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Review Article

Analysis of Financial Sustainability Indicators and their Reflection on the "Economic Cycle" in Iraq for the Period (2004-2022)

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Abstract: The study investigates the impact of "financial sustainability" indicators on Iraq's "economic cycle" from 2004 to 2022. It hypothesizes that changes in these indicators affect the "economic cycle" both positively and negatively, with varying degrees in the short and long term, depending on the country's economic policies. Using the ARDL model for analysis, the results reveal a significant positive relationship between GDP and indicators such as the "public revenues"-to-expenditures ratio (X1), the "public debt"-to-GDP ratio (X2), and the tax gap index (X3). Conversely, a significant negative relationship was found with the "public revenues"-to-GDP ratio (X4), the oil revenues-to-"public revenues" ratio (X5), and the external debt-to-exports ratio (X6). The study recommends that fiscal policies be designed to counteract "economic cycle"s, encouraging austerity and investment during booms and expansionary measures during recessions to stabilize the economy and promote "financial sustainability".

Keywords: "financial sustainability" indicators, "economic cycle", ARDL model, "fiscal policy", Iraqi economy.

INTRODUCTION

"Financial sustainability" is a primary concern in the economic analysis of nations, serving as a significant indicator of governments' capacity to manage financial resources effectively and ensure long-term stability. Maintaining economical viability is essential for fostering sustainable economic growth, balancing revenues and public expenditures, and mitigating the effects of economic fluctuations and adverse cycles. Consequently, it is essential to assess the influence of "financial sustainability" indicators on the profitable cycle across different nations, particularly those experiencing substantial economic difficulties, such as Iraq. From 2004 to 2022, Iraq underwent significant economic and political transformations that profoundly impacted its overall economic condition, commencing after the collapse of the previous regime and the nation's efforts to rebuild state institutions and restructure its economy. The reduction in oil revenues, coupled with political and security instability, has directly influenced the "economic cycle" in the country. Therefore, it is important to assess the impact of "financial sustainability" metrics on Iraq's "economic cycle" to understand how fiscal policies influence economic stability.

Search Problem:

Iraq has significant issues with "financial sustainability" because of its substantial reliance on oil earnings, coupled with elevated "public debt" and fiscal deficits. The major focus of this research project is articulated in its main inquiry: What is the effect of "financial sustainability" indicators on the fluctuations of the "economic cycle" in Iraq from 2004 to 2022?

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Significance of Research:

The significance of the academic analysis in the Iraqi economy is underscored by the need to identify solutions that enhance the state's financial performance and diminish reliance on fluctuating oil income, particularly amid global economic shifts and declining oil prices.

Research Hypothesis:

The research is founded on the assumption that the "economic cycle", through its metrics, is influenced both negatively and positively through fluctuations in "financial sustainability" indicators, in varying degrees over "short and long terms", depending on the economic policies implemented in the country.

Research Objective:

The research proposes to examine the influence of "financial indicators" of sustainability on the "economic cycle" in Iraq from 2004 to 2022.

Research Methodology:

The survey followed the standard quantitative approach method through the application of the statistical program (Eviews10) to estimate by conducting the necessary standard and statistical tests.

Research Limitations:

1. **Spatial boundaries:** Iraqi Economy.
2. **Time limits:** The research covers the time period (2004-2022).

Research Structure:

The study's three primary axes were as follows: The initial focus was on the theoretical and conceptual foundations of "financial sustainability" indicators and the consequent "economic cycle"; the second focused on quantifying and evaluating the influence of "financial sustainability" warning signs on the Iraqi "economic cycle" during the 2004–2022 period; and the third addressed a number of significant findings and suggestions.

The first axis: The "economic cycle" and the scientific and intellectual foundation of "financial sustainability" indicators.

First: The principle of "financial sustainability": The Concept of "financial sustainability"

The European Commission defines fiscal sustainability to be a government's capacity to uphold public expenditure and revenue regulations over the long term lacking compromising its ability to repay or going under on its obligations or current and future expenditures (Balassone and Franco, 2000: 24). Despite the existence of numerous concepts and theories regarding fiscal sustainability, there is consensus that the primary prerequisite for maintaining sustainable public finances is evaluating the state's capacity to persist in executing its fiscal policies and funding various public expenditure applications without facing financial distress or failure to appear (Samaqa Yi and Badawa Yi, 2015: 80). The ability of the nation to generate net future income sufficient to pay down the accrued "public debt" and its interest is essential to guaranteeing nations' ongoing financial stability. The political and economic ability to restrict the expansion of public spending or permit it to expand slowly while generating new income streams or increasing the present rates of public revenue (Al-Tohme and Al-Shammari, 2018: 388), The state's a decrease of "financial sustainability" or the erosion of belief in its capacity to fulfill obligations leads lenders to cease lending or to increase rates of interest on existing loans, imposing stringent controls and conditions for future lending due to the failure to achieve "financial sustainability". This concept is also characterized by the capacity to maintain spending and taxation practices over an extended period without reducing current expenditures or jeopardizing the fulfillment of future financial obligations imposed on the government (Sweet and Good, 2022:67).

Second: "Financial Sustainability" Indicators

The financial viability of nations has emerged as one of the most contentious problems due to the challenges confronting public finances, especially in debtor countries where "public debt" levels and budget deficits are increasing, so there are many criteria and indicators that vary from one country to another according to the strength of the state's financial structure, which are as follows:

1. Net Budget to GDP Index

This indicator derives from an analysis of the "general budget" structure to elucidate the disparity between expenditures and "public revenues", as well as their ratio to GDP. It is a crucial metric encompassing all economic sectors, aimed at stabilizing the debt-to-GDP ratio and thereby attaining "financial sustainability" (Al-Aside and Al-Kubaisi, 2023: 116). Additionally, the net budget index serves as a significant indicator and guide for assessing the deficit or surplus of the state's "general budget" to ensure financial stability. This indicator is based on the premise that attaining "financial sustainability" via "fiscal policy" necessitates sustaining the primary surplus ratio of the "general budget" to GDP at its

current level to guarantee the stability of the "public debt"-to-GDP ratio. The whole budget deficit ratio must not surpass 3%. The computation of this indicator entails assessing the proportion of the primary surplus or deficit in the public budget by calculating the difference between public expenditures (excluding interest payments) and "public revenues" (excluding interest income) (Abu Sharar, 2007: 527). This measure is essential for stabilizing the "public debt"-to-GDP ratio and ensuring "financial sustainability", although it is insufficient by itself. Achieving "financial sustainability" theoretically necessitates that the "general budget" sustains a cumulative primary surplus over a protracted duration, hence facilitating the yearly repayment of "public debt". This metric is computed with the subsequent equation: **(Hassan and Khudair, 2022: 208)**:

Net Budget Index / GDP X 100 ..... (1).

2. Public Revenue to GDP Index

The public revenue index relative to GDP illustrates the degree to which "public revenues" contribute to GDP. A higher percentage indicates a surplus in the public budget, enhancing the government's capacity for "financial sustainability". An increase in this percentage positively influences economic growth and signifies a rise in exports, enabling the government to address budget deficits through "public revenues". This, in turn, yields beneficial effects on the overall national economy. Consequently, this indicator should align with the expenditure index, as revenues must equal expenditures. A baseline of 35% of GDP has been established as an appropriate threshold for public expenditures, which can also be deemed a suitable ratio for revenues. Any surplus beyond this percentage is allocated to investment initiatives. This indicator is assessed using the following formula. ("fiscal policy" Report, 2022: 21):

Public Revenue Index / GDP X 100 ..... (2)

3. Index of Government Receipts to Public Expenditure

The ratio of public income to public costs is a crucial measure of public finance within the state's overall budget. It emphasizes the correlation between these two elements and their impact on the budget for a certain year. When public income increase at a rate surpassing public expenditures in a particular year, it signifies a surplus in the state's "general budget". If public expenditures exceed public earnings throughout the same period, it indicates a budget imbalance. This metric is computed with the subsequent equation: (Alwan and Talib, 2019: 312):

Public Revenue/Overhead Index X 100..... (3)

4. Oil Revenue to Public Revenue Index

The oil revenues to "public revenues" index is used to show the ratio of oil revenues from "public revenues", which are characterized by fluctuation in their outcome and cannot be relied upon much as a criterion for economic growth as revenues tend to deplete in the medium and long term, and this indicator is usually active in rentier developing countries and this indicator is measured according to the following formula (Mohammed and Aziz, 2019: 106):

Oil Revenue / Public Revenue Index X 100..... (4)

5. External Debt to Exports Index

The external debt to exports index is one of the indicators that show the government's ability to provide foreign currency based on the volume of exports, that is, the more the country's exports lead to an increase in foreign currencies and then the state becomes able to repay external debts through a decrease in the ratio of this indicator and achieve "financial sustainability", but in the case of a rise in this indicator, this indicates that external debt is greater than exports and thus the country faces problems in fulfilling its obligations Financial towards creditor countries, that is, does not achieve "financial sustainability"**,** and varying standard ratios have been determined for the volume of "public debt" to the volume of exports, as the ratio of safe borders by the World Bank (135%) and multilateral international financial institutions (150%), while the standard ratio according to the Paris Club was (275%), and this indicator is measured according to the following formula (Al-Helou and Al-Jiashi, 2022: 70):

External Debt/Exports X 100..... (5)

6. "Public debt" to GDP Index

The "public debt"-to-GDP ratio is a crucial indicator for assessing the robustness of a state's financial standing. The Maastricht Treaty, established in 1992, sets a benchmark for the European Union, stipulating that this ratio should remain below 60%. "public debt" is deemed financially sustainable if its ratio to GDP exhibits stability or a gradual decline over the long term. The escalating "public debt"-to-GDP ratio diminishes the flexibility of "fiscal policy" (Al-Moussawi, 2017: 13) and hampers the implementation of fiscal austerity measures, adversely impacting the sustainability of the state's prior expenditure policy. This indicator is quantified using the following formula. (Da'as and Raqoub, 2018: 116):

"Public debt" Index / GDP X 100..... (6)

The "public debt" index is divided into two types of indicators as follows (Al-Shayeb and Hamra, 2022: 27):

- **Internal "public debt" index:** This indicator is a crucial source for financing the state's budget deficit and represents an economic phenomenon prevalent in most countries. The management of internal "public debt" is a priority within

the state's financial policy, necessitating control, particularly over local government debt, which constitutes the majority. Efforts should focus on alleviating the burdens of this debt on the "general budget" or stabilizing it.

- **External "public debt" index:** The external debt index theoretically has the potential to enhance a country's economic growth rate by augmenting its financial resources, contingent upon the debt being allocated towards investment. However, empirical studies have consistently demonstrated that elevated levels of external "public debt" adversely impact economic growth rates, particularly when such debt is utilized for operational expenditures.

7. Tax Gap Index

This statistic illustrates the necessary modifications in "fiscal policy" to maintain the "public debt"-to-GDP ratio, indicating that tax policy should focus on narrowing the gap between taxes that ensure "financial sustainability" and current tax levels. (Legrenzi and Milas, 2012: 5), and Consequently, the objective tax-to-GDP proportion is:

The objective tax burden as a proportion of GDP is equivalent to the government spending ratio as a proportion of GDP (excluding interest payments) plus the product of the disparity between the actual rate of interest and the actual economic expansion rate and the "public debt" percentage as a proportion of GDP. It is observed that the actual annual tax rate collected is insufficient to cover public spending obligations, necessitating the exploration of alternative financing options. This indicator aids in monitoring and analyzing the evolution of tax revenue as a critical variable in the execution of fiscal policies and the financing of governmental responsibilities; however, it does not constitute a sufficient condition for assessing the sustainability of the government's fiscal policies. (Mohammed and Hussein, 2016: 150), so countries with low tax rates have the potential to increase taxes and reduce the gap and the trend towards "financial sustainability", and conversely for countries with high tax rates they have a limited capacity to increase the tax rate and therefore the state is exposed to risks Financial unsustainability (Izquierdo, 2003: 6).

Third: The concept of the "Economic Cycle"

The Concept of the "Economic Cycle"

Despite the fluctuations that affect the level of economic activity are not always cyclical stages and occur regularly, economists and writers use the term cycle to express these fluctuations, as the concept of the "economic cycle" refers to the stages that the macroeconomy goes through up or down depending on the changes in aggregate demand, which is a characteristic or phenomenon inherent to economies that depend on the market mechanism in allocating economic resources between their economic sectors, as the market balance is something It changes continuously as long as economic life or economic activities are in constant motion (Al-Issa, 2001: 175), Fluctuations at the economic level in production or behavior over several months or years (Maarouf, 2005: 231) manifest around a long-term growth trend, typically involving transitions between phases of elevated economic growth (expansion or boom) and periods of recession or relative decline. Deflation or economic contraction These fluctuations are typically assessed by the growth rate of real GDP (4: 2009, (Michael)), and are characterized as a form of fluctuation in the overall economic activity of nations. This cycle comprises expansions that concurrently manifest across various sectors of the economy, succeeded by phases of recession, contraction, and recovery. The time span of these cycles varies, with some extending beyond one year to ten or twelve years. (Vianna, 2023: 135).

Fourth: "Economic Cycle" Indicators

Numerous indicators are employed to assess the "economic cycle", enabling an evaluation of the economy's condition in relation to the cycle's effects. Every phase possesses specific indicators that reflect its intensity and duration. Fluctuations in "gross domestic product" (GDP) represent one of the most significant indicators for identifying and delineating the stages of the "economic cycle"; thus, the emphasis will be placed on GDP as a primary interpretative indicator of the "economic cycle":

- **Fluctuations in "gross domestic product"**

"Gross domestic product" (GDP) is the economy worth of all final products and services produced inside the borders of a country during a certain period, usually a single year. It serves as a measure of the country's economic performance, and fluctuations in GDP are among the leading economic indicators in reflecting the "economic cycle". **(Issa and Rashid, 2021: 311),** and GDP is measured by the rate of economic growth, and there are two ways to measure economic growth: **(Abd and Abd, 2021: 155):**

- **Simple Growth Rate:** Economic growth is measured according to this scale by the change that occurs in real income from year to year, but what is taken on this scale is that it is only suitable for measuring growth in income between two consecutive periods of time, and can be obtained in the following formula:

$$\textbf{CMs} = \frac{y_t - y_{t-1}}{y_{t-1}} * \textbf{100} \ldots\ldots\ldots\ldots\textbf{(7)}$$

Whereas:

CMs: simple growth rate, **yt:** average real income per year **(t),** y_{t-1}**:** average real income per year **(t-1).**

- **Compound Growth Rate**: This scale measures the general yearly growth rate over extended periods and serves as an appropriate instrument for assessing economic growth, derived using the subsequent exponential equation:
  $\mathbf{y = Ae^{rt}}$…….…….**.....**….. (**8**)

Converting it to the linear form gives us the following equation:
Ln(yt) = Ln(A) + r……...….. (**9**)

Whereas:
Ln(yt): the natural logarithm of the variable to be calculated its compound growth rate, **(A**): the constant term, **r)**: the compound growth rate, **(t**): time in a general direction.

Therefore, if the GDP measurement index is at a higher point than the previous point, i.e. the rate of change, this indicates that the economy is in a state of positive economic growth (recovery phase), while if the GDP measurement index is at a lower point than before, it indicates that the economy is in a state of negative economic growth (recession phase).

The second axis: Assessing the influence of "financial sustainability" parameters on the "economic cycle" in Iraq from 2004 to 2022.

First: Exposition of the Standard Model

The description (formulation) phase of the standard model is crucial in constructing the economic model and is particularly challenging, as it necessitates the precise identification of economic variables utilized in the standard model. This process relies on economic theory and prior scientific research to translate the relationship between independent and dependent variables into mathematical equations, thereby elucidating the direction and nature of the attachment between these factors. This enables the development of a standard model that illustrates the influence of "financial sustainability" measures on the "economic cycle" in Iraq. The standard description phase of the model encompasses two primary steps: As follows:

First Step: Determine the variables of the standard model used: Table (1) shows the time series data used in the standard side, as it includes independent variables that represent "financial sustainability" indicators, which are six indicators, and also includes dependent variables that represent the "economic cycle", which is a single variable, so these variables can be clarified as follows:

Table 1: Time series data for search variables used in the standard model for the period (2004-2022)

"economic cycle" Indicators		"financial sustainability" Indicators					
Years	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	GDP	**X1**	**X2**	**X3**	**X4**	**X5**	**X6**
2004	53499239	1.05	370.81	58.63	61.66	98.80	632.66
2005	73911088	1.31	223.29	41.07	54.71	97.34	388.57
2006	96067161	1.31	126.52	38.42	51.06	94.86	233.00
2007	111961230	1.39	83.82	34.13	48.81	95.06	171.12
2008	158443584	1.20	44.02	41.85	50.90	94.61	81.61
2009	131632210	0.99	55.01	40.92	41.97	90.85	121.25
2010	163104739	1.00	47.06	41.94	43.03	90.62	103.14
2011	218617835	1.38	33.56	35.39	49.77	90.29	66.61
2012	255727069	1.14	27.76	40.08	46.72	93.19	55.66
2013	256564458	0.92	25.80	45.10	42.53	96.86	56.20
2014	267262790	0.93	27.03	40.86	39.49	93.33	58.58
2015	196203013	0.94	52.54	34.85	33.88	77.20	95.26
2016	198774369	0.81	65.29	31.80	27.37	81.36	122.96
2017	224636323	1.03	67.29	30.81	34.47	84.16	121.73
2018	272083889	1.32	39.73	27.63	39.17	89.73	52.96
2019	279757643	0.96	41.34	38.50	38.45	92.24	66.22
2020	217413594	0.83	75.89	32.82	29.07	86.15	135.39
2021	305191375	1.06	52.23	32.21	35.74	98.80	53.22
2022	383182486	1.38	28.53	29.50	42.20	95.00	22.77

Source: Created by the investigator according to:

1. Column (1), **"Ministry of Planning**, **Central Bureau of Statistics**, **Directorate of National Accounts for different years".**
2. Column (2) to (7) of the tables in the third analytical chapter.

The second step: The equation of the standard model: that the current research and based on the theoretical framework consists of a dependent variable that reflects the "economic cycle", and six independent variables representing "financial sustainability", All of these factors will be utilized in a single model to assess the influence of "financial sustainability" markers on the "economic cycle" in Iraq. In this scenario, the following functional equation is posited for testing:

❖ **GDP model**

LGDP = a0 + b1X1 + b2X2 + b3X3 + b4X4 + b5X5 + b6X6 + ui.… (10)

GDP: GDP, X1: "public revenues" / Public Expenditures (Net Budget), X2: "public debt" / GDP, X3: Tax Gap, X4: "public revenues"/GDP, X5: Oil Revenues/"public revenues", X6: External Debt / Exports.

Second: The outcomes of the unit root tests for dormancy

Outcomes of Unit Root Assessments for Stationarity

To accurately ascertain the stationarity of economic variable time series, identify unit root issues, and evaluate the stability of these time series, various tests are employed. Among these, the Dickey-Fuller Extended Test and the Phillips-Perron Test are utilized in this research as the most precise and dependable methods for detecting time series stationarity. Administering this test aims to identify the suitable model for assessing the influence of "financial sustainability" indicators on the "economic cycle" in Iraq. Following the execution of one such test, we received the outcomes exhibited in Table (2), detailed below:

Table 2: Outcomes of the time a range stationarity assessment based on the (PP) analysis at the initial level and the differential

PP	**Time series of search variables will dwell at the original level**							
With Constant	Variables	LGDP	X1	X2	X3	X4	X5	X6
	t-Statistic	-2.3818	-2.3745	-9.9441	-4.4228	-2.599	-2.3926	-8.0217
	Prob.	0.1503	0.1524	0.0000	0.0006	0.0977	0.1472	0.0000
	Result	n0	n0	***	***	*	n0	***
With Constant & Trend	t-Statistic	-2.6385	-2.3938	-8.0269	-4.5922	-1.9652	-2.3932	-6.3904
	Prob.	0.2650	0.3797	0.0000	0.0022	0.6104	0.3801	0.0000
	Result	n0	n0	***	***	n0	n0	***
Without Constant & Trend	t-Statistic	2.4017	0.1814	-7.7943	-2.1240	-1.3102	-0.5016	-7.2676
	Prob.	0.9959	0.7361	0.0000	0.0332	0.1742	0.4958	0.0000
	Result	n0	n0	***	**	n0	n0	***
The time series of search variables will remain silent at the first difference								
With Constant	Variables	d(LGDP)	d(X1)	d(X2)	d(X3)	d(X4)	d(X5)	d(X6)
	t-Statistic	-4.4967	-4.0705	-3.6021	-4.7063	-4.156	-4.449	-3.5893
	Prob.	0.0005	0.0019	0.0079	0.0002	0.0015	0.0006	0.0082
	Result	***	***	***	***	***	***	***
With Constant & Trend	t-Statistic	-4.5289	-4.0558	-2.9648	-4.5766	-4.3928	-4.3964	-3.6319
	Prob.	0.0027	0.0109	0.1491	0.0023	0.0041	0.004	0.0338
	Result	***	**	n0	***	***	***	**
Without Constant & Trend	t-Statistic	-4.0722	-4.0706	-3.7938	-4.6975	-4.1684	-4.4628	-3.6299
	Prob.	0.0001	0.0001	0.0002	0.0000	0.0001	0.0000	0.0004
	Result	***	***	***	***	***	***	***

Source: Equipping the investigator with data utilizing the results from the statistical software (Eviews10).

The sign (*) indicates that it is significant at the level of (10%), and the sign (**) means moral at the level of (5%), and the sign (***) means that it is significant at the level of (1%) respectively.

The outcomes presented in Table (2) indicate that the dependent variable is unstable at the original level, as are the independent variables, with certain exceptions. According to the PP test, since all variables exhibit instability, the first difference was computed. This process revealed that all variables stabilized upon taking the first difference, as confirmed by the PP test at significant levels of 1%, 5%, and 10%. The calculated t-value exceeds its tabular counterpart at the 1% significance level, leading to the rejection of the null hypothesis (H0: B=0) and the acceptance of the alternative hypothesis (H1: B≠0), which asserts that the time series is devoid of a unit root. Consequently, it is advisable to employ the Autoregressive Distributed Lag (ARDL) method, given that the data have stabilized at the first difference and the number of observations is limited.

Third: Outcomes of assessing the correlation between "financial sustainability" measures and GDP in Iraq from 2004 to 2022

1: Preliminary Estimate of the "gross domestic product" Model (ARDL)

Table (3) presents the outcomes of the initial estimation of the "gross domestic product" Model (ARDL), illustrating the correlation between the independent variables ("financial sustainability" indicators) and the dependent variable (GDP). Notably, the coefficient of determination (R2) attained a value of (0.99), indicating the studied standard model exhibits high explanatory power, with independent variables ("financial sustainability" indicators) accounting for 99% of the variance in the dependent variable (GDP), while the remaining 1% reflects the influence of excluded variables. The F-test value (8329.019) signifies the model's robustness in estimating both "short-term" and long-term parameters. The selected standard model's rank, based on the ARDL methodology, is (1, 1, 0, 0, 1, 1, 2), determined by optimal lag period tests (HQ, BIC, AIC), with the lag period selected according to the AIC criterion, which yielded the lowest value. Figure (2) illustrates the optimal lag periods for the ARDL model as per the AIC standard:

Table 3: Preliminary Estimation Results of the "gross domestic product" (ARDL) Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGDP(-1)	1.316851	0.085231	15.45043	0.0000
LGDP(-2)	-0.360935	0.08299	-4.349130	0.0001
X1	0.132485	0.069722	1.900183	0.0624
X1(-1)	0.05925	0.020918	2.83245	0.0063
X2	-0.001505	0.000803	-1.87321	0.0661
X2(-1)	0.002122	0.000783	2.709125	0.0089
X3	0.006387	0.002039	3.132793	0.0027
X4	-0.005821	0.002097	-2.77539	0.0074
X5	0.000373	0.000763	0.489055	0.6266
X5(-1)	-0.002653	0.000814	-3.25889	0.0019
X6	-9.26E-05	0.000322	-0.28743	0.7748
X6(-1)	-0.000412	0.00034	-1.21077	0.2309
C	0.857376	0.215229	3.983544	0.0002
R-squared	0.999420	Mean dependent var		18.89637
Adjusted R-squared	0.999300	S.D. dependent var		0.25770
S.E. of regression	0.006818	Akaike info criterion		-6.97457
Sum squared resid	0.002696	Schwarz criterion		-6.56028
Log likelihood	260.5973	Hannan-Quinn criter.		-6.80982
F-statistic	8329.019	Durbin-Watson stat		1.654497
Prob(F-statistic)	0.000000			

Source: Equipping the scholar utilizing the results generated by the statistical software (Eviews10).

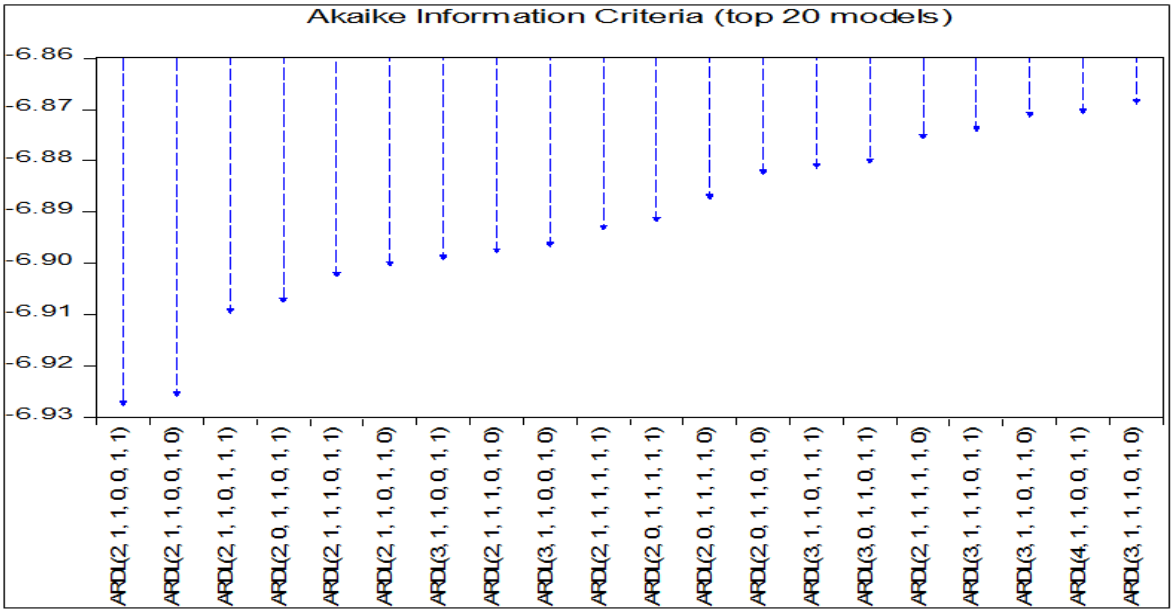


Figure 2: Optimal slowdown periods for AIC ARDL

Source: Equipping the scholar utilizing the results generated by the statistical software (Eviews10).

2: Boundary Test Results for Joint Integration

To establish an equilibrium connection over the long term (joint integration) between the independent variables ("financial sustainability" indicators) and the dependent variable (GDP), the statistics (F) were computed using the boundary test. Table (4) presents the outcome of the joint integration test for the GDP model based on the boundary test.

Table 4: Outcomes of the Cointegration Test for the GDP Model (ARDL) based on the Boundary Test

Test Statistic	**Value**	**K**
F-statistic	**8.001618**	**6**
Critical Value Bounds		
Significance	**Lower Bound**	**Upper Bound**
10%	2.12	3.23
5%	2.45	3.61
2.50%	2.75	3.99
1%	3.15	4.43

Source: Compiled by the researcher utilizing the results from Eviews10.

The computed statistic (F) is 8.001, above the tabulated upper limit of 4.43 and the minimum value of 3.15 at a significance level of 1%. This indicates the rejection of the null hypothesis, which posits the absence of a long-term equilibrium relationship among the examined variables. Consequently, we accept the alternative hypothesis, affirming the existence of a standard integration connection between the variables throughout the research period, signifying a long-term equilibrium relationship originating from the independent variables ("financial sustainability" indicators) towards the dependent variable (GDP). This validates the accuracy of the study hypothesis, necessitating the assessment of both "short-term" and long-term responses, as well as the error correction factor.

3: Outcomes of the assessment of "short- and long-term parameters and the error correction parameter"

Following the execution of dormant tests, initial model estimation, limit testing, and verification of a long-term equilibrium relationship—specifically, the presence of joint integration between the independent variables ("financial sustainability" indicators) and the dependent variable (GDP)—it is necessary to estimate both short- and long-term parameters along with the error correction coefficient utilizing the statistical software Eviews10. As indicated in Table (5), a common integration relationship exists between the independent variables ("financial sustainability" indicators) and the dependent variable (GDP), corroborated by the error correction parameter of (-0.04408) with a probability value of (0.0001=prob). The error correction parameter has attained negative statistical significance, indicating that the speed of adjustment between the short and long term is evident. Specifically, 0.044 of "short-term" errors are rectified within a unit time (year) to achieve long-term equilibrium. This implies that deviations from long-term equilibrium in previous periods are corrected in the current period at an adjustment rate of 4%.

Table 5: Assessment outcomes for the short- and long-term parameters, together with the error correction parameter for the GDP ARDL model.

"short-term" parameters and error correction parameters				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(LGDP(-1))	0.360935	0.082990	4.349126	0.0001
D(X1)	0.132485	0.069722	1.900183	0.0624
D(X2)	-0.001510	0.000803	-1.873210	0.0661
D(X3)	0.006387	0.002039	3.132793	0.0027
D(X4)	-0.005820	0.002097	-2.775390	0.0074
D(X5)	0.000373	0.000763	0.489055	0.6266
D(X6)	-9.305000	0.000322	-0.287430	0.7748
CointEq(-1)	-0.044080	0.010340	-4.263590	0.0001
Cointeq = LGDP - (4.3493X1 + 0.0140X2 + 0.1449X3 - 0.1320X4 -0.0517X5 - 0.0114X6 + 19.44860)				
Long-term parameters (Long Run Coefficients)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
X1	4.349300	1.806326	2.407816	0.0192
X2	0.013992	0.003774	3.707351	0.0005
X3	0.144880	0.052874	2.740084	0.0081
X4	-0.132040	0.051018	-2.58808	0.0122
X5	-0.051720	0.012877	-4.01625	0.0002
X6	-0.011440	0.002318	-4.93454	0.0000
C	19.44860	1.598928	12.16352	0.0000

Source: Generated by the examiner utilizing the results from Eviews10.

4: Evaluation of the quality of the economically, statistically and econometric model

❖ **: Assessment of the quality of the economically evaluated model**

a: Assessment of the parameters of the projected model in the short as well as long term.

The outcomes shown in Table (5) elucidate the link between "financial sustainability" measures, treated as independent variables, and GDP, regarded as the dependent variable, in Iraq from 2004 to 2022, as analyzed by the (ARDL) model.:

1. The coefficient of (X1) indicates that there is a positive and significant impact of the The revenue/expenditure index (net budget) relative to GDP indicates that in the short term, a 1% increase in the revenue/expenditure index in Iraq results in a 0.132% increase in GDP. In the long term, the same 1% increase in the revenue/expenditure index leads to a 4.349% increase in GDP. This aligns with the principles of economic theory, the research hypothesis, and the actual conditions of the Iraqi economy. The substantial increase in "public revenues" from oil has positively influenced Iraq's public budget, resulting in a fiscal surplus that is evident in the "gross domestic product". Furthermore, the direct correlation between the revenue/expenditure index (net budget) and the "economic cycle" (GDP) is demonstrated by the effect of fluctuations in economic activity on revenues and expenditures. The general government and its responses to alterations via fiscal policies (expansionary and contractionary) to maintain economic stability and attain sustainable economic growth.
2. The coefficient of (X2) signifies a detrimental and substantial effect of the "public debt" index relative to GDP on GDP in the short term, and a direct and significant impact in the long term. In the short term, the value of GDP reached (-0.0015) for the "public debt" index relative to GDP, indicating that an increase in the "public debt" index relative to GDP An increase of 1% in Iraq's "public debt" index relative to GDP results in a 0.0015% rise in GDP, whereas a long-term increase of 1% in the "public debt" index to GDP correlates with a 0.013% growth in GDP. This is inconsistent with economic theory and aligns with long-term research hypotheses, as the majority of Iraq's "public debt" is allocated to operational rather than investment sectors. Specifically, "public debt" finances expansionary policies necessitating substantial expenditure on infrastructure projects, social programs, or employee salaries. Consequently, Iraq incurs the obligation to repay the "public debt" and its associated interest, which, according to economic principles, should result in a decline in output. However, the actual performance of the Iraqi economy reveals a contrary trend, characterized by rising "public debt" alongside increasing output, with the significant and sustained growth in GDP attributed to escalating oil revenues during the research period**.**
3. The coefficient (X3) signifies a direct and substantial influence of the tax gap index on GDP, both in the short and long run. In the short term, the GDP value reached 0.0063 for the tax gap index, indicating that a 1% rise in the tax gap index in Iraq corresponds to this change. The GDP increases by 0.0063%, while the long-term value of GDP reaches 0.1448 for the tax gap index. This indicates that a 1% rise in the tax gap index in Iraq results in a 0.1448% increase in GDP. The tax gap denotes the disparity between the taxes mandated by governmental laws and regulations and the taxes that are actually collected. An increase in the tax gap, indicating negative tax collection, signifies a rise in tax evasion or inefficacious tax collection efforts, resulting in a deficit in government revenues. This resource illustrates the reality of the Iraqi economy, indicating that an expansion of the tax gap results in a decline in GDP, rather than the opposite. Furthermore, the growth in Iraq's GDP is attributable to rising oil revenues, the predominant component of the GDP, rather than an increase in the tax gap.
4. The coefficient of (X4) signifies a detrimental and substantial effect of the public revenue index/GDP on GDP in both the short and long term. In the short term, the GDP value reached (-0.0058) for the public revenue index/GDP, indicating that a 1% increase in the public revenue index/GDP in Iraq results in a decrease in GDP by (-0.0058%). In the long term, the GDP value reached (-0.1320) for the public revenue index/GDP, suggesting that a 1% increase in the public revenue index/GDP in Iraq leads to a decrease in GDP by (-0.1448%). This finding contradicts economic theory and the realities of the Iraqi economy, aligning instead with the research hypothesis regarding the inverse relationship between the public revenue index/GDP and GDP in the Iraqi economy during the study period. While not invariably rational, it can be contextually justified given the prevailing economic conditions and policies of the nation. Iraq, recognized as a country reliant on natural resources, particularly oil, may experience adverse effects from an overreliance on these revenues, potentially resulting in the neglect of other economic sectors during periods of declining oil prices. The GDP may be substantially influenced, exhibiting an inverse correlation between the revenue index and GDP.
5. The coefficient of (X5) demonstrates a negative and significant impact of the oil revenues/"public revenues" index on GDP in the long term. Specifically, the GDP value decreases by (-0.0517%) for every 1% increase in the oil revenues/"public revenues" index in Iraq. This finding contradicts conventional economic theory and the practical expectations for the Iraqi economy but aligns with the research hypothesis. Iraq's economy is predominantly rentier, with oil revenues accounting for over 95% of GDP. The observed inverse relationship may stem from an over-reliance on crude oil and excessive consumer-oriented operational spending. In such economies, dependence on oil exports as the primary revenue source makes them highly susceptible to global oil price fluctuations. When oil prices drop, oil revenues decrease, negatively affecting GDP. Moreover, mismanagement of oil resources and financial and administrative corruption exacerbate the issue. Large oil revenues, instead of being effectively invested in economic development, often lead to resource mismanagement and widespread corruption, depleting

wealth and reducing its economic impact. This ultimately results in a decline in GDP, further highlighting the risks associated with over-reliance on oil revenues.

6. The coefficient of (X6) signifies a detrimental and substantial effect of the external debt/exports index on GDP in the long term, with the long-term value of GDP at (-0.0114) for the external debt/exports index. This indicates that a 1% increase in the external debt/exports index in Iraq results in a decrease in GDP. This aligns with the principles of economic theory, the actual conditions of the Iraqi economy, and the research hypothesis. The inverse correlation between the external debt-to-exports ratio and Iraq's "gross domestic product" suggests that an increase in the external debt relative to exports results in a decline in GDP. This illustrates the repercussions of the increase in external obligations of the country relative to its capacity to generate export income, thereby amplifying external liabilities and associated repayment of foreign loans and interest, which exacerbates the "public debt" burden and diminishes the potential for investment and GDP diversification.

❖ **Statistically Estimated Model Quality Assessment:**

It is clear from Table (6) shows the statistical indicators that confirm the integrity of the statistically estimated model completely, so that all the independent variables were significant according to the test (t) in the short and long term, as well as the high value of the corrected coefficient of determination, which amounted to ($\bar{R}^2 = 0.99$), which shows that the estimated model explains (99%) of the changes that occur in the dependent variable (GDP) and that the remaining percentage of (1%) represents the effect of other variables that were not included in The value of the statistics (F) amounted to (8329.019), which confirms the significance of the estimated model as a whole at a significant level less than (1%), as well as the decrease in the value of the standard error (S.e), which amounted to (0.0068).

Table 6: Statistical Indicators of the GDP Model

R-squared	0.999420
Adjusted R-squared	0.999300
S.E. of regression	0.006818
Sum squared resid	0.002696
Log likelihood	260.5973
F-statistic	8329.019
Prob(F-statistic)	0.000000
Durbin-Watson stat	1.654497

Source: Equipping the researcher utilizing the results from the statistical software (Eviews10).

❖ **Standardized model quality assessment:**

After estimating the parameters of the standard model for the short and long-term relationship and after ensuring the superiority of the standard model utilized to measure the impact of "financial sustainability" indicators on the "economic cycle" in Iraq and free from all standard problems, which calls for conducting diagnostic tests as follows:

1. Autocorrelation Test and Heterogeneity Test for GDP Model

Table (7) presents the outcomes of the autocorrelation test utilizing the Lakrang product test for serial correlation (BGLM), which is the most suitable method for identifying self-correlation within the random variable series. The findings indicate that the model is not afflicted by serial autocorrelation, as the p-values for both the (F) test and the chi-square test exceeded (5%). Specifically, the p-value for the (F) statistic is (0.2252), and the p-value for the chi-square statistic is (0.1587), thereby supporting the acceptance of the null hypothesis that the estimated model is devoid of serial correlation issues.

Table (7) indicates that the GDP model does not exhibit heteroscedasticity, as the calculated F statistic is 0.00636 with a probability level of 0.9367, thereby supporting the null hypothesis that the variance of random error is constant in the estimated model.

Table 7: Results of the Autocorrelation (LM) and Heterogeneity of Variance (ARCH) test for the GDP model

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	1.531315	Prob. F(2 ،56)	0.2252
Obs*R-squared	3.681630	Prob. Chi-Square(2)	0.1587
Heteroskedasticity Test: ARCH			
F-statistic	0.006363	Prob. F(1 ،68)	0.9367
Obs*R-squared	0.006550	Prob. Chi-Square(1)	0.9355

Source: Equipping the investigator with utilizing the results from the statistical software (Eviews10).

2. Normal Random Error Distribution Test (Jarque-Bera): Figure (3) indicates that the random errors of the estimated model conform to a normal distribution, as evidenced by a JB test value of (2.337) and a probability value of (0.310), thereby supporting the acceptance of the null hypothesis that random errors are normally distributed in the GDP model.

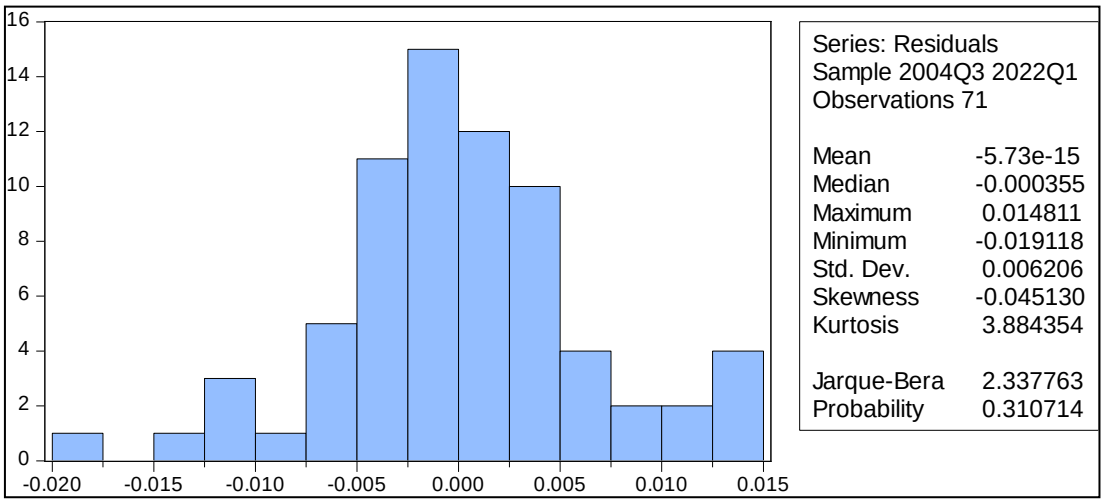


Figure 3: Normal Distribution Test (JB) for Estimated Model Residues
Source: Equipping the researcher utilizing the results from the statistical software (Eviews10).

3. Test the suitability of the validity of the function form (Ramsey RESET Test): Table (8) presents the assessment of the validity of the functional form of the estimated model, shown by a computed F-statistic of 13.958 and a p-value of 0.3167, together with the t-statistic value. The estimated result of 3.736, with a probability of 0.3167, exceeds 5%. This entails adopting the null hypothesis that the functional form employed in the calculated model (GDP) is accurate.

Table 8: Testing the suitability of the validity of the functional form of the GDP model

Ramsey RESET Test **Equation: UNTITLED** **Omitted Variables: Squares of fitted values**			
Test	**Value**	**Df**	**Probability**
t-statistic	3.736166	57	0.3167
F-statistic	13.95894	(1 ،57)	0.3167

Source: Equipping the investigator with utilizing the results from the statistical software (Eviews10).

4: The results of the structural stability test for the estimated (ARDL) model: To guarantee that the data utilized for estimating the GDP model is devoid of structural changes and that the long-term parameter estimates remain stable and consistent with the "short-term" parameter estimates, the cumulative sum test for recursive residuals (Cusum) was employed. The structural stability of the estimated coefficients of the ARDL model is confirmed if the CUSUM test the chart remains within the critical limits at the 5% significance level, thereby accepting the null hypothesis that all parameters calculated are structurally stable, as illustrated in the subsequent figure:

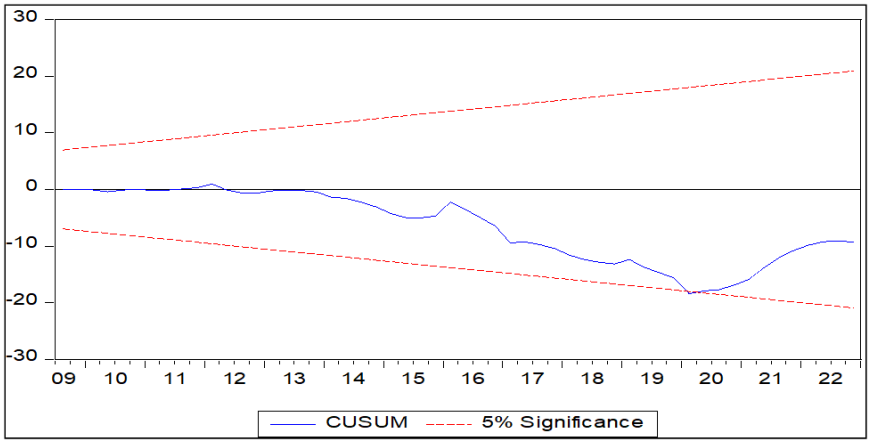


Figure 4: Structural stability test of ARDL coefficients for GDP
Source: Equipping the researcher utilizing the results generated by the statistical software (Eviews10).

Figure (4) clearly illustrates that the CUSUM test line remains within the critical upper and lower limits at a significance level of 5%, oscillating around the zero value. This test concludes that there is stability and consistency in the model estimates between the "short-term" and long-term ARDL results for Iraq's "gross domestic product". Throughout the research duration.

5: Outcomes of the test of the explanatory ability of the estimated model (ARDL): Figure (5) clearly illustrates the outcomes of the interpretive capacity test of the ARDL model, comparing real and estimated values alongside the random error limits. This demonstrates a convergence between the predictive and actual values, indicating that the estimated GDP model possesses a high explanatory capability.

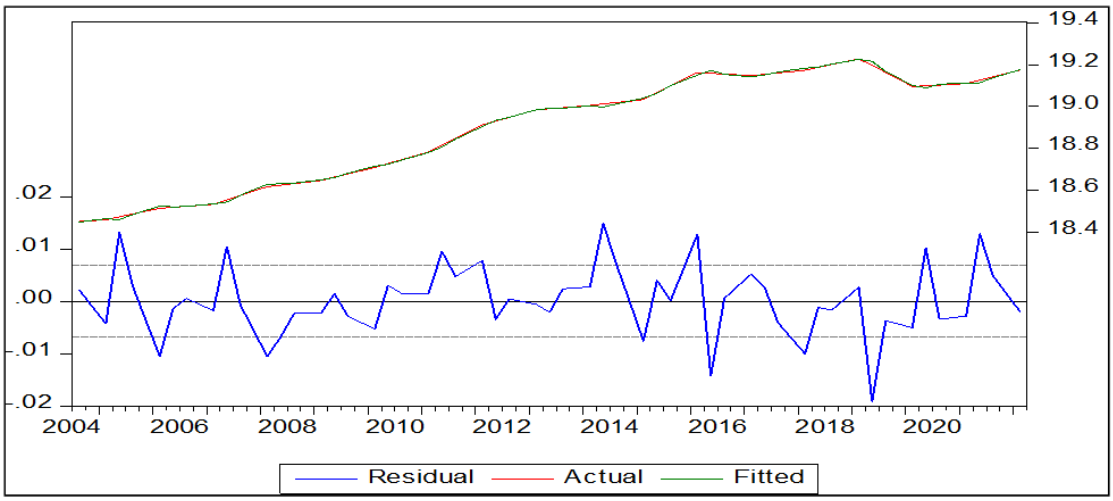


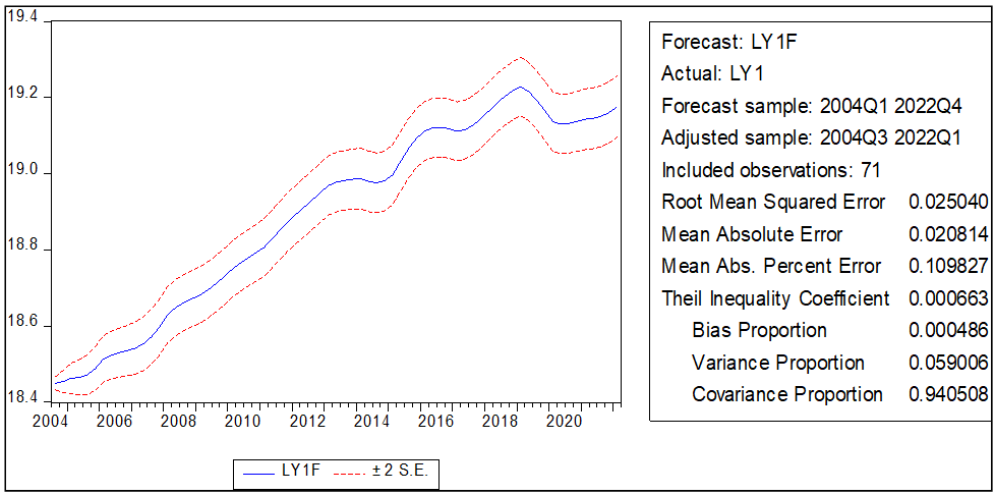
Figure 5: Results of the Test of the Explanatory Ability of the ARDL Model for GDP
Source: Equipping the investigator with utilizing the results from the statistical software (Eviews10).

6: The outcomes of the predictive performance assessment for the calculated Autoregressive Distributed Lag (ARDL) model: Following the structural stability assessment and evaluation of the model coefficients' explanatory power, and confirming that the data is devoid of structural alterations while the model exhibits substantial explanatory power, we employ the Theil inequality coefficient test. In addition to evaluating the sources of error to ascertain the model's predictive efficacy over the study duration, this may be validated using the subsequent table and char:

Table 9: Predictive Performance Test Results for ARDL Unrestricted Error Correction Model

Theil Inequality Coeffcient(T)	Bias Proportion(BP)	Variance Proportion(VP)	Covariance Proportion(CP)
0.000663	0.000486	0.059006	0.940508

Source: Equipping the investigator with utilizing the results from the statistical software (Eviews10).



الشكل (6) : القيم الفعلية والمتوقعة للناتج المحلي الاجمالي في العراق للمدة (2004-2022)
Source: Equipping the investigator with utilizing the results from the statistical software (Eviews10).

The Thiel coefficient (T) during the study period was recorded at (0.000663), which is below the acceptable threshold and near zero. The bias coefficient ratio (BP) was (0.000486), also below the acceptable threshold and near zero, while the variation coefficient ratio (VP) was (0.059006). The coefficient of covariance (CP) is 0.940508, indicating proximity to the accurate value. Consequently, these indicators demonstrate that the estimated GDP model possesses a robust predictive capability during the research period. Furthermore, the results of this model can be utilized for policy analysis and future predictions in the Iraqi economy, facilitating informed financial choices and the achievement of established objectives.

THIRD THEME: CONCLUSIONS AND RECOMMENDATIONS

First: Conclusions

1. The outcome of the standard analysis demonstrated the attainment of the stability characteristic (dormancy) at the original level and at the first difference, as per the unit root test for dormancy based to the Phillips-Perron (PP) method, indicating the absence of integrated variables of the second order. Consequently, the Autoregressive Distributed Lag (ARDL) model was employed to estimate the short- and long-term relationships among the research variables.
2. The findings from the standard models revealed a long-term equilibrium relationship between the independent variable ("financial sustainability") and the dependent variable ("economic cycle"). Utilizing the Bound Test methodology of the ARDL model, the (F) statistic exceeded the critical values of both the upper and lower limits.
3. The econometric analysis results indicated that the "economic cycle" in Iraq, as measured by GDP, is influenced by the following variables: "public revenues"/public expenditures (net budget), "public debt"/GDP, tax gap, "public revenues"/GDP, oil revenues/"public revenues", and external debt/exports. Two the best slowdown periods account for approximately 99% of the variations in GDP.
4. The standard analysis findings of the ARDL model estimators, assessing the influence of "financial sustainability" indicators on the "economic cycle" as measured by GDP, demonstrated a positive and significant correlation for the "public revenues"/public expenditures index (net budget) (X1), the "public debt"/GDP index (X2), and the tax gap index (X3). There exists an inverse and substantial association for every one of the following: "public revenues" index to GDP (X4), oil revenues to "public revenues" index (X5), and foreign debt to exports index (X6).
5. The coefficient of the error correction vector was determined to be negative and statistically significant at a level below 1% across all standard models, with a value of 0.044 in the GDP model. This indicates that 0.04 of "short-term" errors are automatically rectified within one year to achieve long-term equilibrium, signifying that deviations from the long-term balance in previous years are corrected by 4%.
6. The calculated standard model successfully met all statistical and normative criteria, demonstrating through standard tests that it is devoid of statistical and normative issues.

Second: Recommendations

1. Focusing on improving the management of the net public budget by controlling public spending and expanding the public revenue base based on the application of balanced fiscal policies aimed at reducing the fiscal deficit in good economic times and increasing surpluses in the public budget, while allocating these surpluses to establish a sovereign fund to be used in times of economic recession.
2. Develop comprehensive strategies to manage the ratio of "public debt" to GDP, with the aim of maintaining this ratio within safe and sustainable levels by controlling the growth of "public debt", rationalizing government spending, enhancing non-oil revenues, improving the efficiency of the use of loans, as well as setting a maximum debt-to-GDP ratio, and committing not to exceed it except in justified economic emergencies.
3. The necessity for "fiscal policy" to implement various measures that mitigate the impacts of "economic cycle"s by optimizing public expenditure and prioritizing productive investments, ensuring that the growth rate of public spending is lower than both the growth rate of GDP and the growth rate of "public revenues", while also reforming the tax system and diversifying public revenue sources.
4. Economic decision-makers in Iraq must consider the behavior of the "economic cycle" when formulating the state's "general budget" during periods of boom. They should adhere to government "fiscal policy" (austerity) and allocate surplus "public revenues" towards productive projects and the repayment of prior debts and associated interest. Conversely, during periods of depression, the government is required to... Implementing an expansionary fiscal strategy designed to augment public spending and decrease taxes, necessitating counter-cyclical fiscal measures.
5. The necessity to undertake additional research and studies regarding the influence of "financial sustainability" indicators on the "economic cycle" to ascertain the degree of their impact, thereby assisting economic decision-makers in formulating suitable government policies that positively affect the Iraqi economy.

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