THE IMPACT OF OIL PRICE FLUCTUATIONS ON IRAQ'S FOREIGN EXCHANGE RESERVES FROM 2005 TO 2022

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Abstract
The study aims to determine the impact of global oil price fluctuations on Iraq's foreign exchange reserves, as the importance of foreign exchange reserves has increased in recent years due to Iraq's economic and political situation. Therefore, maintaining an adequate share of reserves has become one of the most essential tools for achieving financial stability. Consequently, it is necessary to study and analyze the factors that affect the proportion of foreign exchange reserves held by the central bank. Since the Iraqi economy is rentier, these reserves are primarily affected by oil price fluctuations. Standard models are used to study the extent to which foreign exchange reserves are affected by oil price fluctuations. The study came to several conclusions, the most important of which is the existence of a direct relationship between oil prices and foreign exchange reserves.

Importance of research
The importance of this study is that foreign exchange reserves are significant at both the local and international levels, and it is necessary to analyze the factors that affect foreign exchange reserves, the most important of which may be oil price fluctuations.

Search problem
Due to the increase in oil exports, foreign cash flows have increased, contributing to the central bank's foreign exchange reserves. Therefore, the research question can be asked: Do oil price fluctuations negatively or positively impact foreign exchange reserves?

Research hypothesis
The research hypothesis assumes that global oil price fluctuations positively affect Iraq's foreign exchange reserves.

Research Objective
The study aims to show the impact of oil price fluctuations on Iraq's foreign exchange reserves from 2005 to 2022.

Spatial and temporal boundaries
Iraqi studies were selected as an example of research and period (2005-2022).

Keywords: (oil price fluctuations, foreign reserves, ARDL).

Introduction
Foreign exchange reserves play an essential role in the economy of any country, especially in a single exporting country, as the foreign exchange earnings of rentier countries are

primarily affected by the rise and fall of oil prices in the world market. An increase in oil prices leads to a surge in foreign currency cash flows to these countries, increasing the share of foreign exchange reserves and vice versa. The Iraqi economy is rentier and almost entirely dependent on imports, as local production is insufficient. The primary reliance on the production and export of crude oil hurts the level of foreign exchange reserves held by the central bank. Since oil prices are volatile and an international strategic asset rather than a general commodity, these fluctuations easily affect foreign exchange reserves.

The first topic
The concept of foreign exchange reserves and the factors affecting it
First: The idea of foreign exchange reserves
Various names, such as international reserves, foreign exchange reserves, and external reserves, are known as foreign exchange reserves. All these terms refer to one concept. The difference is due to the differences in assets that may be considered reserve or other assets in the international monetary system adopted by different countries. The foreign exchange reserves of a country can be defined as the external assets that the financial authorities can readily use to finance international imbalances directly and to regulate the level of these imbalances indirectly by intervening in the foreign exchange market to affect the exchange rate of one currency or another for control purposes. (Belkacem, 2007, 47)

Second: Components of Foreign Exchange Reserves
The economic elements of foreign exchange reserves have evolved with the development of monetary systems and international economic relations. Thus, gold was the primary source of foreign exchange reserves under the gold standard. However, after the collapse of the gold standard and the emergence of international liquidity problems, the composition of foreign exchange reserves has expanded due to a variety of factors, including (Moakni, Zidane, 2020, 132)
- Some countries want to build up corresponding foreign exchange and gold reserves to compensate for the balance of payments deficit.
- More flexibility when spending money.
- Protect the external value of the domestic currency through foreign currency.
- The economics of using gold reserves when processing international payments.
According to the Manual on International Payments and Investment Positions (2009), foreign exchange reserves include cash gold, international reserve currencies, special drawing rights, and IMF reserves.

1- Monetary gold: It is a physical asset consisting of gold bars and coins owned and controlled by the monetary authorities. It is treated as an asset and issued as a currency. Its purpose is to issue banknotes and serve as a reserve, providing confidence in the local currency for international transactions.
2—Foreign currencies: Foreign currency is a physical asset generated through international payments made through international trade operations, imports, and exports, as well as

foreign currency received through investments or loans and interest income on the state's capital from abroad.

3- The reserve segment with the International Monetary Fund is one of the components of foreign exchange reserves, equivalent to 25% of the country's share in the International Monetary Fund. Members pay in special drawing rights or convertible foreign currency. Members can use the share if the withdrawal does not exceed the share limit. The share is regarded as a reserve asset of the Fund and the countries. Countries wish to retain the asset until the reserve assets are needed immediately and can withdraw it unconditionally.

4- Drawing rights: It is an international currency reserve established by the International Monetary Fund in 1969 to supplement the official assets of member countries. It is the unit of account the International Monetary Fund uses for internal accounting. Countries use it as a reference currency for their currencies or as a global reserve currency (www.imf.org). It consists of five currencies: the US dollar, the euro, the Chinese yuan, the Japanese yen and the British pound.

Third: The importance of international reserves
Many countries, especially developing countries, tend to increase their foreign exchange reserves, especially during the Asian crisis in the late 1990s. After the crisis, international reserves increased significantly. Statistics show that compared with developed countries, the foreign exchange reserves of developing countries are relatively stable, and their foreign exchange reserves have increased considerably. The share of foreign exchange reserves of emerging and developing countries has increased due to achieving several goals, including:(Kazem, Mohamed, 2017، 7).

A- Evidence of currency support and foreign assets increases confidence in the domestic currency.

B- Maintaining foreign currency liquidity to cushion external shocks in times of crisis and when the country's external borrowing capacity is weak to demonstrate its ability to meet current and future external obligations.

C- Assisting the government in meeting foreign exchange needs and maintaining reserves to deal with disasters and emergencies.

D- Strengthen the foreign exchange control system and allow the central bank to exit the foreign exchange market when necessary.

E- Settlement of daily transactions such as imports or repayment of foreign debts through international reserves.

Fourth: The optimal size of international reserves and indicators for determining it
To determine the optimal size of international reserves, it is necessary to study the following appropriate international reserve standards and indicators (Ben Amer, Bouallaoui, 2021, 14)

1- Ratio of international reserves to imports
This indicator is one of the leading traditional indicators for judging the adequacy of foreign exchange reserves because imports are the most critical variable in the balance of payments and are closely related to domestic consumption, production and growth. The reserve ratio

may be around 30% of annual imports or a reserve amount covering three months of imports, which is an appropriate reserve amount, and the current situation facing developing countries requires an increase in the reserve amount. This value requires four or five months.

2- Ratio of reserves to the volume of short-term external debt
It involves comparing reserves with the level of external debt, especially in the short term, and this comparison allows professionals to measure the risks associated with adverse developments that occur in international financial markets. If short-term external debt exceeds foreign exchange reserves, the economy has significant real risks that can be stopped or reduced only in rare cases. In addition, the measurement of this indicator gauges the country's capacity to fulfill its external responsibilities. If the country is unable to meet these obligations, it signifies a deficiency in international liquidity, resulting in the outflow of capital.

3- Ratio of reserves to total external debt
The ability of a country to repay its external debt burden is evaluated by this indicator. It is assumed that the optimal reserve ratio for each country is 40% of the total external debt.

4- Ratio of reserves to foreign direct investment
According to the index, reserves should cover 30 per cent of indirect foreign investment to offset unexpected capital flight flows. (Belkacem, 2009, 48)

5- Ratio of reserves to a balance of payments deficit
According to this indicator, reserve changes are the same as expected in the balance of payments deficit. As the deficit curve slopes upward, reserves must grow at the same rate as the deficit growth rate.

6. IMF Scale
In 2011, the IMF introduced a composite measure of foreign exchange reserves in developing countries that incorporates a range of risks. The indicator is staggered as follows:
* Components of potential leakage in the balance of payments include
- Export revenues due to lower external demand and losses from the trade crisis.
- Money supply reflects potential capital flight.
* The relative risk of each element depends on actual events. The IMF proposes the following weights:
With a fixed exchange rate, reserves should cover 10% of exports, 10% of money supply, 30% of short-term debt and 15% of other portfolio assets.

The second topic
Measuring and Analyzing the Impact of Oil Price Fluctuations on Iraq's Foreign Exchange Reserves.
First: Analysis of Iraq's International Reserve Structure from 2005 to 2022.

In a rentier state like Iraq, the increase or decrease in international foreign exchange reserves is related to oil revenues and the use of these revenues (whether in the public or private sector) because the central bank's international reserves have grown and come from the sale of oil. After deducting 5% as compensation to the State of Kuwait, oil goes to the overseas treasury account managed by the Central Bank of Iraq, divided into two parts. The first part is used to pay for government imports in Iraq. The second part is sold by the Treasury to the Central Bank to finance its expenditure on wages and salaries in dinars. The Central Bank sells dollars through the daily window to finance private-sector imports. The rest is an increase in the central bank's foreign exchange reserves (Dagher, 2016, 31). Table (1) shows the changes in international reserves and oil prices during 2005-2022.

Table (1) Purchases, Sales, International Reserves of the Central Bank and Oil Prices in Iraq for the Period (2005-2022) (Billion Dollars)

The year	Reserve Foreign Exchange	Oil prices	Central Bank purchases of dollars from the Ministry of Finance	Central Bank Dollar Sales
2005	13541	50.6	10.600	10.4
2006	18336	61	18.000	11.1
2007	24914	69.1	26.700	15.9
2008	38678	94.4	45.500	25.8
2009	54565	61	23.000	33.9
2010	53210	77	41.000	36.1
2011	58973	107	51.000	39.7
2012	75370	109	57.000	48.6
2013	81856	105	62.000	53.2
2014	88578	96	47.500	51.7
2015	77511	47.87	32.500	44.3
2016	60787	39.53	25.653	33.52
2017	54241	51.78	40.355	42.201
2018	59262	68.62	52.229	47.139
2019	75288	63.64	58.851	51.127
2020	79376	41.55	30.730	44.080
2021	80286	70.65	45.999	37.094
2022	90658	111.79	53.355	46.806

Source: Compiled by researchers based on the Central Bank of Iraq's economic reports (2005-20022).

-World Bank Data

Table (1) shows that the central bank's purchase of US dollars from the Ministry of Finance increased from $10.6 trillion in 2005 to $45.5 trillion in 2008. The increase in the central bank's purchase of US dollars from the Ministry of Finance was the increase in fiscal revenue after the lifting of sanctions on Iraq, the resumption of oil exports, and the increase in production and prices. The oil price rose from 50.6 in 2005 to 94.4 in 2008 but fell back in 2009 due to the global financial crisis and the subsequent drop in oil prices to $61 per barrel

and the decline in fiscal revenue, of which oil revenue accounted for more than 95%. Still, it did not rise again until 2013 due to the sharp drop in oil prices and the decline in fiscal revenue, reaching a peak of $62 in 2014. 0 billion, plus the ceiling of foreign exchange sales of 75 million USD/day established in 2015 under Article 50 of the General Budget Law, then reached about 25.6 billion USD in 2016 due to the fall in oil prices to $39.53 per barrel, and increased to 58.851 billion USD in 2019, and fell again in 2020 due to the global health crisis and the resulting sharp drop in oil demand and a sharp drop in prices, and then resumed recovery after the market recovery and the rise in oil prices, reaching 53.355 billion USD in 2022. Despite all these challenges related to economic, financial and monetary realities, Iraq still has sound currency or international reserves according to international standards set by the International Monetary Fund, as Iraq is one of the wealthiest countries in the world. Due to such high foreign exchange reserves, some studies on Iraqi Arab countries have exaggerated the size of foreign exchange reserves. Saudi Arabia and Algeria, whose reserve-to-money supply ratio is around 170%, are among the high ratios, and the reserve coverage ratio of short-term external debt is also high (Al-Alaq, 2016, p. 6).

Second: Impact of oil prices on Iraq's foreign exchange reserves during the period (2005-2022).
1- Research variables:
A- Dependent variable (foreign exchange reserve): foreign exchange reserves in Iraq from 2005-2022.
B - Independent variable (oil prices): oil prices in Iraq 20225 - 2022
Third: Research data: The research data consists of the following time series:
Table (2) Research Data

The year	Foreign Exchange Reserves (Million USD) Y	Oil Prices (USD)
2005	13541	50.6
2006	18336	61
2007	24914	69.1
2008	38678	94.4
2009	54565	61
2010	53210	77
2011	58973	107
2012	75370	109
2013	81856	105
2014	88578	96
2015	77511	47.87
2016	60787	39.53
2017	54241	51.78
2018	59262	68.62
2019	75288	63.64
2020	79376	41.55
2021	80286	70.65
2022	90658	111.79

Source: - Various pages were prepared by researchers based on data from the Central Bank of Iraq Annual Economic Report (2005-2022).

World Bank Data

Fourth: Drawing the time series: From the time series diagram, we can see that the time series of the dependent variable shows an increasing trend, while the independent variable shows an oscillating and unstable trend, see Figure (1).
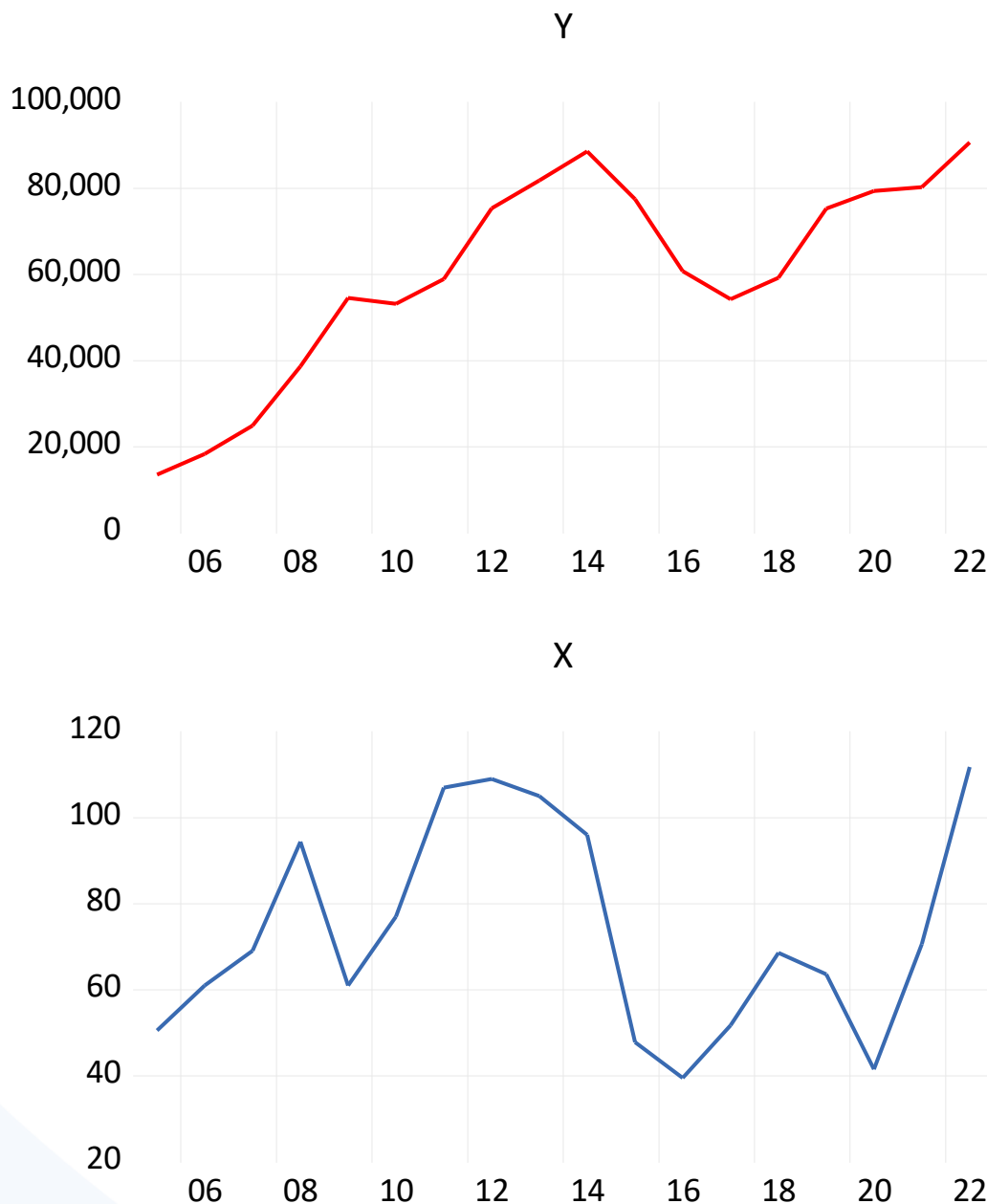

Figure (1) Time Series Data Graph

Source: Prepared by the researcher based on the statistical program (12. EViews).

Fifth: Time series stillness test: To prevent any potential spurious regression in the estimation due to the absence of stationarity in the time series, we perform a unit root test utilizing the findings from the Phillips-Byron test. The outcomes indicate that both the dependent and independent variables are non-stationary in terms of levels. Following the

initial transformation, the independent and dependent variables are consistent at the significant level (1%), whether with a constant, a constant and a direction or without a continuous and a direction, see Table (3).

Table (3) Philips Peron test

UNIT ROOT TEST RESULTS TABLE (PP)			
Null Hypothesis: the variable has a unit root			
At Level			
		Y	X
With Constant	t-Statistic	-1.6198	-2.0719
	Prob.	0.4621	0.2566
		N0	N0
With Constant & Trend	t-Statistic	-1.7581	-2.03
	Prob.	0.7032	0.5652
		N0	N0
Without Constant & Trend	t-Statistic	0.9136	0.0612
	Prob.	0.9	0.6957
		N0	N0
	At First Difference		
		D(Y)	D(X)
With Constant	t-Statistic	-6.3543	-5.7271
	Prob.	0.000	0.000
		***	***
With Constant & Trend	t-Statistic	-6.3745	-5.648
	Prob.	0.000	0.0003
		***	***
Without Constant & Trend	t-Statistic	-5.8871	-5.7446
	Prob.	0.000	0.000
		***	***
a: (*)Significant at the 10%; (**) Significant at the 5%; (***) Significant at the 1% and (no) Not Significant			

 Source: Prepared by the researcher based on the statistical program (12.EViews)
Since the series stops after the first difference, it is transformed into quarterly data and an autoregressive model with distributed slowdown is used.

Sixth: Standard analysis results:

1-The estimated cointegration model, using the ARDL method of the slow gap model, demonstrates the explanatory power of the model. The coefficient of determination, as indicated by the statistical test, reveals the relative quality of the estimated model, indicating that ^293% of the changes in the dependent variable foreign exchange reserves (Y) of the model (R) are explained as the result of changes in the independent variable (oil priceThe model accounts for 93% of the variability, with the remaining 7% attributed to external variables and the quality of the model itself. The level of significance for the model is set at 5%, as indicated in Table 4.

Table (4) Results of the Application of the Slowing Gap Model – Preliminary Estimation

Dependent Variable: Y				
Method: ARDL				
Selected Model: ARDL(2, 0)				
Variable	Coefficient	Std. Error	t-Statistic	Problem.*
Y(-1)	0.586811	0.16626	3.529473	0.0014
Y(-2)	0.30028	0.159419	1.883586	0.0693
X	154.2293	46.13158	3.343248	0.0022
C	-877.127	2130.027	-0.41179	0.6834
R-squared	0.928349	Mean dependent var		31526.15
Adjusted R-squared	0.921184	S.D. dependent var		10424.36
Prob(F-statistic)		0.000		

Source: Prepared by the researcher based on the statistical program (12.EViews)

2. The f-Bounds test was conducted to examine the presence of a long-term equilibrium relationship, or joint integration, between Iraq's independent variable (oil price) and dependent variable (foreign exchange reserves). The findings from this cointegration test can be found in Table (5).

Table (5) Joint Integration Test Results

F-Bounds Test		Null Hypothesis: No levels of relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	7.041252	10%	3.02	3.51
k	1	5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58
Actual Sample Size 34		Finite Sample: n=35		

Source: Prepared by the researcher based on the statistical program (12.EViews)

From the test result table (5), it can be seen that the value of the test based on the statistic (F) is (7.041), which is greater than the highest and lowest values at the significance level (5%), thus forming a long-term joint integral relationship between the research variables.

3. Long-Term and Short-Term Relationships: Testing the short-term and long-term relationships of the variables showed the following results:

A. Short-term relationship: The results showed the following:

1. The results show a positive correlation between oil prices and foreign exchange reserves, with a one-unit increase in oil prices leading to a significant increase in foreign exchange reserves ($154 million) (5%).

2. The results show that the value of the error correction parameter **ECM = (-0.112)** because the error correction coefficient or cointegration coefficient shows a significant negative value

at (1%), representing the deviation of the peak and trough of the change in oil prices. The results show that, in other words, after being affected by oil price shocks and fluctuations, it takes (2) years and 11 months for foreign exchange return equilibrium value i the long run.

$$\frac{1}{0.112} = 8.92 \, quarterly \, year$$

B. Long-run relationship: From the results of (ARDL) model, there is a positive correlation between oil price and foreign exchange reserves, and for every unit increase in oil price, foreign exchange reserves will increase by (1365.96) million. USD is at a significant level (5%). See Table (6).

Table (6) Long and Short-Term Results

ARDL Long Run Form and Bounds Test				
Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-877.127	2130.027	-0.41179	0.6834
Y(-1)*	-0.11291	0.046787	-2.41326	0.0221
X**	154.2293	46.13158	3.343248	0.0022
D(Y(-1))	-0.30028	0.159419	-1.88359	0.0693
* p-value incompatible with t-bounds distribution.				
** Variable interpreted as Z = Z(-1) + D(Z).				
Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
X	1365.96	661.6905	2.064348	0.0477
C	-7768.43	20899.88	-0.3717	0.7127
EC = Y - (1365.9599*X - 7768.4344)				

Source: Prepared by the researcher based on the statistical program (12.EViews)

4. In order to verify the accuracy and validity of the previous test results, we will conduct diagnostic tests. By analyzing the data from the autocorrelation test (LM test) in Table (7), we have determined that the statistical value (F-statistic) at a probability level of (Prob = 0.118) is significant, indicating that there is no autocorrelation issue. Additionally, the results of the heterogeneity test (ARCH) show that the (F-statistic) value at a probability level of (Prob = 0.439) is within the acceptable range (5%), suggesting that there is no variance difference problem. Consequently, we can accept the null hypothesis and reject the alternative hypothesis, which implies that there is no variance heterogeneity issue among the random residuals.

Table (7) Diagnostic Tests

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	2.30828	Prob. F(2,28)	0.1181
Obs*R-squared	4.812372	Prob. Chi-Square(2)	0.0902
Heteroskedasticity Test: ARCH			
F-statistic	0.614411	Prob. F(1,31)	0.4391
Obs*R-squared	0.64134	Prob. Chi-Square(1)	0.4232

Source: Prepared by the researcher based on the statistical program (12.EViews)

Conclusions

1- Iraq's international reserves show volatility as the Iraqi economy is almost entirely dependent on oil production and exports and is affected by factors beyond the central bank's control.
2- 2. Iraq has reasonable reserves that meet international standards and is considered one of the countries with high reserves.
3- The results of the unit root test show that all the variables examined are not static in their levels and become static after the first difference.
4- The analysis results show a positive correlation between cash reserves and oil price fluctuations, and the model explains that 93% of the changes in reserves result from oil price changes.
5- The analysis results show that a one-unit increase in oil price will lead to an increase in international reserves of $1365.96 million, a significant increase of 5%.

Recommendations

1- Eliminate the structural imbalances of the Iraqi economy by diversifying the economy and reducing control over the oil sector in favour of other productive sectors (agriculture, industry, banking, services, tourism).
2- Iraqi policymakers must consider the risk of oil price fluctuations when preparing the general government budget.
3- International reserve accumulation aims to reduce exchange rate volatility, so policymakers should stabilise the exchange rate to reduce dependence on foreign exchange reserve accumulation.
4- Develop a long-term approach and strategy to protect the country's profits from foreign exchange reserves exchange.

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