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The Impact of Government Spending and Oil Revenue Fluctuations on Banking Credit in the Iraqi Economy

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Abstract

The research aims to analyze government spending and its impact on banking credit through oil revenue fluctuations in the Iraqi economy for the period (2004 - 2021). The research problem lies in the weak performance of fiscal policy in addressing economic and financial fluctuations in the Iraqi economy, negatively affecting the banking activity in providing the necessary credit for financing developmental activities, salaries of employees in government agencies, and relying heavily on crude oil as the main source of income and gross domestic product. Crude oil revenues directly fluctuate with global oil prices, and in the event of revenue fluctuations, the government resorts to bank borrowing to finance its public expenses due to the lack of alternative sources. The researcher formulated a hypothesis stating that there is a positive relationship and impact between government spending and banking credit granted to economic sectors through an increase in oil revenues in the Iraqi economy. The researcher developed a standard model consisting of the independent variable represented by oil revenues and its effect on the dependent variable (banking credit) when government spending is an intermediary variable. The researcher reached the following conclusions: the results of testing oil revenues (independent variable) and government spending (intermediary variable) have a significant impact on the dependent variable (banking credit), and the tests (F, r, R^2) demonstrated that the results were good and had a significant impact on banking credit, aligning with the reality of the Iraqi economy. Since oil revenues are the primary source of financing government spending, any decline in oil revenues will lead the government to resort to borrowing from banks as an alternative source to finance its ongoing expenses.

Keywords: *Government spending, oil revenues, and banking credit*

Introduction

Government spending is one of the tools of fiscal policy for the state, encompassing the total cash amounts spent by the government to finance its economic activities for the purpose of achieving the public interest (Fisher, 2022). It includes two types of spending: consumption spending, which is the government's expenditure on salaries and wages paid to its employees, maintenance expenses, and public debt interest payments; and investment spending, which involves financial allocations spent by the government to increase productive capacity with the aim of raising economic growth rates. This includes expenses in education, agriculture and forestry sectors, industrial sector, and transportation. (Feng & Lee, 2023)

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In Iraq, government spending relies on oil revenues. Whenever oil revenues increase, either due to higher crude oil prices in the global markets or increased oil exports, this leads to an increase in government spending. This is because the Iraqi economy is heavily reliant on oil as the oil revenues make up around 95% of the total general budget revenues and oil sector contributes around 60% of the GDP. However, when crude oil prices decline in the global market, it leads to a decrease in oil export revenues, which, in turn, negatively impacts the general revenues and results in reduced government spending (Karl, 2007). In such a scenario, the government may resort to alternative sources, like borrowing from commercial banks or other lending institutions, to finance the general budget. This, in turn, negatively affects the banking sector's activity in providing banking credit to finance both local consumption and investment in the Iraqi economy (Park et al., 2020; Algumzi, 2022).

Literature Review

1. Theoretical Framework of Government Spending

Government spending is defined as the total expenses that a state incurs in a specific amount of money over a certain period of time, with the aim of satisfying specific public needs of the society it governs (Abdel-Hamid, 2007). It is also defined as an amount of money spent by a public entity with the goal of achieving the public interest (Fatawi, 2006; De-Lara et al., 2022).

2. Bank Credit

It is also known as the available purchasing power for the borrower, as credit markets enable individuals who are currently unable to obtain financial resources to access them (Wilson, 2012; Mahrinasari et al., 2023). This process requires a price or cost, represented by the interest rate charged to the borrower (Roger, 1990, p. 20).

3. Oil Revenues

It refers to the income generated from the sale of oil and gas and is considered exceptional profit since there is a significant difference between their extraction cost and selling price (Han & Wang, 1998). This difference does not reflect any specific effort on the part of countries or companies extracting them (Kapelus, 2002). It may be justified by the fact that these resources are non-renewable and, therefore, a compensation should be paid for their extraction, to protect the rights of future generations in their countries' wealth. Regardless of the reason behind this difference, it represents an exceptional economic rent (Ibrahim, 2006; Lalithambigai et al., 2023).

4. The Relationship between Government Spending, Oil Revenues, Bank Credit, and Economic Theory Logic

Countries heavily reliant on oil revenues, known as rentier countries, experience economic instability due to the fluctuating prices or exports of oil (Auping et al., 2016). As a result, government spending tends to fluctuate as well because these countries rely on oil revenues to finance both consumption and investment spending. When oil revenues increase, it leads to higher government income through increased salaries, social welfare benefits, and investments in economic projects (Al-Ali, 2018; Muthuswamy & Al-ameryeen, 2022). This, in turn, reduces withdrawals from individuals' bank accounts or increases savings beyond their immediate needs, resulting in increased liquidity in banks. Consequently, banks

become more capable of providing bank credit (Shlash, 1991). Thus, a positive relationship emerges between government spending, banking credit, and oil revenues. When oil revenues are abundant, it leads to increased government spending and, consequently, an increase in the provision of banking credit (Keliuotyte, 2015). Conversely, a decrease in oil revenues leads to a budget deficit since the government heavily relies on oil revenues. This deficit may force the government to borrow from banks and financial institutions to cover expenses such as salaries, wages, dues, and other projects, resulting in the government bearing the interest on the loans granted by banks. If this situation persists, the state will have to repay these debts (borrowings) in hard currency (Kanaan, 2009; Oriola-Requena et al., 2022).

Research Methods

1. Description of the Standard Model

To describe the relationship between variables, it is necessary to first identify the type of each variable (independent, mediator, dependent) based on economic theories, as illustrated in Table (1):

Table.1 Standard Model Variables

variable	type	symbol
Banking Credit	dependent	BC
Government Expenditure	mediator	GE
Oil Revenues	independent	OR

Source: Prepared by Author (2023)

We will use the path analysis method to represent the relationship between variables based on economic theory. Thus, we will have four standard models as follows:

1. The first standard model: The impact of the independent variable (oil revenues) on the mediator variable (government spending). The formula of the first standard model can be represented as follows:

$$\boldsymbol{GE_i = \beta_0 + \beta_1 OR_i + e_i}$$

2. The second standard model: The impact of the mediator variable (government spending) on the dependent variable (banking credit). The formula of the second standard model can be represented as follows:

$$\boldsymbol{BC_i = \beta_0 + \beta_1 GE_i + e_i}$$

3. The third standard model: The impact of the independent variable (oil revenues) on the dependent variable (banking credit). The formula of the third standard model can be represented as follows:

$$\boldsymbol{BC_i = \beta_0 + \beta_1 OR_i + e_i}$$

4. The fourth standard model: The joint impact of the independent variable (oil revenues) and the mediator variable (government spending) on the dependent variable (banking credit). The formula of the fourth standard model can be represented as follows:

$$\boldsymbol{BC_i = \beta_0 + \beta_1 OR_i + \beta_2 GE_i + e_i}$$

2. The Relationship between Model Variables according to Economic Theory

The nature of the relationship and the impact between the independent variable (OR) and the dependent variable (BC) will be identified in the presence of the mediator variable (GE) based on economic theory, as illustrated below:

1. The relationship between oil revenues and government spending: The relationship between oil revenues and government spending is a positive relationship. As oil revenues increase, government spending also increases, especially in oil-producing and exporting countries.
2. The relationship between government spending and banking credit: Economic theory suggests a positive relationship between government spending and banking credit. As government spending increases, it leads to higher demand for banking credit to finance the needs of government institutions, especially when other government revenues decrease.
3. The relationship between oil revenues and banking credit: The relationship between oil revenues and banking credit is a positive relationship. This leads to an increase in banking credit.

Research Findings

Practical Application - Analyzing the Relationship between Government Spending, Banking Credit, and Oil Revenues

Through Table (2), it can be observed that oil revenues increased from (32,627,203) million dinars in 2004 to (39,480,069) million dinars in 2005, with an annual growth rate of (%21.00). This increase continued until 2008, reaching (75,358,291) million dinars. Similarly, government spending showed continuous growth, reaching (59,403,375) million dinars in 2008. This increase was mainly due to the rise in crude oil prices in the international markets, which had a positive impact on economic activity and led to a surplus in the general budget.

At the same time, banking credit witnessed steady growth, reaching (824,673) million dinars in 2004 and continuing to increase until it reached (4,587,454) million dinars in 2008 (Sabri & Saeed, 2021). This growth was primarily driven by increased demand for loans and advances by customers for consumption purposes, such as wedding loans, car loans, and construction loans (Karaçimen & Studies, 2014; Zhao & Zhao, 2022). Additionally, credit was also extended for productive purposes to finance projects and increase production capacity. Furthermore, credit was granted to the government sector to rebuild production facilities that were damaged during the Iraq-US war in 2003 (Alhajji & Dev., 2003).

In 2012, oil revenues continued to rise, reaching (116,597,076) million dinars due to a surge in crude oil prices in the international markets, surpassing $100 per barrel (Rasheed, 2023). This led to an increase in banking credit to (11,721,535) million dinars, and government spending also rose to (28,438,688) million dinars for the same year (Hussein et al., 2022). The years 2017 and 2018 also witnessed an increase in oil revenues to (65,071,929) million dinars and (95,619,820) million dinars, respectively, due to higher crude oil prices in the global markets. This led to a rise in government spending to (75,490,115) million dinars and (80,873,189) million dinars, respectively, as well as an increase in banking credit to (37,952,829) million dinars and (38,486,947) million dinars, respectively.

However, in 2009, there was a decrease in crude oil prices in the international markets to $58.96 per barrel from $88.8 due to the impact of the global financial crisis in 2008 (Akram Neamah &

Obaid, 2022). As a result, oil revenues and government spending decreased, negatively affecting economic activity and leading to borrowing from banks to finance the general budget deficit (al-Rubaie & Ahmed, 2023). This decrease in oil revenues was also attributed to a decline in the contribution of tax revenues to the general revenues due to inefficiency in tax administration, administrative and financial corruption, and nepotism in the country (Ghura, 1998).

During the years 2014 to 2016, oil revenues continued to decline, reaching (97,072,410) million dinars, (51,312,621) million dinars, and (44,267,060) million dinars, respectively. This decline resulted in a decrease in government spending to (113,473,517) million dinars, (70,397,515) million dinars, and (67,067,434) million dinars, respectively. Consequently, banking credit increased to (34,123,067) million dinars, (36,752,686) million dinars, and (37,180,123) million dinars, respectively. The increase in banking credit amid declining oil revenues was attributed to the country's exposure to terrorist organizations like ISIS, as well as the decline in global oil prices. The government resorted to borrowing from local banks as a form of domestic borrowing to finance the general budget deficit, government spending, and the payment of employee salaries.

Oil revenues witnessed a decrease from (99,216,318) million dinars in 2019 to (54,448,514) million dinars in 2020, with a negative annual growth rate of (%45.12-) (ALSABBAGH & JABER, 2023). This decline was a result of the double shock caused by the drop in crude oil prices from $60 per barrel to $40.68 per barrel during the mentioned years. Consequently, government spending also decreased from (76,082,659) million dinars to (76,082,443) million dinars in 2020, with a negative annual growth rate of (%31.90-). Meanwhile, banking credit increased from (42,052,511) million dinars to (49,817,737) million dinars for the same years, with a positive annual growth rate of (%18.46). This increase in banking credit was utilized to cover the budget deficit and finance employee salaries amid the double shock.

In 2021, oil revenues rebounded, reaching (95,270,298) million dinars, and government spending also increased to (102,849,659) million dinars. Despite the improvement in oil prices and an increase in oil revenues, the government continued borrowing from commercial banks to avoid persisting deficits in the general budget and to finance the salaries of government employees. This led to a further increase in banking credit to (52,971,508) million dinars.

Table.2 Development of Government Spending, Banking Credit, and Oil Revenues in Iraq (Million Dinars)

Years	Crude Oil Prices	Government Spending	Annual Change Rate (%)	Oil Revenues	Annual Change Rate (%)	Banking Credit	Annual Change Rate (%)
2004	36.05	32,117,491	-----	32,627,203	----	824,673	----
2005	50.08	26,375,175	- 20.03	39,480,069	21.00	850,706	3.15
2006	61.08	38,806,679	47.13	46,534,310	17.86	2,664,898	213.25
2007	69.1	39,031,232	0.57	51,701,300	11.10	3,459,020	29.79
2008	88.8	59,403,375	52.19	75,358,291	46.06	4,587,454	32.62
2009	58.96	52,567,025	-11.50	43,309,228	- 42.52	5,590,062	21.85
2010	75.61	70,134,201	33.41	66,819,670	54.28	11,721,535	109.68
2011	103	78,757,666	12.29	98,090,214	46.79	20,344,076	73.56
2012	107	105,139,576	33.49	116,597,076	18.86	28,438,688	39.78
2013	103	119,127,556	13.30	110,677,542	-5.07	29,952,012	5.32
2014	94.9	113,473,517	-4.74	97,072,410	-12.29	34,123,067	13.92

2015	44.7	70,397,515	-37.96	51,312,621	-47.13	36,752,686	7.70
2016	36	67,067,434	-4.73	44,267,060	-13.73	37,180,123	1.63
2017	49.3	75,490,115	12.55	65,071,929	46.99	37,952,829	2.07
2018	65.98	80,873,189	7.01	95,619,820	49.99	38,486,947	1.40
2019	60.38	111,723,523	38.14	99,216,318	3.76	42,052,511	9.26
2020	40.69	76,082,443	-31.90	54,448,514	-45.12	49,817,737	18.46
2021	68.38	102,849,659	35.18	95,270,298	74.97	52,971,508	6.33

Source:- Column (1, 2, 4, 6) from the annual reports of the Central Bank of Iraq, the Directorate of Statistics and Research, for the period (2004 - 2021).
- Column (3, 5, 7) prepared by the researcher based on the formulas mentioned above.

Statistical Method - Standard Analysis to Study the Impact of Government Expenditure on Bank Credit in Light of Oil Revenue Changes.

First Requirement: Testing for Normal Distribution and Stability of the Variables in the Standard Model

Firstly: Augmented Dickey-Fuller (ADF) Test for Unit Root

The Augmented Dickey-Fuller (ADF) test was conducted to determine the stability of the variables in the standard model using Eviews 12. The results showed that all-time series of the variables in the model were not stable at level (0) I for all three cases (with a constant, with a constant and trend, without a constant and trend). To address this issue, first-order differences (1) I were taken to achieve stationarity for the time series.

However, the results in Table (A-2) indicated that the time series of the variables for the bank credit (BC) and oil revenues (OR) did not become stationary even after taking the first-order difference, whereas the time series for government expenditure (GE) achieved stationarity with the presence of a constant and at significance levels of 1% and 5%.

To further address the non-stationarity of the bank credit (BC) and oil revenues (OR) time series, second-order differences (2) I were taken. The results in Table (A-3) demonstrated that the time series for bank credit (BC) and oil revenues (OR) became stationary at significance levels of 1% and 5% with the presence of a constant.

The third issue: Path Analysis for the Standard Model

Firstly, testing the first standard model

The first standard model was tested to examine the impact of oil revenues (OR) on government expenditure (GE) using the statistical programming language (R). The results showed that the coefficient of the independent variable (oil revenues) was found to be 0.948, indicating a positive relationship between oil revenues and government expenditure. The p-value for the t-test was 0.000, which is less than 0.05, leading to the rejection of the null hypothesis (H0: $\beta 1=0$), indicating that the variable OR has a significant effect on GE.

Moreover, the simple correlation coefficient was 0.878, indicating a strong positive correlation between oil revenues and government expenditure. The coefficient of determination (R^2) was found to be 77%, indicating that 77% of the variation in the mediator variable (GE) can be explained by the independent variable (OR). The p-value for the F-test was 0.000, which is less than 0.05, leading to the acceptance of the alternative hypothesis, indicating that the standard model is statistically significant and effective.

However, despite the significant results aligning with economic theory, the mean squared error (MSE) was very high, with a value of 1.758E+14, which is statistically unacceptable. This suggests that the proposed model is not statistically valid and does not adequately represent the relationship between the variables. Therefore, the researcher decided to take the logarithm of the data as a processing method and reevaluate the model's strength based on statistical measures and indicators.

After applying the logarithm transformation, the constant parameter was found to be -0.07, which was not statistically significant (p-value = 0.93). However, the coefficient for the variable OR was significant with a p-value of 0.000, indicating its importance. The coefficient value was 1.01, signifying a positive relationship between OR and GE. The simple correlation coefficient (R) was 0.867, indicating a strong positive correlation between the two variables.

These results align with the reality of the Iraqi economy, as oil revenues are the main and essential source of funding for government expenditure. The coefficients of determination and adjusted determination were approximately 75%, indicating that the independent variable (OR) explains 75% of the variation in the mediator variable (GE), while the remaining 25% is attributed to other variables not included in the estimated model.

$$GE_i = \beta_0 + \beta_1 OR_i + e_i$$

Table.3 Indicators and Estimates for the Standard Model after Taking the Logarithm

Coefficients	***β***	**Std. Error**	**t**	**Sig.**
Constant	-0.070	0.789	-0.089	0.930
log_OR	1.010	0.101	10.02	0.000
R = 0.867R^2 = 0.752Adjusted R2 = 0.745				

Source: Prepared by the researcher using R programming language.

As observed from the results in Table (4), the value of (Sig.) for the test of (F) is (0.000), which is less than (0.05), therefore, the null hypothesis is rejected, indicating that the standard model is significant. Furthermore, the value of Mean Squared Error (MSE=0.009) is very small, indicating the accuracy of the proposed standard model after taking the logarithm. This is in line with the economic theory, where oil revenues are considered the main source of funding for government consumption expenditures as well as investment expenditures aimed at promoting economic growth in various sectors.

Table.4 Analysis of Variance for the First Standard Model after Taking Logarithm

ANOVA Table					
Source	Degree of freedom	Sum of Squares	Mean Square	F	Sig.
Regression	1	0.879	0.879	100.291	0.000
Residuals	33	0.289	0.009		
Total	34	1.169			

Source: Prepared by the researcher using the R programming language.

The estimated formula for the first standard model after parameter estimation is:

$$\log(GE_i) = 1.01 \log(OR_i)$$

For further clarification, the effect of the relationship between OR and GE is represented in Figure (1).

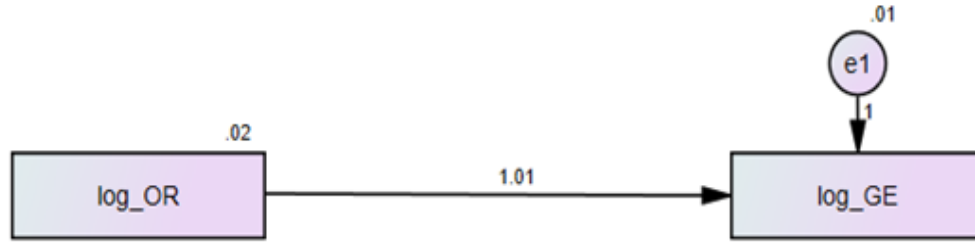

Figure.1 Path Analysis for the First Standard Model
Source: Prepared by the researcher using Amos software.

Secondly, testing the second standard model

The effect of government spending on bank credit was tested using the R programming language. It is observed that the estimated coefficient of the mediator variable (government spending) is 0.486, indicating a positive relationship between government spending and bank credit. The p-value (Sig.) for the t-test is 0.000, which is less than 0.05, leading to the rejection of the null hypothesis (H0: β1=0), indicating that the variable GE has a significant effect on BC. The simple correlation coefficient is 0.758, indicating a strong positive relationship between oil revenues (OR) and government spending (GE). The coefficient of determination (R^2) is 58%, indicating that 58% of the variation in BC is explained by GE. Additionally, the p-value (Sig.) for the F-test is 0.000, which is less than 0.05, leading to the acceptance of the alternative hypothesis, showing that the standard model is significant and effective.

However, despite the favorable and consistent results with economic theory, it is noted that the mean square error (MSE) is very large at 1.333E+14, which is statistically unacceptable. This suggests that the proposed model is not statistically good and does not represent the relationship between the variables. Therefore, the researcher decided to take the logarithm of the data as a form of treatment and test the model's strength based on statistical measures and indicators.

After taking the logarithm of the data, the results in Table (2) improved compared to before. The constant parameter became statistically significant with a p-value (Sig.) of 0.000, and its value is -15.132. The parameter for the variable GE is also statistically significant with a p-value (Sig.) of 0.000, indicating a positive relationship between GE and BC, with a coefficient value of 2.845. The simple correlation coefficient increased to 0.931, showing a strong positive relationship between the two variables. These findings align with the reality of the Iraqi economy, where oil revenues are the main and primary source of funding government spending.

The coefficients of determination and adjusted determination increased to approximately 83%, indicating that the independent variable (OR) explains 83% of the variation in the dependent variable (BC), while the remaining 17% can be attributed to other variables not included in the estimated model.

$$BC_i = \beta_0 + \beta_1 GE_i + e_i$$

Table.5 Indicators and Estimates for the Second Standard Model / After Taking the Logarithm

Coefficients	β	Std. Error	T	Sig.
Constant	-15.132	1.730	-8.747	0.000

log_GE	2.845	0.221	12.881	0.000
R = 0.931R^2 = 0.834Adjusted R2 = 0.829				

Source: Prepared by the researcher using the R programming language.

As observed from the results in Table (6), the value of (Sig.) for the (F) test is (0.000), which is smaller than (0.05). Therefore, the null hypothesis is rejected, indicating that the standard model is statistically significant. Additionally, the mean square error (MSE) value is (0.057), which is very small and indicates the accuracy of the proposed standard model after taking the logarithm. This result aligns with economic theory, suggesting a significant relationship and impact between government spending and bank credit. This finding is consistent with the reality of the Iraqi economy, especially during times of financial and economic crises such as oil price fluctuations, which can lead to reduced oil revenues. Consequently, there is increased pressure on commercial banks to provide internal borrowing as an alternative source for financing government spending and other economic activities.

Table.6 Analysis of Variance for the Second Standard Model after Taking the Logarithm

ANOVA Table					
Source	Degree of freedom	Sum of Squares	Mean Square	F	Sig.
Regression	1	9.457	9.457	165.932	0.000
Residuals	33	1.881	0.057		
Total	34	11.338			

Source: Prepared by the researcher using the R programming language.

The formula for the second standard model after parameter estimation is:

$$\log(BC_i) = -15.132 + 2.845 \log(GE_i)$$

To illustrate the relationship between GE and BC, it is represented in Figure (2).

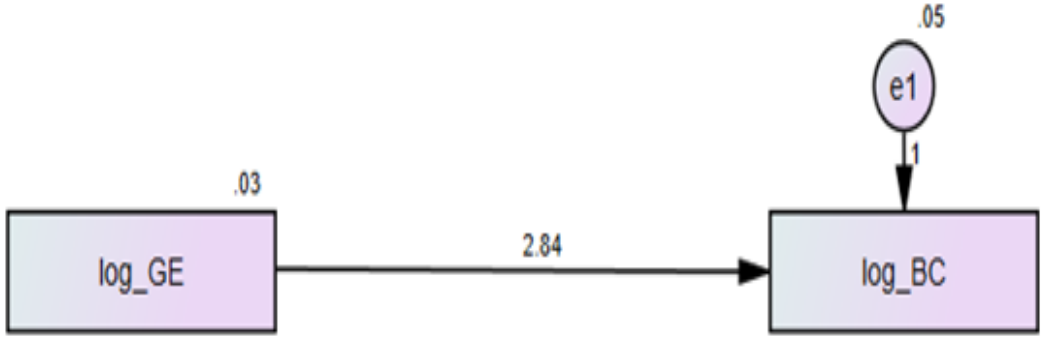

Figure.2 Path Analysis for the Second Standard Model
Source: Prepared by the researcher using the Amos software.

Thirdly, testing the third standard model

The impact of oil revenues on bank credit was tested using the R programming language. It was observed that the coefficient for the independent variable (oil revenues) was 0.337, indicating a positive relationship between oil revenues and bank credit. The p-value for the t-test was 0.003, which is less than 0.05, leading to the rejection of the null hypothesis (H0: β1=0), indicating that the variable OR has a significant effect on BC. The simple correlation

coefficient was 0.487, indicating a moderate positive relationship between oil revenues and bank credit. The coefficient of determination (R^2) was 24%, suggesting that 24% of the variation in BC can be explained by OR.

The F-test resulted in a p-value of 0.003, also less than 0.05, leading to the rejection of the null hypothesis and accepting the alternative hypothesis, meaning that the standard model is significant and influential. Despite these good and consistent results with economic theory, it was observed that the mean squared error (MSE) was very high at 2.393E+14, indicating that the proposed model is statistically inadequate and does not represent the relationship between the variables.

Therefore, the researcher also decided to take the logarithm of the data and test the model's strength using statistical indicators. The results in table (18) showed improvement compared to before taking the logarithm. The constant coefficient was -12.052 and was statistically significant with a p-value of 0.002. The coefficient for the variable OR was 2.453, which was positive, indicating a positive relationship between OR and BC. The simple correlation coefficient increased to 0.677, suggesting a strong positive relationship between the two variables. The coefficients of determination and corrected determination increased to approximately 46% and 44%, respectively. This means that the independent variable (OR) explains 44% of the variation in the dependent variable (BC), while the remaining 46% is attributed to other variables not included in the estimated model. These other variables may include political, economic, and managerial factors that have an impact on bank credit.

$$\boldsymbol{BC_i = \beta_0 + \beta_1 OR_i + e_i}$$

Table.7 Indicators and Estimates for Standard Model III / After Taking the Logarithm.

Coefficients	$\boldsymbol{\beta}$	Std. Error	T	Sig.
Constant	-12.052	3.637	-3.313	0.002
log_OR	2.453	0.465	5.279	0.000
$R = 0.677 R^2 = 0.458$ Adjusted $R^2 = 0.441$				

Source: Prepared by the researcher using the R programming language.

Table (8) shows that the value of (Sig.) for the (F) test is (0.000), which is smaller than (0.05). Therefore, we reject the null hypothesis, indicating that the standard model is significant. Additionally, the value of Mean Squared Error (MSE) is (0.186), which is very small and indicates the accuracy of the proposed standard model after taking the logarithm. This result is consistent with economic theory.

Table.8 Analysis of Variance for the Standard Model III / After Taking the Logarithm

ANOVA Table					
Source	Degree of freedom	Sum of Squares	Mean Square	F	Sig.
Regression	1	5.191	5.191	27.869	0.000
Residuals	33	6.147	0.186		
Total	34	1.338			

Source: Prepared by the researcher using the R programming language.

The formula of the Standard Model III after estimating the parameters is:

$$\log(BC_i) = -12.052 + 2.453 \log(OR_i)$$

For better illustration, the effect of the relationship between OR and BC has been represented in Figure (3).

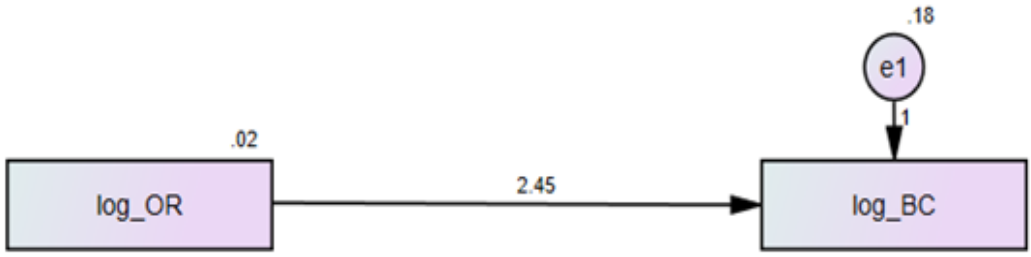

Figure.3 Path Analysis for Standard Model III
Source: Prepared by the researcher using Amos software.

Fourthly, Testing the Fourth Standard Model

The impact of oil revenues and government expenditure on bank credit was tested using the R programming language. It is observed that the (Sig.) value for the t-test of both the independent variable (oil revenues) and the mediating variable (government expenditure) is (0.000), which is less than (0.05). Therefore, we reject the null hypothesis, indicating that both OR and GE significantly affect the dependent variable BC in a positive direction. The correlation coefficient value is (0.845), indicating a strong positive relationship. The coefficient of determination (R^2) is (71%), meaning that 71% of the variation in BC is explained by OR and GE. Additionally, the (Sig.) value for the F-test is (0.000), which is less than (0.05), leading to the rejection of the null hypothesis and acceptance of the alternative hypothesis, indicating that the standard model is significant and effective.

However, despite the good results above, it is also noted that the mean squared error (MSE) is very large, reaching (9.273E+13), which is statistically unacceptable, implying that the proposed model is not statistically sound and does not represent the relationship between the variables. Consequently, the researcher decided to take the logarithm of the data and test the model's strength based on statistical measures and indicators. The results in Table (20) show an improvement after taking the logarithm, as the constant coefficient value becomes (-11.764), which is statistically significant (Sig. < 0.05).

Moreover, the coefficient value for the independent variable (OR) becomes (-1.692), indicating a negative relationship with BC. This coefficient is also statistically significant (Sig. < 0.05), which aligns with the reality of the Iraqi economy where an increase in oil revenues, as the main source of government spending and other economic activities, leads to reduced borrowing from banks to finance economic activities.

Furthermore, the coefficient value for the mediating variable (GE) is (4.106), indicating a positive relationship with BC. This coefficient is also statistically significant (Sig. < 0.05), which is consistent with the economic theory.

The correlation coefficient increases to (0.94) after taking the logarithm, indicating a strong positive relationship. The coefficient of determination (R^2) and the adjusted R^2 increase to approximately (89%) and (88%) respectively, suggesting that both OR and GE explain 88% of the variation in BC. The remaining 12% is attributed to other variables not included in the estimated model, which could be real or monetary economic variables (interest rates, money supply), political decisions, or administrative decisions within the Iraqi banking system.

$$BC_i = \beta_0 + \beta_1 OR_i + \beta_2 GE_i + e_i$$

Table.9 Indicators and Estimates for the Fourth Standard Model / After Taking the Logarithm

Coefficients	β	Std. Error	T	Sig.
Constant	-11.764	1.679	-7.008	0.000
log_OR	-1.692	0.431	-3.927	0.000
log_GE	4.106	0.370	11.090	0.000
$R = 0.942 R^2 = 0.888$ Adjusted $R^2 = 0.881$				

Source: Prepared by the researcher using the R programming language.

As observed from the results of Table (10), the value of (Sig.) for the test of (F) is (0.000), which is less than (0.05). Therefore, the null hypothesis is rejected, indicating that the standard model is significant. Additionally, the value of mean squared error (MSE=0.04) is very small, indicating the accuracy of the proposed standard model after taking the logarithm. This is consistent with economic theory.

Table.10 Analysis of Variance for Standard Model 4 / After Taking the Logarithm

ANOVA Table

Source	Degree of freedom	Sum of Squares	Mean Square	F	Sig.
Regression	2	10.069	5.035	126.93	0.000
Residuals	32	1.269	0.040		
Total	34	11.338			

Source: Prepared by the researcher using the R programming language.

The formula for Standard Model 4 after parameter estimation is:

$$\log(BC_i) = -11.764 - 1.692 \log(OR_i) + 4.106 \log(GE_i)$$

For further clarification, the effect of both variables OR and GE on BC has been represented, as shown in Figure 4.

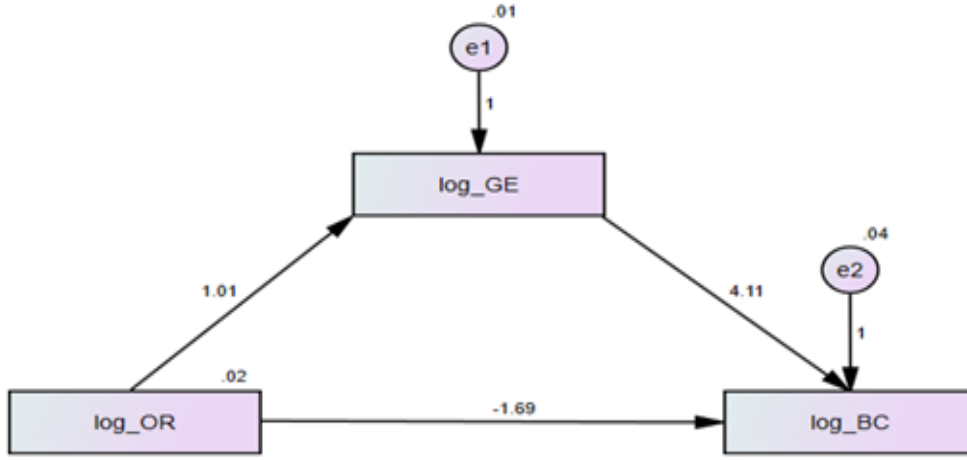

Figure.4 Path Analysis for Standard Model 4
Source: Prepared by the researcher using the Amos software.

Discussions

The decrease in crude oil prices directly affects the reduction of oil revenues, leading to a decrease in government spending since it is the primary source of funding. Consequently, the state tends to borrow from commercial banks, resulting in an increase in bank credit. Conversely, when oil prices increase, it leads to a direct rise in oil revenues and subsequently government spending. In this scenario, the state reduces its borrowing from commercial banks. (Strehovec, 2023)

Bank credit has continuously increased in the Iraqi economy during the research period due to the growing demand for bank credit by individuals and investment projects. Additionally, various economic sectors received credit to reconstruct damaged production facilities during periods of war and occupation.

Furthermore, the results of the co-integration test, following the Johansen methodology, indicate a long-term equilibrium relationship between the variables of the first and fourth models. However, no long-term equilibrium relationship was found in the second and third models. (Soler Campo et al., 2023)

Conclusion

In conclusion, this research investigated the relationship between crude oil revenues, government spending, and bank credit in the Iraqi economy. The study employed four different econometric models to analyze the data, and various statistical tests were conducted to assess the significance and strength of the relationships.

The findings revealed that there is a significant and positive relationship between crude oil revenues and bank credit. As oil revenues decrease, government spending also declines, leading to increased borrowing from commercial banks. Conversely, when oil prices rise, government spending increases, resulting in reduced reliance on bank credit.

The econometric models demonstrated that the first and fourth models have a long-term equilibrium relationship, indicating a stable and sustainable connection between the variables. However, the second and third models did not exhibit a long-term equilibrium relationship, suggesting a more dynamic interaction between these variables.

It is noteworthy that bank credit experienced a continuous upward trend during the research period, driven by the rising demand from individuals and investment projects. Moreover, various economic sectors received credit to rehabilitate and rebuild production facilities damaged during periods of conflict and occupation.

In light of the research findings, it is evident that fluctuations in crude oil prices have a significant impact on the overall economic dynamics in Iraq. The government's fiscal policies, in response to changes in oil revenues, play a crucial role in influencing bank credit and the broader economic performance.

Despite the robust findings, it is essential to acknowledge some limitations in this research. The study focused solely on the relationship between crude oil revenues, government spending, and bank credit, while other potential influencing factors were not considered. Future studies could expand the analysis to incorporate additional economic variables for a more comprehensive understanding of Iraq's economic dynamics.

Overall, the research highlights the complex and interrelated nature of the variables under investigation and provides valuable insights for policymakers and stakeholders in managing the economic challenges and opportunities in the Iraqi economy. The findings emphasize the need for prudent fiscal policies, effective management of oil revenues, and strategic utilization of bank credit to promote economic stability and sustainable growth in the country.

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