Hume all had the same opinions. They opposed government borrowing because they believed it to be costly and ineffective (Perry, 2014). In his essay "Against Public Debt," David Hume said that once a nation starts borrowing, it will be powerless to stop until it reaches the brink of insolvency. (Aybarç, 2019).

David Ricardo concentrated on two presumptions: the perspective of a household and the family's outlook up until taxation. He contends that a government's budget deficit causes private savings to rise above what would be obtained by tax cuts, which causes the desired level of national saves to fall. Therefore, rather than resulting in a higher real interest rate, a country's decision to replace current taxation with a budget deficit mostly results in more foreign borrowing (Sabr, *et al*, 2021). The alternative is to increase government bonds as a result of lower taxes, which currently provides a transitory income for an individual. As a result, both the government and the consumer accumulate more debt and savings, which will result in future, tax payments that are larger. A current account deficit develops as a result of budget deficits. Only if rising national debt encourages foreign lenders to seek higher expected returns on this country's liabilities or if predicted real interest rates are significant enough to affect global markets (Shamsi *et al*, 2016). The potential for a nation's budget deficit to crowd out its domestic investments in the short term and its capital stock in the long term is weaker, in comparison. Long-term effects of the current account deficits, however, include decreased national wealth stocks and consequently higher claims from foreign investors. In essence, According to Ricardian theory, the government must pay a budget deficit whether it occurs now or in the future. Therefore, the tax cut policy has no impact on spending or saving, and it has no impact on economic growth (Barro, 1989).

3.4 Keynesian theory:

According to Keynesian theory, a budget deficit will increase the actual growth rate of an economy (Mengste, 2022). A government may occasionally decide to create a deficit as part of a specific plan, such as when addressing a conflict and the accompanying economic crisis. However, Keynesian theory does not view a budget deficit as a problem provided excess government spending is directed in the appropriate direction of investment (Sabr *et al.*, 2021). A deficit in the government's budget can boost private investment, savings, and the overall economy. Furthermore, Keynes opposed the purposeful

infliction of budget deficits on the government (Shaviro, 1997). In light of this; Keynes seems to have had a different perspective on the problem of public debt than is generally believed. Keynes opposed current expenditures over current revenue in the discretionary budget (Aspromourgos, 2014). Nevertheless, Keynes was certain that public capital investments have to be at least partially financed by debt. As a result, Keynes's worry was about the buildup of public debt that was issued to support current expenditures; his distaste of budget deficits was specifically directed toward current budget deficits. He did insist that the government should borrow money to pay for major projects as well as relying on user-charges to funding public investment (Dwyer, 2012).

3.5 The modern theory

The historical foundation for the development of contemporary views of this issue was laid by the debates between the classical and Keynesian schools on the subject of funding government budgets through deficits. By attempting to present a third argument, many of them refute both Keynes' and Smith's points of view (Zahariev, 2012.). According to J. Tobin's theory of the budget deficit, fiscal policy and monetary policy are the government's two primary macroeconomic management tools. According to him, economic depressions brought on by rising interest rates are more of a result than a cause of the budget deficit (Tobin, 2003). According to this theory supporting public consumption through debt was "eating up the national capital. The present theory of public debt places more emphasis on macro-economic factors than it does on specific utilities. It views the economy as a whole as a single entity (Zahariev, 2012). Modern economics assert that internally held state debt is not burdensome because we owe the loan to ourselves. They contend that having external debt is a real burden since it requires transferring actual goods and services from the debtor nation to the creditor nation in addition to paying back principal and interest to foreign governments. Modern economists believe that public debt is an essential tool for increasing employment and that it is currently employed to carry out economic policy (Bilan, 2016).

These discussions make clear that each of these theories relies on many variables and makes a variety of assumptions in order to arrive at the correct conclusion.

3.6 Iraq's budget deficit and external debt

The Iraq-Iran war, the drop in oil prices in the middle of the 1980s, the Gulf War and the ensuing economic blockade, and the suspension of Iraq's oil exports in the 1990s all had an impact on the state of the Iraqi economy during those years. All of this was brought on by a persistent deficit in the state

budget that began in 1981 and kept growing until 2002. Due to this budget shortfall, the Iraqi government turned to an inflationary financing strategy using bonds and other forms of public debt as well as transfers from the Treasury. As a result, the monetary policy was used to finance the government's financial imbalance and achieve a fundamental purpose. It should be highlighted that public debt, through affecting the money supply and how debt amounts are invested in projects that boost Real GDP growth rates and strengthen the productive system's flexibility, plays a significant influence in lessening the intensity of inflationary waves (Hasana, et al, 2020).

4. Descriptions of the data and the study process

4.1 Descriptive analysis:

The external debt problem is one of the most serious issue confronting the Iraqi economy because it causes financial imbalances, which results in an improvement in structural imbalances in the country's economy, as well as interfering in internal affairs by forcing the government to implement economic programs that have a negative effect on standards of economic and social life.

Figure1 depicts that, after 2004, there was a period of fluctuation in external debt, with rises and falls, but the overall trend was modest. The reason for this drop is the government's commitment with the Paris Club countries to cut foreign debt by 80% in 2004; however the external public debt has since increased. One of the most important reasons for the government to increase borrowing during the years (2014-2020) was an increase in current expenditures, particularly military expenditures to combat ISIS and financing and relief for the displaced, which coincided with a drop in oil revenues necessary to cover public spending due to the drop in oil prices and, as a result, a drop in public revenues.

Figure 1: Budget Deficit and External Debt
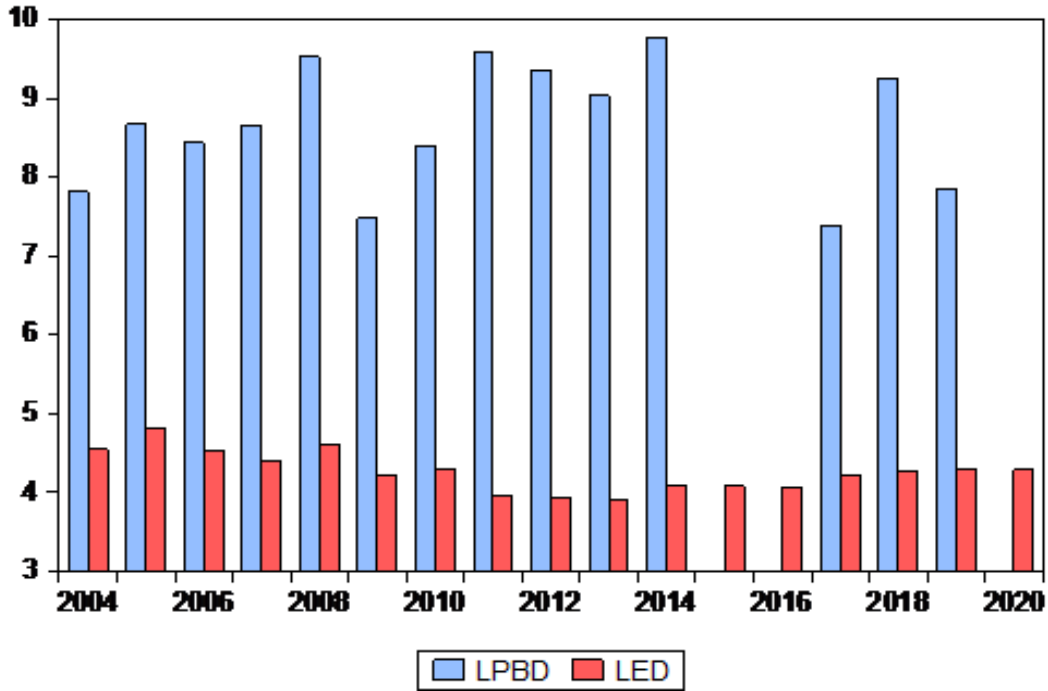
4.2 Data Description and Model specification:

Annual data for public budget deficit as a dependent variable, and external debt, and exchange rate as explanatory variables have been collected from the Central Bank of Iraq from 2004 to 2020 to examine the impact of external debt on the budget deficit in Iraq. The following function is utilized: PBD = F (ED, ER, D1) where PBD represents public budget deficit in Iraq, ED regards to Iraq's external debt, ER is the exchange rate between Iraq Dinar and US dollar, and a dummy variable of war against ISIS (D1).

The dummy variable of D1 shows the presence of ISIS in Iraq which is equal to one for observations belonging to the existing of ISIS in Iraq during 2014-2019 and zero for the others.

The empirical model for this paper is as follow:

$$\text{Log (PBD)} = \lambda_0 + \lambda_1 Log(ED_t) + \lambda_2 Log(ER_t) + \lambda_3(D1) + \xi_t$$

Where Lpbd depicts the logarithm of Iraq's public budget deficit at time t; Led is the logarithm of external debt, Ler refers to the logarithm of exchange rate, D1 refers to the war against ISIS and lastly, ξ_t represents the error term.

4.3 Research Methodology

For modeling Iraq's external debt consequences on its public budget deficit, the econometric analysis of stationary test, Johansen Co-integration test, Pairwise Granger Causality test, and ARDL technique are utilized.

4.3.1 Stationary Test:

The stationary of the series is a necessary step before doing econometric analyses to investigate the existence of unit root in the variables of the model, as its stationarity or lack thereof can have a significant impact on its behavior and features, as well as lead to spurious regression (Brooks, 2014). Argumentative Dickey Fuller (ADF) unit root test is used to check the stationarity of the data.

4.3.2 Cointegration Test:

Following the unit root tests, the Johansen cointegration test was used to determine whether the two economic variables, external debt and budget deficit, have a long-term link. The variables must be non-stationary at level and stationary after differences, and they must be integrated in the same order, according to the Johansen cointegration test (Enders & Hurn, 1997; Brooks, 2014). Trace statistics and Max-Eigen statistics are the two test statistics in question, and they're written like this:

$$\lambda_{trace} = T \sum_{i=r+1}^{n} \ln(1 - \lambda_i) \qquad (1)$$

$$\lambda_{max(r,r+1)} = -T\ln(1 - \lambda r + 1) \qquad (2)$$

Under the null hypothesis, r is the number of cointegrating vectors, and λ the estimated value for the matrix of canonical correlations' ith ordered eigenvalue (Enders & Hurn, 1997; Brooks, 2014). These two test statistics examine the claim that a series has no more than r cointegrating vectors (0 r n).

λ_{trace} is a joint test where

H_0: the number of co-integrating vectors $\leq$ r

H_1: the number of co-integrating vectors > r

λ_{max} Conducts a separate test on each eigenvalue in sequence as follows:

H_0:r = 0 Versus H1: 0 < r $\leq$ n

H_0:r = 1 Versus H1 :1 < r $\leq$ n

H_0:r = n -1 Versus H1 :r = n

An H_0 of non-co-integrating vectors is used in the first test. If the H_0 isn't rejected, it means there aren't any co-integrating vectors. The H0 for r = 1 and so on shall be reviewed if the H0 for r = 0 is rejected. As a result, the up until H0 is no longer rejected, the value of r is gradually increased.

4.3.3 Granger Causality Test

A Granger causality test was performed to determine the existence and direction of causality between external debt and budget deficit. Granger causality is defined as follows: X and Y are two variables (time-series variables). "If the histories of both X and Y can better forecast Y than the history of Y alone, X is said to Granger-cause Y. In the VAR model, the following equation is estimated. The absence of the Granger causality test was determined.

$$BD_t = c_0 + c_1 BD_{t-1} + \ldots + c_p BD_{t-p} + d_1 PD_{t-1} + \ldots + d_p PD_{t-p} + v_t \qquad (1)$$

$$PD_t = a_0 + a_1 PD_{t-1} + \ldots + a_p PD_{t-p} + b_1 BD_{t-1} + \ldots + b_p BD_{t-p} + u_t \qquad (2)$$

Where, BD_t and PD_t represent budget deficit and national debt at time relatively.

4.3.4 Autoregressive Distributed Lag (ARDL) Approach:

After determining the levels of integration of the variables, the next step is to analyze the likelihood of cointegration of public budget deficit and its determinants using the ARDL test as described in (Pesaran & Shin 1999, Pesaran *et al.*, 2001). The ARDL test has a number of advantages over other techniques. In contrast to previous techniques, it uses a single reduced form model (Fosu, 2007). Given that none of the series is I, the ARDL bound test is applicable regardless of series level, form, or mixture of Stationary (2). The ARDL also has the advantage of allowing both long and short-run model parameters to be estimated at the same time.

5. Results and Discussion:

This section presents the findings of the study. To examine the effect of External debt on budget deficit in Iraq the Autoregressive Distributed Lag (ARDL) is applied. We start with testing for the existence of unit root for the variables of the model because its well-known that the (ARDL) can be applied if all the time series are stationary at level I(0) or if all the time series are stationary at level I(1) and if they are a combination of I(0) and I(1) but it can't be used if one of the time series is stationary at I(2). The Augmented Dickey Fuller test is utilized to test stationarity of the series. Moreover, co-integration test is applied to see whether there is a long-run equilibrium among external debt and the fundamental variables. After that, we also apply Granger's causality test to examine the causal relationship between the variables. Finally, the ARDL model is estimated to capture both long-run and short-run relationships between the series

Table 1: Results of Stationary (Augmented Dickey Fuller test)

Unit root test					
	ADF test (Level)		ADF test (First difference)		
Variables	Intercept	Intercept Trend	Intercept	Intercept Trend	Decision
Lpbd: Log of public budget deficit	0.1837	0.2129	0.0057*	0.0407**	Stationary
Led: Log of External Debt	0.4013	0.7701	0.0003*	0.0002*	Stationary
Ler: log of exchange rate	0.0274	0.8672	0.0124**	0.0673***	Stationary
Note: (*), (**) denotes Significant at 1%, 5% respectively					

Table 1 shows that all the variables are stationary in the First difference (Intercept) at the (1%, 5% and 10%) significant levels. The co-integration procedure is performed after validating the relevance in the first order I (I) of the co-integration concept.

Table 2: Results of Co-integration test

Series: PBD ED ER D1				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
PBD	0.997855	126.0752	47.85613	0.0000
ED	0.676596	33.90773	29.79707	0.0159
ER	0.658826	16.97493	15.49471	0.0297
D1	0.054742	0.844464	3.841466	0.3581
Trace test indicates 3 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
PBD	0.997855	92.16746	27.58434	0.0000
ED	0.676596	16.93280	21.13162	0.1752
ER	0.658826	16.13046	14.26460	0.0251
D1	0.054742	0.844464	3.841466	0.3581
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Table 2 shows that the trace statistics indicate three co-integrating equations at the (5%) levels, which denotes a rejection of the hypothesis of no co-integration amongst the series by (Mackin- non-Haug-Michelis, 1999). Therefore, the alternative hypothesis which states that there is a long run relationship between the variables is accepted

Table 3: Bounds test for co-integration

ARDL Bounds Test		
Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	47.80111	4
Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Table 3 shows the existence of co-integration between dependent variable (PBD) and the independent variables (ED, ER). Hence, the calculated F-Statistic (47.80111) is greater than all the upper bounds under the column I(1) of the table (3) then the null hypothesis can be rejected which says: There is no long run relationship between the dependent variable and explanatory variables for the estimated model. Then we conclude that is there is a long run relationship between the variables. Thus the ARDL model for the long run with error correction model (VECM) is performed.

Granger Causality test is performed to determine the existence and direction of causality between external debt and public budget deficit as it shown in the table below.

Table 4: Pairwise Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.	Decision
ER does not Granger Cause PBD	12	0.70591	0.7126	No causality
PBD does not Granger Cause ER		1.43530	0.5581	No causality
ED does not Granger Cause PBD	12	0.67585	0.7219	No causality
PBD does not Granger Cause ED		775.058	0.0273	Causality
ED does not Granger Cause ER	12	3.01024	0.4107	No causality
ER does not Granger Cause ED		7.64043	0.2677	No causality

Table 4 shows the result of Granger Causality test, that public budget deficit (PBD) is granger cause external debt(Ed). Thus, the null hypothesis is rejected according to 5% significance level. It means that is there is a bi-directional causality between Public budget deficit and external debt in Iraq.

Table 5: Short-run and Long- run estimation using ARDL Approach

ARDL Cointegrating And Long Run Form				
Dependent Variable: LLPBD				
Selected Model: ARDL(1, 1, 0, 0)				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LED)	-0.023708	0.150221	-0.157820	0.8791
D(LER)	0.528481	0.147318	3.587339	0.0089
D(D1)	-0.018648	0.058220	-0.320304	0.7581
CointEq(-1)	-1.162385	0.300873	-3.863375	0.0062
Cointeq = LLPBD - (-0.2453*LED + 0.4547*LER -0.0160*D1)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LED	-0.245336	0.095636	-2.565308	0.0373
LER	0.454652	0.058429	7.781240	0.0001
D1	-0.016043	0.050254	-0.319239	0.0758

Table 5 shows the results of ARDL in both short run and long run. In the first part the result finds negative though statistically insignificant relationship between external debt and public budget deficit in short run, that is, when the external debt increases by one percent, the public budget deficit decreases by 0.02%. Moreover, the second part of the table shows the long run relationship between the including variables in the study. External debt (ED) has a negative and statically significant relationship with public budget deficit (PBD), meaning that a one percent increase in (ED) leads to decrease in (PBD) by 0.24%. This result is consistent with previous literature (for instance, Jauda and Saleh, 2020, Al-Qudah, and Jaradat, 2018, Saim and Uddin, 2017). Furthermore, the result is also consistent with the reality of the Iraqi economy, as there is deficit in the budget; government depends on external debt to finance its budget deficit (IMF, 2020 World Bank, 2018).

A dummy variable of war against ISIS in 2014 (D1) has a negative and statistically significant at (10%) effect on public budget deficit in the long run, which means that as the intensity of the war with ISIS increases lowers the BOP by o.016. However, during periods of war, theoretically budget deficit should increase as a result of increasing government expenditure to finance the war; still such result is acceptable and validates the existing situations in Iraq over the period 2014- 2018 since the IMF approved a three year, 5.34 billion US dollars loan for Iraq

As well as providing Iraq with 1.2 billion US dollars for emergency assistance.

Finally, the error correction parameter is equal to (-0.162385) and significant at 5% level. It exhibits a negative value, which confirms the existence of a balanced relationship in the long run. In addition, the error correction mechanism is present in the model, and the parameter measures the speed of return to the equilibrium position in the long term. Thus, the long-term imbalance is corrected by 0.16%.

Table 6: Diagnostic tests and Statistical Indicators for ARDL model

Tests	LM test F-statistic	(ARCH) test	Ramsey RESET test	Jarque-Bera	VIF	Stability
	F-statistic	F-statistic	F-statistic	F-statistic	Centered VIF	CUSUM CUSUM of squere
	0.2027 [0.8205]	0.446 [0.5168]	0.4025 [0.5415]	Not applicable [0.216]	Less than 10	Stable

R-squared	0.933430	Mean dependent var	8.808187
Adjusted R-squared	0.700435	S.D. dependent var	0.771884
S.E. of regression	0.422472	Akaike info criterion	1.105173
Sum squared resid	0.356965	Schwarz criterion	1.347241
Log likelihood	2.474134	Hannan-Quinn criter.	0.839625
Durbin-Watson stat	3.292581		

Table 7 shows all diagnostic tests results that have been used such as LM, for Correlation; ARCH, for heteroscedasticity, Ramsey RESET, for model specification, Jarque-Bera, for normality and Variance Inflation Factor, for multicollinearity. The F-statistic of these tests is more than the critical value. The model passed these tests. The null hypothesis (H_0; the econometrics problem does not exist) is accepted for the model. Therefore, the ARDL models are correctly specified for Iraq. Table 7 also shows that R^2 and adjusted R squared are too high for the public budget deficit model. This finding shows that the model fit the data and has a correct specification.
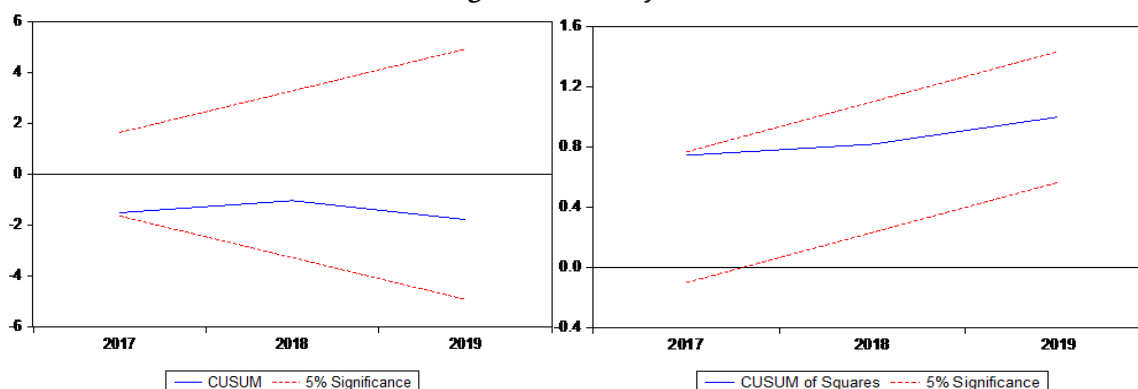
Figure 2: Stability Test

Figure 2: represents the stability test of the model CUSUM and CUSUM of square at significant level (5%) which shows that the regression line passes the mean of the critical region boundary lines. Thus, the model is stable at significant limits.

Conclusion:

  This study aims to examine the effect of external debt on budget deficit in Iraq in both short run and long run by using annually time series data for the period (2004-2020). The unit root test, Johansen cointegration test, Granger Causality, Autoregressive Distributive Lag (ARDL) Approach has been applied to examine the study hypotheses. The study finds the followings:

- The Johansen cointegration test finding shows the variables are cointegrated, which means that there is a long-run relationship between the budget deficit and the explanatory variables in Iraq.
- Bidirectional causality between external debt and budget deficit is found by using the granger causality test.
- The study finds that external debt has a negative relationship with public budget deficit in Iraq both over the short run and long run. In a long-run, any one percent increases in external debt causes the Iraqi public budget deficit to decrease by 0.24%.
- A dummy variable included in the study (war against ISIS) which had a negative effect on the public budget deficit as a result of the loans and aids received by Iraq during the war.

These findings have the consequence that increasing debt levels causes the Iraqi economy to experience a lower degree of budget deficit for the reason that the Iraqi government may have so far failed to raise enough financial resources to reduce its load with preserving its public budget balances. Fiscal policymakers should consider other financial resources instead of focusing merely on the oil sector in order to boost the economy generally, improve the state budget, and pay off external debt simultaneously. Therefore, urging economic diversification, spending on infrastructure and productivity improvements are in paramount.

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Appendix (1) The Data used for estimation

Year	Public Budget Deficit (Billion USD)	External Debt (Billion USD)	Exchange Rate(1 USD)	ISIS
2004	2476.14	93.95	1453	0
2005	5874.84	125	1472	0
2006	4602.44	93.33	1467	0
2007	5770.61	81.48	1255	0
2008	13647.98	100.9	1193	0
2009	1776.83	67.47	1170	0
2010	4410.33	73	1170	0
2011	14507.8	52.58	1170	0
2012	11521.63	50.79	1166	0
2013	8405.8	50.26	1166	0
2014	17370	59.49	1166	1
2015	-4517.75	59.49	1166	1
2016	-4874.47	58.13	1167	1
2017	1622.9	68.01	1182	1
2018	10402.93	72.43	1184	1
2019	2585.72	73.02	1184	1
2020	-4466.78	73.02	1195	0