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Impact of Global Crude Oil Price Shocks on Iraq's National Budget (2004-2020): Dampak Fluktuasi Harga Minyak Mentah Global terhadap Anggaran Nasional Irak (2004-2020)

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General Background: Oil-exporting economies are highly vulnerable to fluctuations in global crude oil prices, with fiscal stability closely tied to external market dynamics. **Specific Background:** Iraq exemplifies this fragility due to its rentier structure, where over 90% of state revenues derive from oil exports, making the national budget especially sensitive to shocks. **Knowledge Gap:** While oil price volatility is widely studied, limited research has empirically examined the asymmetric transmission of these shocks through revenues, expenditures, and deficits within Iraq’s post-2003 fiscal framework. **Aims:** This study investigates the dynamic relationship between crude oil price shocks and Iraq’s national budget from 2004 to 2020, assessing both short- and long-term effects. **Results:** Using the ARDL approach with data from the World Bank, OPEC, and Iraq’s Ministry of Finance, findings reveal strong cointegration and unidirectional causality from oil prices to revenues and expenditures, alongside a destabilizing feedback loop between expenditures and deficits. Fiscal outcomes demonstrate procyclical spending, rapid adjustment rates, and heightened vulnerability during crises such as the 2008 financial downturn, the 2014–2015 oil shock, and the COVID-19 pandemic. **Novelty:** This is the first comprehensive econometric analysis linking Iraq’s fiscal performance to oil price volatility post-2003. **Implications:** Results underscore the urgent need for structural reforms, diversification policies, and international financial support to mitigate fiscal fragility in resource-dependent states.

Highlight :

- The research analyzes Iraq’s budget sensitivity to global oil price fluctuations.
- Results confirm strong dependence of revenues and expenditures on oil income.
- The study suggests diversification policies to stabilize fiscal performance.

Keywords : Oil Price Shocks, Fiscal Vulnerability, National Budget, Iraq, ARDL Model

Introduction

Global oil price volatility presents a significant fiscal challenge for oil-exporting nations, profoundly impacting public budgets and economic stability. In the past, it has been different since “downward trends in the oil market, whether or not brought on by weak global demand or technological changes reducing importers’ dependency, transfer market power to demand-side aspects, making the impact of supply shortfalls muted,” historically governments have preferred to focus on issues associated with tracking fluctuations in oil pricesTriggered by weak global demand and technological changes reducing importers’ reliance, downturns shift market dominance to demand-side aspects, making the impact of supply shortfalls muted. It is therefore important for these resource-exporting economies to comprehend the transmission processes of the real effects of oil price shocks, but also to identify which are the effective policy measures which can help to offset the destabilizing effects of such shocks. People over half a world away know about the frailty of depending on heavy oil receipts, Iraq typifies this state of acute susceptibility. Its economy has suffered from deep instability as a result of a combination of pre and post-2003 shocks, such as wars, institutions’ weaknesses represented by a rentier economy, wide spread corruption, and non-oil sectors’ share of the GDP [1,2]. This has entrenched a budget framework that is highly responsive to and dependent on changes in oil revenues, for which external factors determine government receipts and payments. Consequently, oil price declines directly translate into substantial budget deficits, with estimates suggesting each dollar per barrel drop costs Iraq over a billion dollars in revenue, while price increases often lead to commensurate rises in government spending. The period 2004-2020 starkly illustrates this vulnerability. Iraq's fiscal position was severely tested by the triple shocks of plummeting oil prices, the security threat from Da’esh, and political instability in the Kurdistan region, exacerbating its fiscal crisis and deepening oil dependency [3], [4]. The literature finds that oil price shocks have asymmetric effects on fiscal spending, posing challenges for budget planning and execution. In addition, the accumulated pressure placed on the economy by rentier inefficiencies has not only made it difficult to restructure, but also reflectively affected diversification initiatives and the social and political environment, calling for reform of policies to strengthen budget stability and minimize oil revenue risk. In this vein, the current study aims to examine the dynamic linkage between crude oil price volatility and the Iraqi general budget from 2004 to 2020. We hypothesize that from this epoch [5], [6] forward the vagaries of oil prices had critical, complex (both adverse and beneficial) influences on the budget. The study aims to:

1. Study the empirical connection between oil price changes and Iraqi fiscal performance.

2. Predict the likely effects of this association based on historical patterns.

3. Evaluate the resultant fiscal vulnerability and the urgent necessity for effective oil revenue management and economic diversification policies to attain sustainable budget stability.

Fiscal Shocks, Oil Dependence, and Budgetary Dynamics in Rentier States

Government spending shocks undergo rapid modifications in their valuation. This modification can encompass every aspect of public spending, with effects ranging from beneficial to detrimental concerning various economic indicators. Short-term shocks generate minimal economic fluctuations, while long-term shocks produce significant economic ramifications. Original government spending reflects actual financial resources expended relative to planned amounts [7]. A revenue shock refers to unexpected fluctuations in government revenue collection, which can be either positive or negative, akin to the currency depreciation or appreciation experienced by various countries globally. Such shocks may arise from factors external to governmental control, such as export earnings variations, exemplified by oil price shifts within oil-exporting nations [8]. Additionally, these alterations may result from economic shocks occurring both pre-recession and post-recession, characterised by a decline in tax revenue due to reduced economic activity, followed by an increase during periods of economic recovery. Revenue shocks can be broadly classified into two categories:

1. Tax Shock: This phenomenon influences supply and demand, often leading to deflationary conditions due to the increased revenue collected. The oil price shock will be analysed in depth concerning its alternative impact on government revenue, representing a crucial variable in this research

2. Crude Oil Price Fluctuations: In numerous developing nations, particularly those that are oil-producing, crude oil functions as a crucial resource for governmental budgeting, as authorities strategically manage this asset to finance their expenditures. Variations in oil prices represent a significant shock for countries that predominantly rely on oil, such as Iraq [9], [10]. An increase in oil prices leads to an expansionary shock, whereas a decrease results in a considerable contractionary shock, encompassing economic, social, and political consequences. These shocks can arise from intentional changes or occur spontaneously. Such events are categorized as external shocks that originate from alterations in factors that directly affect oil markets, manifested through fluctuations in price, or through a sudden disruption in market equilibrium over a specified timeframe, as a result of factors influencing both supply and demand [11].

James D. Hamilton asserts that while positive shocks to oil revenues yield numerous benefits, adverse oil shocks resulting from a collapse in oil prices can reveal the vulnerabilities of certain oil-exporting economies in the context of economic fluctuations. Consequently, the magnitude of such shocks is particularly pronounced in countries where oil exports constitute a substantial percentage of the gross domestic product and where the contribution of oil revenues to government revenues is typically significant [12]. The short-term repercussions manifest when oil revenues decline in these nations, potentially leading to the cessation of specific production initiatives and causing the economy to spiral into a detrimental cycle characterised by rising unemployment and diminishing aggregate demand, particularly in scenarios where economic activities are predominantly centred around the oil sector, alongside a notable decline in the contributions of other commodity sectors to the gross domestic product Among the most significant shocks to government revenues, transmitted through oil revenues post-2004, are identified in works

1. The 2008-9 oil crisis received broad attention as the oil demand soared, due to, among others, the failure of OPEC to adjust to the substantial global economic growth, which created a shortfall in the global oil supply and caused a jump in the prices across the world. There was a large inflation in oil price at the market because of the increased market speculation and in 2008 the prices were even nearly reached $147 per barrel which became the highest level in the history [13]. After a very large upsurge in oil prices in 2008 hundred dollar a barrel which were fueled by speculation, the fulcrum of the world financial system, American institutions banks and mortgage companies failed, which brought the prices of oil all the back to normal. As a result, by the close of 2008, the market price was $94.45 per barrel, declining to $61.06 by 2009.

2. During the oil shock of 2014–2015, the price of crude oil rose to $105.87 / barrel. But after 2014, these prices have kept falling, reaching a value of about $96.29 US to the barrel and dropping even further, to $49.49 US per barrel in 2015.A significant factor contributing to this decline was the insufficient growth in global demand relative to the surge in oil supply

3. Oil Shock (2019-2020): This event is commonly called the Covid-19 shock (Selmi et al., 2022), Despite the initial virus outbreak in China, OPEC members, particularly Iraq, have experienced significant adverse effects. This impact was exacerbated following the global proliferation of the epidemic, particularly given that China is the foremost importer and the second-largest oil consumer worldwide [14], [15], [16]. Consequently, both consumption and demand for oil diminished leading to prices declining across global markets. Specifically, oil prices fell from $66.5 per barrel in December 2019 to a nadir of approximately $17.7 per barrel in April 2020. Subsequently, oil prices rebounded to $25.2 per barrel in June 2020 due to increased demand and decreased production. However, oil prices continue to exhibit volatility, fluctuating between increases and decreases, influenced by public health closure measures and the expansion of global oil demand [17], [18].

Budgetary Institutions in Rentier Economies: Iraq’s Case

The general budget is an indispensable instrument of governance in the modern era, essential for the functioning of any state irrespective of its political system, economic structure, or type of government. Without an approved budget, government ministries, institutions, and interests lack the financial resources to operate effectively, fundamentally impairing the state's capacity to fulfill its mandated functions. As the primary tool of financial planning, the state budget enables governments to articulate their objectives, formulate policies, and determine the optimal strategic allocation of resources [19]. Authorities employ comparative analysis of budgetary alternatives during its preparation to maximize societal benefits derived from available resources. Consequently, the general budget is formally defined as an annual financial program: a detailed, legislatively approved projection of the state's anticipated revenues and expenditures for a specific fiscal period. Submitted to the lawmaker for approval, it is designed to attain certain economic and social ends. In addition, the budget reflects the economic, political and financial priorities of a country and is an important tool for economic growth and stability planning. Public spending is required for the realization of this end and in order to satisfy the public needs of the population, thereby promoting both economic stabilization and financial coverage of operational and investment expenses. But Iraq’s budget suffers from structural imbalance – a large chunk of it is spending on current items of cost based primarily on an oversized public sector and very little allocation of money for investment. This is fundamentally due to the rentier nature of the economy, where over 90% of state revenues come from oil exports [20]. This business model exposes the country to price shifts in the world oil markets and does not favour economic stability. The weak domestic production capacity, exacerbated by underinvestment, forces Iraq to meet rising consumption demand through imports, depleting hard currency reserves and perpetuating deficits in the balance of payments. Consequently, the state's heavy dependence on oil for budget financing renders it susceptible to periodic fiscal crises, endangering national economic projects. The resulting general budget deficit defined as the excess of expenditures over revenues encompassing all state financial activities reflects adverse fiscal policy effects and budget preparation/execution approaches, while diversified non-oil revenues (like taxes and fees), indicative of economic development, remain critically underdeveloped. The concept can be demonstrated through the analysis of Iraqi budget figures (2004-2004), as presented in Table (1). The external, in particular energy price, is the source of financial shocks, which are imported domestically via a number of channels. These shocks are worsened by the fragility of Iraq’s domestic economic order. Perhaps most important is that, the volatility of oil prices sharply undermines the government's oil revenues which are not only the state's largest revenue source, but also its main tool for financing public spending.

Knowledge Gap: Although oil price consternations are widely-reported, the asymmetrical transference through all portions of the budget (revenues, expenditures, deficits) in Iraq’s war-torn rentier economy is overlooked in the literature, which this study remedies.

Methodology

The ARDL Bounds Test approach by Pesaran and al. (2001) by investigating the dynamic relation between crude oil prices (OIL) and fiscal variables of Iraq [public revenues (RE), public expenditure (EX), and budget deficit (DB)] over the period 2004–2020.The ARDL framework is selected for its robustness in modeling cointegration with variables of mixed integration orders [I (0) or I (1)], superior small-sample performance, and simultaneous estimation of short-run dynamics and long-run equilibrium. The methodology follows a five-stage analytical procedure.

Years	Public revenues (1)	Growth rate % (2)	Public expenditure (3)	Growth rate % (4)	Surplus or deficit (5)	Growth rate % (6)
2004	32982739	□□□	32117491	□□□□	865248	□□
2005	40502820	22.8	26375175	-17.9	14127645	1532.8
2006	49063361	21.1	38806679	47.1	10248866	-27.5

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2007	54599451	11.3	39031232	0.6	15568219	51.9
2008	80252182	46.9	59403375	52.2	20848807	33.9
2009	55209353	-31.2	52567025	-11.5	2642328	-87.3
2010	70178223	27.1	70134201	33.4	44022	-98.3
2011	108807392	55	78757666.3	12.3	30049926	68.2
2012	119817224	10.1	105139575.7	33.4	14677648	-51.2
2013	113840076	-4.9	119128000	13.3	-5360605	-63.5
2014	105364301	-7.4	113473517	-4.7	-8086894	50.9
2015	72546345	-31.1	70397515	-38	-3927264	-51.4
2016	53413446	-26.4	67067437	-4.7	-12658160	222.3
2017	77335955	44.8	75490115	12.5	1932057	-84.7
2018	106569834	37.8	80873189	7.13	25696645	1230
2019	107567032	0.9	111723523	38.1	-4156491	-83.8
2020	63199689	14.24-	76082443	31.9 -	12882754-	106.8-
Average duration	2020-2024	9.56%		7.53%		1.49
Source: From the work of the researchers based on:Republic of Iraq, Ministry of Finance - Economic Department for the years 2004-2020Column (2-4-6) from the researcher's workThe growth rate was extracted according to the following equation: Current year - previous year / previous year 100xAverage period = Total number of years / Number of years under study						

Table 1. *Iraq's general budget for the 2004-2020 period at current prices (1 million dinars)*

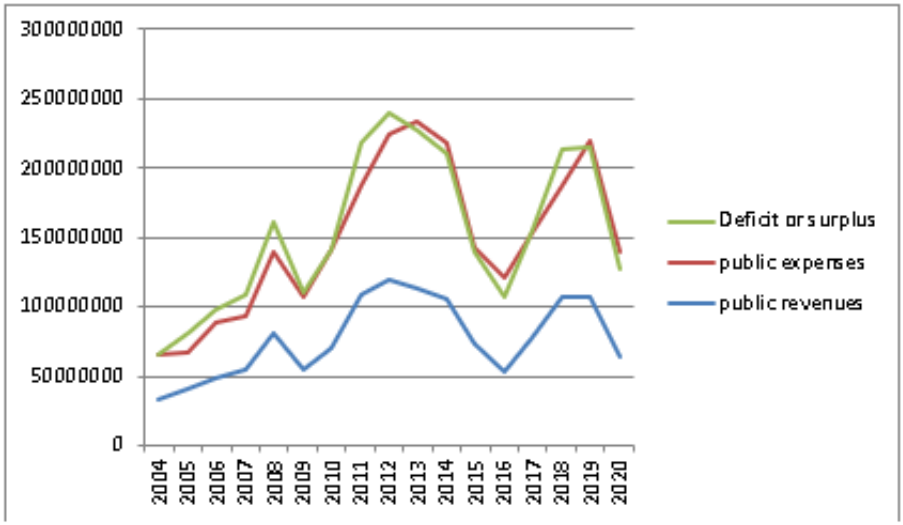

Figure 1. *The general budget in Iraq for the period (2004-2020)*

Table 1 details the Iraqi general budget from 2004 to 2020 (in million Iraqi dinars, current prices). Initial surpluses marked this period: a surplus of 865,248 million dinars in 2004 (revenues: 32,982,739; expenditures: 32,117,490) grew significantly to 20,848,807 million dinars by 2008 (revenues: 80,252,182; expenditures: 59,403,375), driven primarily by crude oil exports. However, the 2009 global financial crisis caused revenues to fall to 55,209,353 million and expenditures to 52,567,025 million, narrowing the surplus to 2,642,328 million. A significant break came in 2014, when revenues of 113,840,076 million were exceeded by spending, which soared to 119,128,000 million, primarily due to the cost of the military operations to fight ISIS, resulting in a 5,360,605 million-dinar deficit. In the years that followed there were waves of increases and in 2020 receipts

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dropped to 93,199,689 million (from here in 2019 at 107,567,032 million) and expenses to 76,082,443 million (from here in 2019 at 111,723,523 million) creating a deficit of 12,882,754 million dinars.This final deficit stemmed from challenging global economic conditions, severely exacerbated by the COVID-19 pandemic and plummeting oil prices, which crippled Iraqi oil exports.

Year	Crude oil prices (USD/barrel)	Effective exchange rate(1,000 dinars)	Crude Oil Prices(1,000 dinars)	Oil revenues (1,000 dinars)
2004	36	1460	52560	32627
2005	50.6	1474	74584.4	39480
2006	61	1391	84851	46908
2007	69.1	1217	84094.7	53162
2008	94.4	1172	110636.8	79131
2009	61	1170	71370	51719
2010	77.4	1170	9055	66819
2011	107.5	1170	12577	98090
2012	109.5	1166	12767	116597
2013	105.5	1166	123479.4	110677
2014	96.3	1166	112285.8	97072
2015	49.5	1182	58509	51312
2016	40.8	1182	48225.6	44267
2017	52.4	1182	61936.8	65071
2018	69.8	1182	82503.6	95619
2019	64	1182	75648	99216
2020	41.50	1304	54116	54448
Source: The work of the researchers based on: OPEC, various issues, the annual report of the Secretary-General Central Bank of Iraq; official website https://cbiraq.org/Default.aspx				

Table 2. *Crude oil prices (OPEC basket) for the period (2004-2020)*

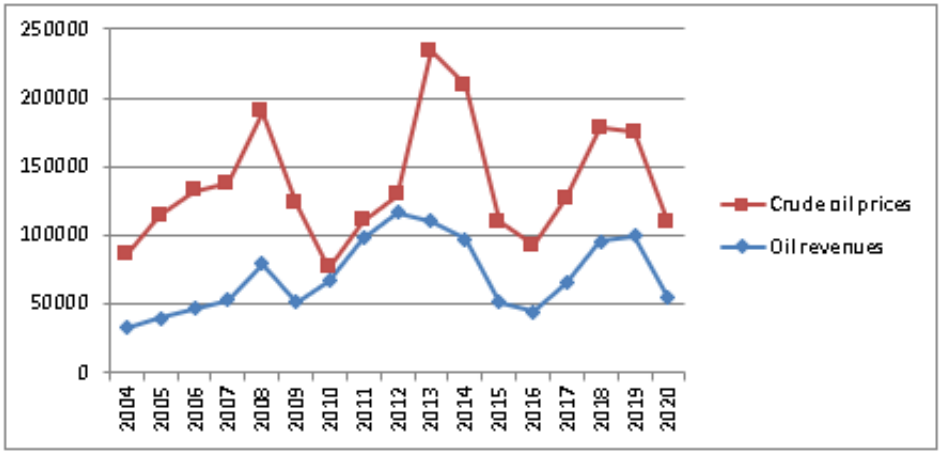

Figure 2. *Crude oil prices (OPEC basket (2004-2020)*

Table 2 illustrates crude oil prices in both foreign and Iraqi currencies, alongside the exchange rate in Iraqi dinars. In 2004, a notable increase in oil prices occurred, rising from 2.73 million to 6.76 million barrels per day due to growing global demand, particularly from the United States, China, India, and other developing nations. Subsequently, oil prices surged to 107.5 million barrels in 2011. Nonetheless, in 2009 the average price of the OPEC basket fell to 61 dollars with an average demand for world oil falling to 84.8 million barrels per day from 86.1 million in 2008 and then again increasing to 107.5 million in 2011. WORLD OIL PRICES: In 2014 world oil prices fell further to

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96.3 dollars per barrel, the basket price for OPEC. The decrease was a consequence of slower annual growth in oil demand and appreciation of the dollar. Sometime in 2018, crude oil prices rose with the OPEC basket price exceeding $69.80 per barrel, driven by demand from the then accommodative and renewed Russian-Saudi policy for a second consecutive year. The average OPEC basket price of crude oil in 2019 was $64.00 a barrel, but fell to $41.50 in 2020. Overall, the COVID-19 pandemic, which had a huge impact on global output, while many factories had to shut down, and global demand for crude oil dropped, so the crude oil price was reduced considerably.

Model Specification

$$RE_t = f(OIL_t), EX_t = f(OIL_t), DB_t = f(OIL_t) \quad (1)$$

The unrestricted error correction model (ECM) for each dependent variable takes the form:

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{j=0}^{q} \gamma_j \Delta OIL_{t-j} + \lambda_1 Y_{t-1} + \lambda_2 OIL_{t-1} + \epsilon_t \ (2)$$

where $Y \in \{RE, EX, DB\} Y \in \{RE, EX, DB\}$, Δ is the first-difference operator, p and q are optimal lag lengths, and ϵ_t is white-noise disturbance.

Unit Root Testing

Stationarity is verified using the **Augmented Dickey-Fuller (ADF) test**

$$\Delta X_t = \alpha + \beta t + \gamma X_{t-1} + \sum_{i=1}^{k} \delta_i \Delta X_{t-i} + \varepsilon_t \ (3)$$

Biannual data transformation (two observations per year) addresses sample size limitations. Results (Table 4) confirm all variables are integrated of order I (1), satisfying the ARDL preconditions.

Granger Causality Analysis

Pairwise short-run causal relationships are tested via the Granger causality framework:

$$X_t = \alpha + \sum_{i=1}^{m} \beta_i X_{t-i} + \sum_{j=1}^{n} \gamma_j Y_{t-j} + u_t \ (4)$$

with null hypothesis $H_0: \gamma_j = 0 \ \forall j$ (Y does not Granger-cause X). Lag length is determined by Akaike Information Criterion (AIC).

Figure 3.

ARDL Cointegration Procedure

Bounds Testing

The F-statistic for joint significance of lagged level terms tests cointegration:

$$H_0: \lambda_1 = \lambda_2 = 0 \quad \text{(no cointegration)} \ (5)$$

against the alternative of cointegrated relationships. The computed F-statistic (Table 8) is compared against Pesaran's critical bounds.

Long-Run Estimation

The cointegrating form is derived as:

$$Y_t = \theta_0 + \theta_1 OIL_t + \mu_t \quad (6)$$

where coefficients are normalized from the ARDL specification.

Figure 4.

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Short-Run ECM
The final error correction specification is:

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{j=0}^{q} \gamma_j \Delta OIL_{t-j} + \phi ECM_{t-1} + \nu_t \quad (7)$$

where ECM_{t-1} is the lagged residual from the long-run equation and ϕ measures speed of adjustment.

Diagnostic Testing
Three critical tests validate model robustness:

i. **Normality**: Jarque-Bera test for residual distribution

ii.

$$JB = \frac{n}{6}\left(S^2 + \frac{(K-3)^2}{4}\right) \quad (8)$$

iii. **Serial Correlation**: Breusch-Godfrey LM test

iv. **Heteroscedasticity**: White test

Figure 5.

Results Analysis and Discussion

To test the study hypotheses and achieve its objectives, the model was described as follows:

Table 3. Description of the model variables

Variable	Description	Status	Source
OIL	Brent crude spot price (USD/bbl)	Independent	EIA/World Bank
RE	Government revenues (constant IQD)	Dependent	Iraqi Ministry of Finance
EX	Government expenditures (constant IQD)	Dependent	Iraqi Ministry of Finance
DB	Budget deficit (RE - EX)	Dependent	Calculated

Table 3. *Biannual frequency (2004–2020) with inflation adjustment via Iraqi CPI*

Test the stationarity of the time Series.

To increase the sample size and obtain accurate results, the data of the variables under study were converted into biannual data to get the stillness of the time chains [21].

Variables	Level			Its Difference			Integration Degree
	Fixed limit only	Fixed limit and general direction	No fixed limit and no general direction	Fixed limit only	Fixed limit and general direction	No fixed limit and no general direction	
	p-value	p-value	p-value	p-value	p-value	p-value	
OIL	0.2287	0.4865	0.5634	0.0001	0.0008	0.0000	I (I)
RE	0.3786	0.5368	0.7587	0.0003	0.0007	0.0000	I (I)

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EX	0.6738	0.6346	0.8489	0.0002	0.0003	0.0000	I (I)
DB	0.0670	0.1424	0.0129	0.0000	0.0006	0.0000	

Table 4. *The Phelps Test Results (Unit Root Test)*

Table 4 indicates that the time chain is stable at the first difference, i.e., integrated level (0). Since the prob value is less than 5%, it accepts the alternative hypothesis and rejects the null hypothesis.

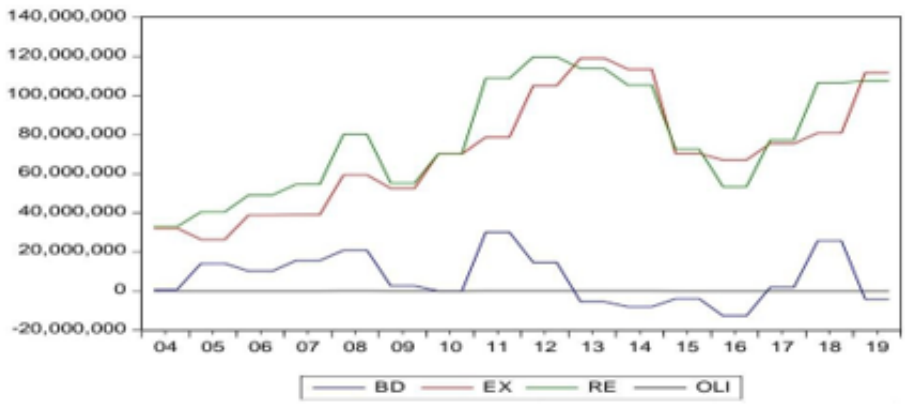

Figure 6. *Stability of the time chains at the first difference*

Null Hypothesis	Lags	F- Statistic	prob
EX does not Granger cause RE.RE does not Granger cause EX.	2	0.03242 3.45581	0.9452 0.0345
Does not Granger cause RE BDDoes not Granger cause BD RE	2	0.08357 3.01234	0.9201 0.0543
Does not Granger cause RE OILDoes not Granger cause OIL RE	2	0.18780 0.52335	0.8323 0.0566
Does not Granger cause ED BD	2	3.82776	0.0342
Does not Granger cause BD EX	2	2.65598	0.0955
Does not Granger cause EX OIL	2	0.03244	0.9677
Does not Granger cause OIL EX	2	1.06993	0.0432
Does not Granger cause BD OIL	2	0.53341	0.6066
Does not Granger cause OIL BD	2	0.63324	0.0433

Table 5. *Results of causal relationship between variables using the Granger Test*

Granger Causality Test

Table 5 illustrates the ratio relationship among the variables examined utilizing the Granger method, as a substantial correlation exists between (EX-RE), specifically between overhead and general income [22], [23]. There is also a strong interdependency between (BD-RE), general income, and general balance, and between (RE), general revenue, and oil prices. Moreover, there is

a direct relationship between (BD) and (EX), and a significant relationship that also exists between oil prices and (BD) deficit or surplus. This accords with the economic rationale that prices of oil shape rentier dynamics in the economies [24].

Joint Integration Test Using the ARDL Model

The initial phase of the Autoregressive Distributed Lag (ARDL) model involves estimating the correlation between the dependent variables namely public expenditure, general revenue, and deficit or surplus and the independent variable, which is represented by oil prices [25]. Table 6 references the ARDL model, which autonomously identifies optimal time lags.

Variables	Coefficients	t-statistic	P-value
RE (-1)	0.254925	1.609279	0.1029
RE (-2)	0.415771-	2.900134-	0.0086
EX	0.837664	5.092843	0.0000
EX (-1)	0.244315-	1.971398-	0.1062
EX (-2)	0.489964	3.340538	0.0024
BD	1.090778	4.278917	0.0000
BD (-1)	0.257792-	1.677349-	0.1067
BD (-2)	0.443216	3.107318	0.0056
OIL	10.38764-	0.941998-	0.3573
C	302685.3	0.341758	0.7215
R-Squared		0.999141	
Adjusted R-Squared		0.997814	
Prob(F-statistic)		0.000000	
Durbin-Watson		1.857725	

Table 6. *Estimate the regression of joint integration using the (ARDL) model*

Table 6. shows that the Adjusted R-Squared value interpreted by Oil (99%) in the EX-RE-DE variants, along with the morale (F), is (0.000000), which is below (5%). This suggests that the morale of the estimated model is low. Additionally, the value (D.W) is (1.858824), indicating no issues with self-association.

Residual Diagnostics Test

Table (7) refers to the Residual Diagnostic Tests. First, it shows the expected distribution test value (0.864676), which is more significant than (5%). The second test appears in the self-correlation value (0.7139) and is more important than the ratio (5%). This means that the model shows a self-correlation problem [26], [27], [28]. The third test is the inconsistency of the variance shown at 0.3472 (greater than 5%), in the sense that there is no inconsistency problem.

Histogram-Normality Tests	P-Value=0.8434
Serial Correlation Lm Test	P-Value=0.7122
Heteroscedastictiy	P-Value=0.4765

Table 7. *Residual Diagnostic Tests*

Bound Test for Joint Integration

Table (8) refers to the bound test for joint integration through the value (F) calculated at (11.46811), which is greater than the upper and lower bound (4.66) and (3.15) at the level (1%). This means that there is a standard integration between the variables under study and the

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subsequent balance relationship in the long term [29], [30].

Test Statistic	Value	K
F-statistic	11.46701	3
Significance	Bound 0	Bound 1
10%	2.23	3.2
5%	2.26	3.23
2.5%	3.66	4.05
1%	3.45	4.34

Table 8. *Bound Test*

Estimated Short Term Coefficients

Table 9 provides an analysis of the short-term parameters pertaining to the variables under investigation. Specifically, there exists a positive correlation between the Autonomous Variable (Oil) and the variable (ES) in the short term. This indicates that a 1% increase in Oil corresponds with a rise in (EX) valued at 0.948092. Conversely, a negative relationship is observed between (Oil) and (BD); when Oil increases by 1%, it leads to a decrease in (BD) valued at 0.437626. Furthermore, the error limit parameter has also demonstrated a negative and significant value, suggesting a long-term relationship among the variables under consideration [31].

Variable	Coefficient	t-statistic	Prob
D(RX)(-1)	0.409250	3.432678	0.0014
D(EX)	0.948032	26.599344	0.0000
D(EX)(-1)	0.433466-	3.124881-	0.0003
D(BD)	1.018772	33.126708	0.0000
D(BD)(-1)	0.466332-	3.678331-	0.0009
D(OIL)	19.3740023-	0.701324-	0.3613
CointEq(-1)	1.1423345-	7.534224	0.0000

Table 9. *Short Term Parameter Estimation*

Estimated Long Term Coefficients

Table 10 highlights the long-term negative signal of the independent variable (Oil), along with the positive signal variables (EX, BD), which have a significant moral impact over time. Additionally, it indicates a negative error correction coefficient, marked by a moral value below (5%), signifying a long-term equilibrium among the variables study.

Variable	Coefficients	T - statistic	P – Value
EX	1.013163	124.964248	0.0000
BD	1.030256	38.560899	0.0000
OIL	8.944413-	0.961512-	0.3478
C	260720	0.357	0.7245
Cointeq = RE-(1.0142EX+1.0303BD - 8.9344OIL + 260720.0536			
CointEq(-1)	1.142347-	7.50345-	0.0000

Table 10. *Long-Term Coefficients Estimation*

Conclusion

This study empirically establishes that Iraq's general budget (2004–2020) exhibits extreme vulnerability to oil price volatility, with Granger causality tests confirming unidirectional oil price shocks drive public revenues (RE) and expenditures (EX), while revealing a destabilizing bidirectional feedback loop between expenditures and budget deficits (DB). Univariate and multivariate unit root tests revealed I (1) integration of all the variables so that ARDL bounds testing was justified, additionally it also validated that there were strong long-run cointegrating relationships (F-statistic=11.47>1% critical bound). On the long run elasticities It is demonstrated that there appears rentier susceptibility in Iraq with the fragility (1% = 1.01%) of the oil price leading to a higher rise in expenditure (Table 10) and a marginal decrease in deficit (−0.44%) which means a pro-cyclical spending behaviour. Short-run characteristics (Table 9) further reveal acute sensitivity: expenditures respond rapidly (elasticity: 0.95) to price upturns, whereas deficits deepen sharply (elasticity −0.44) to downturns underpinned by unusually rapid error correction rate (CointEq(−1): −1.14, p = 0.000), implying 114% per annum adjustment towards equilibrium which emphasizes ingrained fiscal instability. Oil prices export revenues 99.8% (Adj.R2) of the variabi- lity. R^2, Table 6), and model validation diagnostic tests revealed stable model (normality p = 0.84; no autocorrelation p = 0.71; homoscedasticity p = 0.48). These results throw into sharp relief Iraq's existential fiscal predicament: absent swift diversification away from the 99% oil-dependent revenue architecture, binding fiscal strictures to halt procyclical spending proclivities, and sovereign debt instruments to manage deficits, dramatic budget disruption as hallmarks of volatile global oil market gyrations will continue its ongoing reenactment. However, this analysis acknowledges the methodological limitations of six-month averaging to reveal more frequent volatility and the fact that exogenous shocks such as the Da'esh conflict and political instability (Jiyad, 2018) are not modelled as structural breakpoints. The future efforts will need to be carried out on quarterly basis and include explicit dummy variables for social-political crises, non-oil in GDP (Gross Domestic Product) growth rates, corruption indices, and geopolitical risks within the DSGE (Dynamic Stochastic General Equilibrium) models to "easily" offer policy recommendations.

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References

1. Abd, C., Khanjar, S., Sami, P., and O. Muhammed Al Tamimi, "Measuring the impact of oil price fluctuations in global markets on investment budgets in Iraq using ARDL methodology for the period (2004–2021)," Gospodarka i Innowacje, vol. 43, pp. 137–161, 2024. \[Online]. Available: https://www.gospodarkainnowacje.pl/index.php/issue_view_32/article/view/2224
2. S. A. Ahmed Rasheed, "The impact of oil price volatility on economic growth and stability in Iraq through the public expenditure for the period (2003–2020)," International Journal of Professional Business Review, vol. 8, no. 6, p. e01278, 2023. doi: 10.26668/businessreview/2023.v8i6.2059
3. Y. Albaji, K. Azarbayjani, and S. Daei-Karimzadeh, "The response of Iranian economy to monetary and exchange rate policies shocks base on the foreign sector: A dynamic stochastic general equilibrium analysis," Quarterly Journal of Quantitative Economics, vol. 20, no. 4, pp. 1–37, 2024. doi: 10.22055/JQE.2021.33852.2255
4. Z. Ali and S. Hussein, "Economic diversification in Iraq: Overcoming oil dependency and building a sustainable future," Business and Investment Review, vol. 2, no. 6, pp. 2986–7347, 2024. doi: 10.61292/BIREV.143
5. E. Balli, A. Nazif Çatık, and J. B. Nugent, "Time-varying impact of oil shocks on trade

balances: Evidence using the TVP-VAR model," Energy, vol. 217, p. 119377, 2021. doi: 10.1016/j.energy.2020.119377
6. J. A. Batten, H. Kinateder, P. G. Szilagyi, and N. F. Wagner, "Hedging stocks with oil," Energy Economics, vol. 93, 2021. doi: 10.1016/j.eneco.2019.06.007
7. R. C. Biro, Political Challenges of Economic Development in Rentier States: The Case of Kurdistan Region 2003–2020. Singapore: Springer, 2024. doi: 10.1007/978-981-96-0563-7
8. R. Brini, M. Amara, and H. Jemmali, "Renewable energy consumption, international trade, oil price and economic growth inter-linkages: The case of Tunisia," Renewable and Sustainable Energy Reviews, vol. 76, pp. 620–627, 2017. doi: 10.1016/j.rser.2017.03.067
9. R. Di Peri and I. Costantini, "Navigating the COVID-19 pandemic in consociational systems: The cases of Lebanon and Iraq," International Spectator, vol. 58, no. 1, pp. 128–145, 2023. doi: 10.1080/03932729.2023.2173913
10. P. Esmaeili, M. Rafei, M. Salari, and D. Balsalobre-Lorente, "From oil surges to renewable shifts: Unveiling the dynamic impact of supply and demand shocks in global crude oil market on U.S. clean energy trends," Energy Policy, vol. 192, p. 114252, 2024. doi: 10.1016/j.enpol.2024.114252
11. A. U. Gelan, S. Al-Qudsi, and A. AlAwadhi, "Simulating policy responses to multiple economic shocks: An experiment with combined impacts of COVID-19 and oil price crash on Kuwait," OPEC Energy Review, vol. 47, no. 3, pp. 197–215, 2023. doi: 10.1111/opec.12279
12. M. I. Haque, "Oil price shocks and energy consumption in GCC countries: A system-GMM approach," Environment, Development and Sustainability, vol. 23, no. 6, pp. 9336–9351, 2021. doi: 10.1007/s10668-020-01027-y
13. M. Jiang and J. Li, "Government spending shocks and default risk in emerging markets," PLOS ONE, vol. 18, no. 7, p. e0288802, 2023. doi: 10.1371/journal.pone.0288802
14. S. Khan and R. Shaheen, "Transition to renewable energy technologies and future prospects for oil-exporting countries," OPEC Energy Review, vol. 44, no. 4, pp. 429–450, 2020. doi: 10.1111/opec.12189
15. X. L. Liu, J. Nassios, and J. Giesecke, "To tax or to spend? Modelling tax policy responses to oil price shocks," Energy Policy, vol. 185, p. 113929, 2024. doi: 10.1016/j.enpol.2023.113929
16. S. Mukhtarov, S. Humbatova, and N. G. O. Hajiyev, "Is the transition to renewable energy consumption hampered by high oil prices?" International Journal of Energy Economics and Policy, vol. 11, no. 5, pp. 377–380, 2021. doi: 10.32479/ijeeep.11345
17. S. Mukhtarov, J. I. Mikayilov, S. Humbatova, and V. Muradov, "Do high oil prices obstruct the transition to renewable energy consumption?" Sustainability, vol. 12, no. 11, 2020. doi: 10.3390/su12114689
18. C. Nitschke and M. Rose, "Financial crises in American history," Oxford Research Encyclopedia of American History, 2021. doi: 10.1093/acrefore/9780199329175.013.167
19. S. B. Omotosho, "Oil price shocks and macroeconomic policy in resource-rich emerging economies," Ph.D. dissertation, Univ. of Glasgow, Glasgow, U.K., 2021. doi: 10.5525/gla.thesis.81953
20. A. K. Patidar, P. Jain, P. Dhasmana, and T. Choudhury, "Impact of global events on crude oil economy: A comprehensive review of the geopolitics of energy and economic polarization," GeoJournal, vol. 89, no. 2, pp. 1–25, 2024. doi: 10.1007/s10708-024-11054-1
21. J. Peng, Z. Li, and B. M. Drakeford, "Dynamic characteristics of crude oil price fluctuation—From the perspective of crude oil price influence mechanism," Energies, vol. 13, no. 17, p. 4465, 2020. doi: 10.3390/en13174465
22. E. Raouf, "Oil prices shocks and government expenditure," International Journal of Energy Economics and Policy, vol. 11, no. 5, pp. 78–84, 2021. doi: 10.32479/ijeeep.11172
23. R. Springborg, Political Economies of the Middle East and North Africa. Cambridge, U.K.: Polity Press, 2020. \[Online]. Available: https://books.google.com.my/books?id=WyvfDwAAQBAJ
24. A. Roza, E. S. Violita, S. Aktivani, and A. R. Statistician, "Study of inflation using stationary test with augmented Dickey Fuller & Phillips-Peron unit root test (case in Bukittinggi City inflation for 2014–2019)," Eksakta: Berkala Ilmiah Bidang MIPA, vol. 23, no. 2, pp. 106–116,

2022. doi: 10.24036/eksakta/vol23-iss02/303
25. R. Selmi, S. Hammoudeh, K. Kasmaoui, R. M. Sousa, and Y. Errami, “The dual shocks of the COVID-19 and the oil price collapse: A spark or a setback for the circular economy?” Energy Economics, vol. 109, p. 105913, 2022. doi: 10.1016/j.eneco.2022.105913
26. P. Shahrestani and M. Rafei, “The impact of oil price shocks on Tehran Stock Exchange returns: Application of the Markov switching vector autoregressive models,” Resources Policy, vol. 65, p. 101579, 2020. doi: 10.1016/j.resourpol.2020.101579
27. R. C. Smith, “The real oil shock: Re-examining petrodollar recycling’s impact on international credit markets,” Ph.D. dissertation, Univ. of Glasgow, Glasgow, U.K., 2022. doi: 10.5525/gla.thesis.82854
28. K. Q. Yaqub, “The role of oil revenue in shaping Iraq’s public budget,” British Journal of Interdisciplinary Research, vol. 1, no. 2, pp. 1–24, 2024. doi: 10.58934/bjir.v1i2.6
29. K. Q. Yaqub, “Analysis of nominal and real exchange rates in the Iraqi economy (1970–2013),” British Journal of Interdisciplinary Research, vol. 2, no. 3, pp. 17–41, 2025. doi: 10.58934/bjir.v2i3.13
30. Y. Zhao, Y. Zhang, and W. Wei, “Quantifying international oil price shocks on renewable energy development in China,” Applied Economics, vol. 53, no. 3, pp. 329–344, 2021. doi: 10.1080/00036846.2020.1808173
31. J. Zhou, M. Sun, D. Han, and C. Gao, “Analysis of oil price fluctuation under the influence of crude oil stocks and US dollar index—Based on time series network model,” Physica A: Statistical Mechanics and Its Applications, vol. 582, p. 126218, 2021. doi: 10.1016/j.physa.2021.126218