

Assess the Sustainability of Public Debt in Iraq's Oil Economy (Autoregressive Distributed Lag Methodology)

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Abstract: It led to the decline of oil revenues below levels normalized by the public budgets of the worsening fiscal deficits and levels of public debt in Iraq. The sustainability of public debt and the ability of the government to track the flow of public spending and meet its future financial obligations are dominated by most economic and financial studies given the importance of fiscal sustainability framework in the design, implementation and effectiveness of macroeconomic policies including fiscal policy in particular. This study attempts to monitor and analyze the public debt trajectory in the Iraqi economy through the discussion of modern approaches in assessing fiscal sustainability in resource-rich countries, the design of the standard model based on self-regression approach for periods of Distributed delay Autoregressive Distributed Lag (ARDL) to assess the sustainability of the public debt during the period (1980-2015). And out a set of procedural policies guaranteeing the continuity of government debt service (internal and external) and to achieve justice between generations and the rebuilding of the fiscal space that allows fiscal policy room for maneuver during periods of boom and bust oil.

Key words: Public debt, fiscal sustainability, resource-rich countries, ARDL Model, effectiveness, government

INTRODUCTION

The nature of the subject and the practical purpose of the paper and the institutional environment surrounding the public debt in Iraq influenced the choice of approach, to show the dimensions and mechanisms that did not appear prominent in Iraq so far. Oil price fluctuations and social and political pressures to raise public spending raise many questions for Iraq's fiscal and monetary policymakers, especially as oil prices fluctuate in business cycles in other countries if not more violent. The collapse of crude oil prices over the past three years has led to a serious increase in public budget deficits that has translated into a sharp increase in public debt rates in the country. Which arranges future deductions from the public budget to serve the premiums and benefits of public debt instead of directing them to finance the requirements of development, construction and reconstruction. The current levels of oil revenues require redesigning public finances on new fiscal rules to manage public finances efficiently and keep the national economy away from the acute part of the crisis. The recent sharp fluctuations in international oil markets have reinforced the role of fiscal policy in absorbing and mitigating oil shocks and in achieving economic growth and stability in oil-rich countries. In this context, assessing the sustainability of public debt is a central issue in assessing the course of fiscal policy in oil-dependent countries in budget financing and economic development.

The study seeks to discuss the general thesis on debt sustainability in resource-rich economies (including Iraq), followed by the design of a standard model based on modern approaches to economic measurement to assess the sustainability of public debt in Iraq. The second part examined the sustainability of the debt in the context of the budget constraint while the third part monitored the direction of fiscal sustainability in resource-rich countries. Finally, Part IV reviewed the steps of the regression approach (ARDL) and the results of the assessment of the sustainability of public debt in the Iraqi economy during the period (1980-2015). The study concluded with a summary and a set of policies.

MATERIALS AND METHODS

Public debt in the context of fiscal sustainability: Acquired fiscal sustainability has been at the forefront of fiscal policy debates since the global financial crisis of 2008 and the legacy of sovereign debt in European and other countries. fiscal sustainability is closely linked to the dynamics of public debt. fiscal policy is unsustainable when the ratio of public debt to GDP grows without limits, thus the debt out of control and consequent serious economic sanctions such as inflation, fiscal austerity, unemployment, monetary tightening and other effects Economic (Cruz-Rodriguez, 2014).

The importance is increasing of fiscal sustainability as a monitor tool and analyze the country's fiscal ability

to sustain long-term public expenditure and revenue policies without affecting financial solvency or exposure to financial insolvency risks and failure to meet future financial obligations due to increased budget deficit and internal and external public debt. The sustainability of public finances ensures the state's ability to balance expenditure and public revenues over the long term without reducing solvency, exposure to financial insolvency risks or defaulting on future liabilities. (Al-Hawi, 2015). On the other hand, the concept of fiscal sustainability associated to the time balance of public finance which means financing the future budget deficit by future government revenues. Fiscal sustainability is also linked to the ability of the state to change the direction of fiscal policy without defaulting on public debt. That is the sustainability of public debt.

Other studies point to fiscal sustainability as the ability of the country, both now and in the future to meet its financial obligations and to service its debt without the need for debt rescheduling or accumulation of arrears or debt sustainability without the need for substantial adjustments in future fiscal policies to strike a balance between Revenue and overhead. Non-sustainability is a situation in which debt accumulates indefinitely at a rate faster than the state's capacity to service (bonanza). The fiscal sustainability framework involves the initial availability of solvency and liquidity. The solvency is the ability of the state to meet its financial obligations and is realized if the current discount rate PDV for current and future spending is lower than the current discount rate for current and future income less public debt receivables. Liquidity means sufficient financial resources to meet financial obligations as they mature (Banafa and Ali, 2016).

The sustainability of public debt is seen as having an impact on sustainability. The problem of sustainability is not the level of public debt but the way the government uses it. Religion is not a problem as long as it does not affect economic growth in the country. This is consistent with Blanchard's definition of fiscal sustainability as the policy that ensures the stability of the public debt to GDP ratio. This may be achieved through the use of funds borrowed by the government in appropriate projects and investments that have a positive impact on the value of output. To be accompanied by a rise in the size of gross domestic product in order to maintain this ratio.

However, fiscal sustainability requires avoiding excessive government debt because it is a burden on future generations. The use of borrowing to finance current public expenditure means that future generations will bear the burden of ongoing financial decisions and this has a negative impact on social justice between generations because it is imperative for future generations to do away with part of their income to cover these loans. The government's borrowing today will shift consumption

from the future to the present and future generations are forced to abandon part of their personal consumption for present-day generations. In other words, current generations will live at the expense of future generations if the government does not set limits on the excessive increase in public debt. Therefore, in order to achieve sustainability, the state must think about the long term when resorting to borrowing which has an impact on the future of future generations (Kabbaji, 2012).

Sustainability of debt in the context of budget constraint:

Recent studies focus on indicators of fiscal sustainability in the management of public debt. The public debt is considered fiscal sustainability if the debt repayment condition is met. In order to achieve this requirement, there should be a surplus in the government budget sufficient to repay the public debt whether its basic value or interest on him. Public finance becomes sustainable when the ratio of public debt to gross domestic product remains constant, returning to its original levels in the event of changes or emergency events. To achieve this, government finances must be sufficient to cover future debt burdens without the need to reschedule debt or borrow again to repay debts.

It provides under the usual budget of the government and expressed as below, the necessary information on government deficits and the various sources of funding for the size of this deficit (Mahmood and Rauf, 2012) as in Eq. 1:

$$G_t - R_t + i_t B_{t-1} = \Delta B_t \tag{1}$$

Where:

- Bt : The represents public debt (domestic and foreign)
- Gt : Government expenditure
- Rt : Government revenue

In developing countries (including Iraq), one of the difficulties encountered in the above-mentioned budget constraint is that debt sustainability analysis must include the credit of seigniorage, tax revenues, non-tax revenues, fees, etc. to finance government deficits. Thus, Eq. 1 can be rewritten as follows:

$$G_t - R_t + r_t B_{t-1} = \Delta B_t + \Delta H_t \tag{2}$$

Where:

- Rt : Tax revenue+non-tax revenue+additional fees+grants
- Gt : Current government expenditure (including interest payments)
- Bt : Public debt (internal and external)
- rt : real interest rate
- Ht : High cash payment (the monetary base) to support the budget

The left side of the budget constraint in Eq. 2 expresses the fiscal deficit as the sum of the initial deficit and the real interest rate. While the right side of the equation refers to sources of funding for the government's fiscal deficit. With some adjustments in Eq. 2 we get:

$$-PS_t + (1+r_t)B_{t-1} = B_t + \Delta H_t \quad (3)$$

$$B_t = (1+r_t)B_{t-1} - (PS_t + \Delta H_t)$$

$$B_t = (1+r_t)B_{t-1} - S_t \quad (4)$$

Since, the Pst is the initial balance and because the primary balance variable is of primary importance, it can be seen that the negative initial balance ($Pst < 0$) simply means that the government will meet its debt either by issuing debt securities or through debt consolidation, both options to finance the government's fiscal deficit. On the contrary in the case of initial surplus, ($Pst > 0$), the government can use the initial surplus to extinguish its old debt and reduce the accumulation of debt. Thus, the sum of the initial balances and the change in the monetary base are referred to as $S_t = (Pst + H_t)$. To derive budgetary constraints between the above mentioned time periods, the equation (N) is repeated forward as shown in Eq. 5:

$$B_t = (1+r_{t+1})^{-1} B_{t+1} + (1+r_{t+1})^{-1} S_{t+1} \quad (5)$$

$$B_{t+1} = (1+r_{t+2})^{-1} B_{t+2} + (1+r_{t+2})^{-1} S_{t+2}$$

By replacing the B_t values in +1 (Eq. 5) and taking expectations into account, take the equation form the following:

$$B_t = \lim_{N \rightarrow \infty} E_t \prod_{j=1}^N (1+r_{t+j})^{-1} B_{t+N} + \lim_{N \rightarrow \infty} E_t \sum_{j=1}^N \prod_{j=1}^N (1+r_{t+j})^{-1} S_{t+j} \quad (6)$$

There is a necessary and sufficient for the sustainability of the public debt in accordance with the previous analysis of the condition which is the discounted present value of the expected debt ratio to GDP close to zero because ($N \rightarrow \infty$) and therefore, under government solvency government solvency, sufficient condition, can be expressed:

$$E_t \lim_{N \rightarrow \infty} \prod_{j=1}^N (1+r_{t+j})^{-1} B_{t+N} = 0 \quad (7)$$

A necessary and sufficient condition for the sustainability of public debt, according to the previous analysis is that the present value discounted from the ratio of debt to GDP is close to zero because (N) and thus, the government solvency is sufficient can be expressed.

If the proceeds of Eq. 7 are smaller than zero, the initial discounted surpluses (projected in the future) will exceed the current value of the public debt; this means that the government will accumulate tax revenues. Conversely, if the adjusted Eq. 7 is greater than zero, the present value of the government debt will exceed the expected initial surpluses which means that the government is constantly borrowing to extinguish interest payments on its debts.

A basic and sufficient condition for the sustainability of public debt is that the expected discounted value of the public debt ratio of the GDP to zero when n becomes infrequent which is known as the transversality condition, implicitly implies that no Ponzi games are allowed (allowed), i.e., not to issue new debt to repay previous debts and therefore the discounted present value of all future debt balances must be zero. This requirement means that the ratio of current debt to GDP is equal to the sum of current and future surpluses (expected). According to Eq. 8, the current debt is offset by the expected total expected surplus (current and future):

$$B_t = E_t \sum_{N=0}^{\infty} \prod_{j=1}^N (1+r_{t+j})^{-1} S_{t+N} \quad (8)$$

Thus, the time constraint of the budget shows the government's inability to continue the game of bonzi forever. Assuming Rashadh government, the behavior when borrowing is not the same Albonza financing but tends to pay off their debts on time periods in a row and therefore, the public debt of Seoul to zero in the future (Tanner, 2013).

RESULTS AND DISCUSSION

Standard model and analysis of results: In order to determine the relationship between economic variables and their trends, most modern economic studies use the Autoregressive Distributed Lag Model (ARDL) Model which is based on the estimation of the Unrestricted Error Correction Model (UECM). This is because ARDL is characterized by its traditional approaches to the techniques of joint integration, its ability to distinguish between independent and reliable variables and the possibility of estimating short and long-term variables simultaneously and at the same time. The ARDL Model helps to eliminate problems related to the deletion of variables and the problem of self-correlation and the time series are not required to be stable at the same level. In addition to its applicability in small samples, most of the tests of co-integration that require relatively long time series have been reversed (Shoman *et al.*, 2013). In order to estimate the ARDL Model, it is necessary to conduct

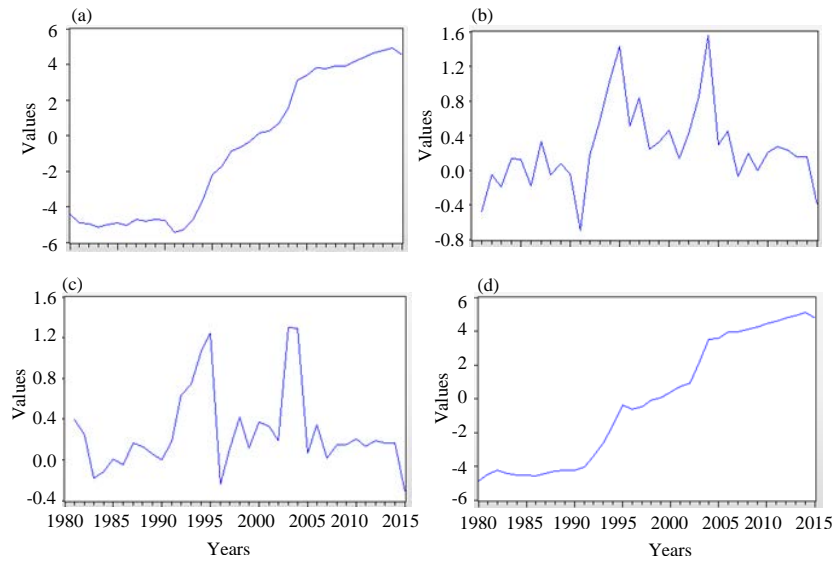


Fig. 1(a-d): The evolution of Government Expenditure (GE) Government Revenue (GR) in Iraq for the period (1980-2015) (a) Logarithmic data for government revenue at the level (b) Logarithmic data for government revenue at the first difference (c) Logarithmic data for government expenditures at the first difference and (d) Logarithmic data for government expenditure at the level

the necessary tests for the time series used in the analysis whether stable or unstable as well as to analyze the existence of a long-term balance relationship linking the study variables.

First, test the stability of time series: The concept of stability is used as an expression of the degree of complementarity of the time series by estimating its root root. If it contains a single unit root, it is an Integrated One Order One and is symbolized as $I(1)$. The time series that do not contain the root of the unit or the stable strings are complementary from the $0(I)$ (Hill *et al.*, 2012). The condition of stability is fundamental in the study and analysis of time series and if time series are not stable, sound and logical results will not be obtained (Heij *et al.*, 2004). A number of approaches were used to test the stability of the time series of the variables used in the analysis as follows.

Time series graph: Figure 1 illustrates the direction of the time series of the economic variables studied and shows that the time series of the GE and GR government variables can be unstable at the level with a fixed limit and a general trend 1-A) and becomes stable when taking its first differences (Fig. 1b). The fluctuation of the data mentioned in the zero value is observed in the first difference as shown in Fig. 1b. The evolution of Government Expenditure (GE) Government Revenue (GR) in Iraq for the period (1980-2015).

Function self-correlation: Self-correlation function also helps to verify the stability of the time series of the study variables. The results of the self-correlation test show that Government Expenditure variables (GE) and Government Revenues (GR) are unstable at the level and become stable in the first difference . The self-correlation function of the variable of public revenue and the variable of expenditure at the level and at the first difference.

Augmented dickey-fuller: Dickey and Fuller (1981) test was used to test the stability of the time series of GE and GR in Iraq for the period 1980-2015. The results of the test (Table 1 and 2) show that the calculated values of t (1), 5 and 10% which means that the root hypothesis of the unit cannot be rejected $H_0: \beta = 0$ for the time series of the variables of Government Revenue (GR) and Government Expenditures (GE) during the study period, so that, the time series of the variables mentioned are not For a stable time at the general level.

Table 3 shows the results of the extended Dickey Voller test for the time series of the government variable GR and the variable of the GE government expenditures after taking the first differences. First, the results show the significant value (t) calculated at 5 and 10% In the first difference and this indicates the correlation of the variables of the first rank $I(1)$.

Second: the Johns-Jecius joint integration test: The model of joint integration tests the existence of a long-term equilibrium relationship between economic

Table 1: ADF test for government expenditure levels and government revenues in Iraq for the period 1980-2015

ADF level with intercept and trend Government Revenues (LGR)				ADF level with constant only Government Revenues (LGR)			
Variables	CV	t-statistic	Probability	Variables	CV	t-statistic	Probability
1% level	-3.639407			1% level	-4.252879		
5% level	-2.951125	-0.686219	0.8370	5% level	-3.548490	-1.956468	0.3433
10% level	-2.614300			10% level	-3.207094		
Government expenditure (LGE)				Government expenditure (LGE)			
1% level	-3.632900			1% level	-4.252879		
5% level	-2.948404	-0.180880	0.9319	5% level	-3.548490	-2.462496	0.3433
10% level	-2.612874			10% level	-3.207094		

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Table 2: ADF test for government expenditure levels and government revenues in Iraq for the period 1980-2015

ADF level with constant only Government Revenues (LGR)				ADF level with intercept and trend Government Revenues (LGR)			
Variables	CV	t-statistic	Probability	Variables	CV	t-statistic	Probability
1% level	-3.639407			1% level	-4.252879		
5% level	-2.951125	-3.361305	0.0197	5% level	-3.548490	-3.149736	0.1116
10% level	-2.614300			10% level	-3.207094		
Government expenditure (LGE)				Government expenditure (LGE)			
1% level				1% level	-4.252879		
5% level	-2.948404	-3.472561	0.0151	5% level	-3.548490	-3.397329	0.0685
10% level	-2.612874			10% level	-3.207094		

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Table 3: The results of the long-term relationship between government revenues and government expenditures according to the Johansson-Jeslous methodology

Ho (null hyp.)	Ha (alt. hyp)	Trace stat (λ)	Critical values (5%)	Eigen-values
$r = 0$	$r = 1$	23.25186	15.49471	0.485937
$r \leq 1$	$r = 2$	0.627968	3.841466	0.018300
$r = 0$	$r = 1$	22.62389	14.26460	0.485937
$r \leq 1$	$r = 2$	0.627968	3.841466	0.018300

Prepared by researchers depending on the program Eviews-9.1

Table 4: The results of the decline of the joint integration according to the model (ARDL)

Regressor	Coefficient	T-Ratio	Prob
LX2(-1)	0.66186	5.0345	[.000]
LX1(-1)	-.67430	-7.2423	[.000]
R-Squared	0.99603	R-Bar-Squared	0.99653
F-Stat F (4, 28)		29.6[.000]	

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variables. This model was developed by Johansen (1988) and (Johansen and Juselius, 1990) to avoid the shortcomings of the methodology The Steps of Angel and Granger Engel-Granger two step method.

Table 4 shows the nature of the long-term relationship between the Government Revenue log (GR) and the Government Expenditure log (GE) in Iraq during the period 1980-2015. Where the λ trace shows that the calculated values of the highest possible rate of Government Expenditure (GE) and its relation to Government Revenues (GR) amounted to (23.25186), exceeding the critical value of (15.49471) at a significant level (5%). The null Hypothesis ($H_0: \beta = 0$) and the absence of any vector of cointegration ($r = 0$) and acceptance of the alternative hypothesis that a number of cointegration vectors are greater than zero ($r = 1$).

The results of the λ max test corresponded to the results of the impact test in interpreting the relationship between the Government Revenue log (GR) and the

Government Expenditure log (GE) in Iraq during the study period. The results in Table 4 show that the calculated value of the possibility rate (22.62389) is greater than the critical value (14.26460) at a significant level (5%). This means rejecting the null hypothesis that there is no vector of cointegration ($r = 0$) ($R = 1$).

Thus, the results of the test of joint integration of the two series of government revenues and expenditures reveal a long-term balance between them. This relationship means that the long-term will balance government revenues and expenditures, despite short-term fluctuations. Which means that the condition of stability of the deficit will be achieved and thus achieve the sustainability of public debt in the Iraqi economy. Third: to estimate the relationship between government revenues and government

(ARDL) is used to measure the long-term and short-term relationship between economic variables. The nature of the relationship between Government Expenditure (GE) and Government Revenues (GR) in Iraq for the period 1980-2015 can be illustrated by the following tests.

Integration regression according to ARDL Model:

Table 5 shows the results of the regression of joint integration according to the ARDL Model and using the Microfit program which automatically sets the delay times

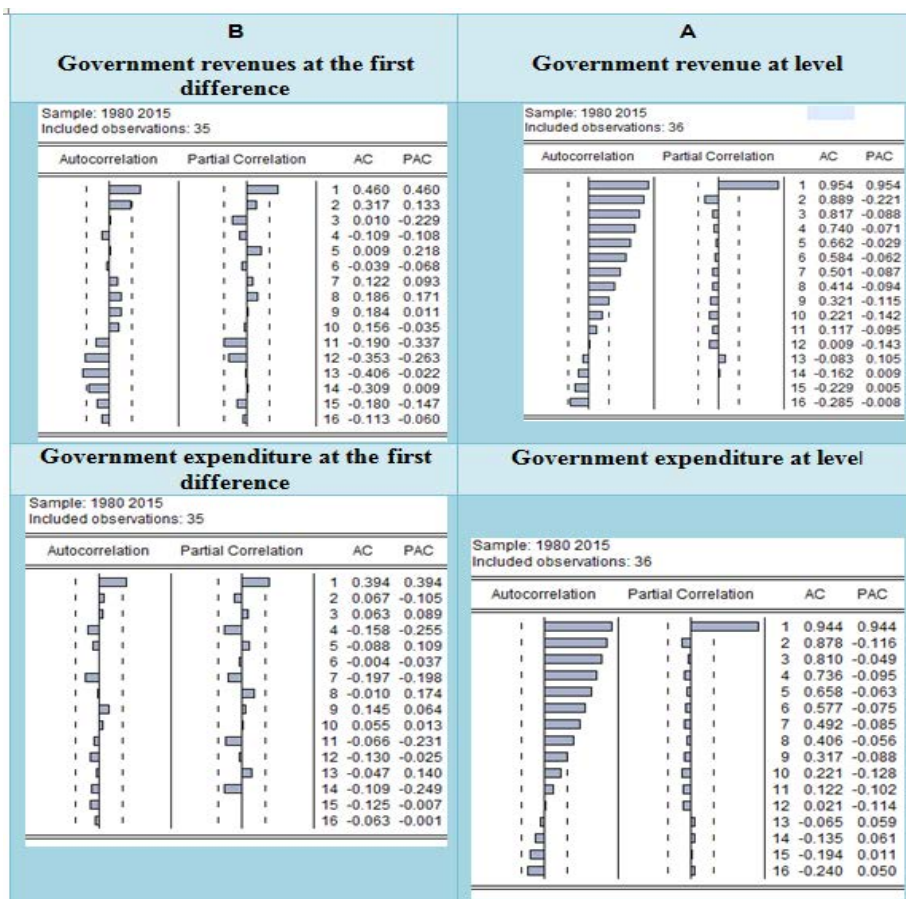


Fig. 2: The self-correlation function of the variable of public revenue and the variable of expenditure at the level and at the first difference; Prepared by researchers depending on the program Eviews-9.1

(1.0, 0, 0) based on the Akaike values which give the lowest value to this standard and are determined by the program. The model's statistical tests show that the value of the 2 R) test is very high as the model explains (0.99%) of the changes in government expenditure due to changes in government revenues. This is consistent with the logic of economic theory and financial analysis in addition, the calculated value (F) was significant (29). Table 5 the results of the decline of the joint integration according to the model (ARDL).

Estimating error correction model and short-term relationship: The error correction model helps to show the short-term elasticities of the studied variables. The results show that the signal of the parameters was as expected. The reference of both the government revenue and the government expenditure was positive and reflects the positive relationship between the dependent variable and the changes in the variable Independent (government revenue). This means that the increase in government revenues by 1% is offset by an increase in government spending of up to 0.8% as shown in Table 6.

Estimating error correction model and long-term: Table 6 shows the long-term relationship between government expenditures and government revenues which represent long-term elasticities due to the use of logarithmic formula. The positive sign of the parameters reflects a long-term positive relationship between government expenditures and government revenues during the study period. This is in line with the short-term results and is also consistent with the hypothesis of the study of the convergence of government expenditure trends with the trends of public revenues in the long run. Iraq according to the methodology of the budget time constraint.

Test the stability of the model according to the estimated model (ARDL) can be used to test (2) and (3) stability of the estimated ARDL Model. It is noted from the graphs below that the line of expression is expressed in the middle between the boundary lines of the critical area of the graph and the zero value. The straight lines in Fig. 2 the upper and lower critical limits at a significant level (5%). Thus, the stability of the short-and long-term parameters of the estimated ARDL Model According to the statistical tests.

Table 5: Short-term relationship according to the model (ARDL estimated)

Regressor	Coefficient	T-Ratio	Prob
dLX1	0.80003	6.9646	[0.000]
ecm(-1)	-0.33814	-2.5722	[0.015]
ecm = LX2 -0.37183*LX1			
26.0128[.000] F-Stat		-Bar-Squared 69822	

Prepared by researchers depending on the program mic

Table 6: Long-term relationship according to the model (ARDL estimated)

Regressor	Coefficient	T-Ratio	Prob
LX1	0.37183	2.0289	[0.52]

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CONCLUSION

The study sought to assess the public financial ability to bear the burden of public debt in Iraq by studying the long-term balance between public revenues and public expenditures during the period 1980-2015 according to the budget-based time-recording methodology adopted in resource-rich economies. The results of the estimated standard models revealed the strength of the long-term equilibrium relationship between public revenues and overhead. Although, there are some gaps caused by the volatility of the oil resource, public revenues are able in the medium and long term to absorb public expenditure and contain the burden of public debt and thus achieve fiscal sustainability in Iraq's economy based on the export of oil wealth.

However, excessive government spending and total reliance on volatile oil resources in financing the budget and bearing future debt are a fragile pillar that threatens the country's fiscal sustainability and weakens sustainable growth and stability. The study suggests a framework of procedural policies that could guide the design and formulation of a fiscal policy that is appropriate for the cycles of oil boom and recession and to achieve greater sustainability at the level of public finance, public debt, growth and economic stability. Strengthen the government's efforts to implement financial control measures, most of which are by reducing inefficient capital expenditure while protecting social spending. This will help bring government spending to a sustainable level as oil revenues fall to low levels.

Targeting the initial non-oil deficit in the assessment of financial performance as it isolates spending decisions on the continuing fluctuations of crude oil revenues and thus ensure the compatibility between long-term fiscal sustainability with the achievement of justice among generations in the utilization of oil wealth.

Focusing the efforts of the financial administration in Iraq in the search for the great opportunities for non-oil resources that make the non-oil main balance measure a target for strengthening and the required financial adjustments at the level of controlling and controlling public expenditures and maximizing non-oil revenues.

In the light of the rapid rate of public debt accumulation in Iraq and limited experience on key debt products and major financing needs, strengthening the debt management capacities of the Ministry of Finance and the Central Bank is critical. As well as the need to establish a fund for public debt compensation in which the deposit of any increase resulting from the improvement of oil prices above the target rate in the federal budget used to compensate for any internal or external debt.

To improve fiscal discipline and raise expenditure efficiency, the Ministry of Finance should strengthen the Public Finance Management Act, publish reports in accordance with international financial standards, strengthen controls governing expenditure commitments, improve cash management including reforming public investment management and improving debt management. Arabic and English sources.

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