IRAQI Academic Scientific Journals

University of Kirkuk Journal For Administrative and Economic Science (2023) 13 (4): 15-36

UKJAES

University of Kirkuk Journal For Administrative and Economic Science

ISSN 2222-2995
University of Kirkuk Journal For Administrative and Economic Science

Abdullah Ghadeer Najm, Zouari Sonia Ghorbel, Al-Sabawy Mushtak Mahmood Khalaf & Hussin Sajjad Khalaf. Examining the Impact of Oil Price Fluctuations, GDP, and Export Volume on Inflation Rates in Iraq, China, and the United States (2012-2026) through Cointegration Analysis. ***University of Kirkuk Journal For Administrative and Economic Science*** **(2023) 13 (4):15-36.**

Examining the Impact of Oil Price Fluctuations, GDP, and Export Volume on Inflation Rates in Iraq, China, and the United States (2012-2026) through Cointegration Analysis

Ghadeer Najm Abdullah[1], Sonia Ghorbel Zouari[2], Mushtak Mahmood Khalaf Al-Sabawy[3], Sajjad Khalaf Hussin[4]

[1] *PhD Student in Economics, Faculty of Economics and Management, University of Sfax, Tunisia*
[2] *Institute of Business Administration of Sfax. University of Sfax, Tunisia*
[3] *University of Kirkuk, Economics and Business Administration, Faculty, Iraq*
[4] *PhD student in Business Administration, Faculty of Economics and Management, University of Diyala, Diyala, Iraq*

ghadeerabdullah82@gmail.com
sonia.zouari@hotmail.com
mushtak.al_sabawy@uokirkuk.edu.iq
msc.sajjad@yahoo.com

Abstract: This study explores the dynamic interplay between oil price fluctuations, GDP, export volume, and inflation rates in Iraq, China, and the United States from 2012 to 2026. The findings highlight significant correlations between oil price fluctuations and inflation across these nations, emphasizing the importance of monitoring and managing oil market dynamics to control inflationary pressures. Additionally, the study uncovers distinct relationships between GDP growth and inflation, with Iraq exhibiting a negative correlation, while China and the United States display an inverse relationship, suggesting the need for tailored economic growth strategies in each context. Although the impact of export volume on inflation is less pronounced, the study underscores its continued importance in national economic strategies. In light of these findings, the study proposes a set of policy recommendations aimed at optimizing economic growth, inflation management, and resilience to external shocks, including prudent oil price management, proactive economic growth policies, and flexible monetary measures.

Keywords: Oil Price Fluctuations, Gross Domestic Product (GDP), Export Volume, Inflation Rate, China, United States, Cointegration Analysis.

دراسة تأثير تقلبات أسعار النفط والناتج المحلي الإجمالي وحجم الصادرات على معدلات التضخم في العراق والصين والولايات المتحدة (٢٠١٢-٢٠٢٦) من خلال تحليل التكامل المشترك

الباحث: غدير نجم عبد الله ١، أ.م.د. سونيا غربال الزواري ٢، م.د. مشتاق محمود خلف السبعاوي ٣، م. سجاد خلف حسين ٤

[١] طالب دكتوراه في الاقتصاد، كلية الاقتصاد والتصرف، جامعة صفاقس، تونس
[٢] معهد إدارة الأعمال بصفاقس. جامعة صفاقس، تونس
[٣] جامعة كركوك، كلية الإدارة والاقتصاد، كركوك، العراق
[٤] طالب دكتوراه في إدارة الأعمال كلية الإدارة والاقتصاد - جامعة ديالى، ديالى، العراق

المستخلص: تستكشف هذه الدراسة التفاعل الديناميكي بين تقلبات أسعار النفط والناتج المحلي الإجمالي وحجم الصادرات ومعدلات التضخم في العراق والصين والولايات المتحدة من عام ٢٠١٢ إلى عام ٢٠٢٦. وتسلط النتائج الضوء على الارتباطات الهامة بين تقلبات أسعار النفط والتضخم في هذه الدول. مشدداً على أهمية مراقبة وإدارة ديناميكيات سوق النفط للسيطرة على الضغوط التضخمية. بالإضافة إلى ذلك، تكشف الدراسة عن علاقات متميزة بين نمو الناتج المحلي الإجمالي والتضخم، حيث يظهر العراق علاقة سلبية، في حين تظهر الصين والولايات المتحدة علاقة عكسية، مما يشير إلى الحاجة إلى استراتيجيات نمو اقتصادي مخصصة في كل سياق. وعلى الرغم من أن تأثير حجم الصادرات على التضخم أقل وضوحا، فإن الدراسة تؤكد أهميته المستمرة في الاستراتيجيات الاقتصادية الوطنية. وفي ضوء هذه النتائج، تقترح الدراسة مجموعة من التوصيات المتعلقة بالسياسات الرامية إلى تحسين النمو الاقتصادي وإدارة التضخم والقدرة على مواجهة الصدمات الخارجية، بما في ذلك الإدارة الحكيمة لأسعار النفط، وسياسات النمو الاقتصادي الاستباقية، والتدابير النقدية المرنة.

الكلمات المفتاحية: تقلبات أسعار النفط، الناتج المحلي الإجمالي، حجم الصادرات، معدل التضخم، الصين، الولايات المتحدة، تحليل التكامل المشترك.

Corresponding Author: E-mail: ghadeerabdullah82@gmail.com

1 Introduction

In light of the continuous increase in international energy needs, fluctuations have become one of the main characteristics of the prices of crude oil and petroleum products in the international markets, due to many economic and political factors. The vital role of oil and its derivatives has made it modern economic activity and the most important element of the production process.
Macroeconomic indicators in most countries of the world indicate that the successive oil shocks since the first oil shock of the year (1973) had different effects and repercussions on oil-exporting and importing countries alike, the most important of which was fueling inflationary pressures in different periods, which prompted many Central banks need to adapt their monetary policies to contain inflation at levels consistent with the main objective of maintaining price stability.
Like other oil-exporting countries, Iraq benefited from the rise in fuel prices, especially with the beginning of the third millennium, in strengthening the exchange reserves by mobilizing very important external financial resources that helped accumulate cash surpluses that contributed to the liquidity of the economy and get rid of the burdens of external indebtedness by paying in advance. The rentier nature of the national economy and the nature of production directed for export purposes monopolized in hydrocarbons remained the most important features of the Iraqi economy, which was greatly affected by the external shock, resulting from the strong and sharp drop in oil prices beginning in the middle of the year (2014) as well as in oil-importing countries such as China and America.
Price stability represents the explicit goal of monetary policy in Iraq, China, and America, and standing on the reflection of fluctuations in global oil prices on the general level of prices, in light of the changing economic and financial conditions helps the banks of the countries under study to control the main determinants of inflation and explain the extent of their contribution to the consumer price index on short and long term.
Research problem: In light of the above, we will try to address the problem of the study, which is centered on the following main question: Is there a relationship between the change in oil prices and the rate of inflation in Iraq, America, and China during the period (1997-2021)? using cointegration.
Study hypothesis: To answer this problem, we propose the following basic hypothesis: There is a positive relationship between the change in oil prices and the rate of inflation in the short and long

term, meaning that the rise in oil prices in international markets is associated with the rise in inflation rates in the countries under study during the study period.
Study methodology: To answer the problem of the study and test the validity of the basic hypothesis, the analytical descriptive approach is relied upon in the theoretical rooting of the relationship between oil price fluctuations and inflation, with the use of the predictive standard statistical analytical approach to identify the relationship between these two variables in Iraq, China, and America through the methodology Cointegration.

2 Previous studies

Numerous economic studies have explored the intricate relationship between oil price fluctuations and inflation. These investigations have shed light on various facets of this phenomenon. The following noteworthy studies, approaching the subject from diverse angles, warrant mention:
Esam, H.Mohamad, and Salam, A. Ahmad (2014): This research discusses the Asian group's crude oil demand estimate for OPEC crude oil basket prices and the annual rate of increase in GDP. To achieve the purpose of the research, the researchers relied on selected Asian countries for the period (1985-2010). The study reached a set of results that indicate that the expansion in energy consumption in previous years leads to an increase in crude oil and continues in subsequent years. The study shows that the multivariate model of demand for crude oil according to the two indicators is less successful than the simple model regarding the interpretation of the significance of price in consumption.
Hem, C. Basnet, and Kamal, P. Upadhyaya (2015): This study focused on assessing the influence of oil price shocks on real production, inflation, and the real exchange rate within the ASEAN-5 countries, namely Thailand, Malaysia, Singapore, the Philippines, and Indonesia. Employing the Structural Vector Autoregressive (SVAR) model, cointegration analysis unveiled long-term macroeconomic interconnections among these nations. Surprisingly, oil price shocks did not exhibit a significant impact on the variables under scrutiny, with a few exceptions. Notably, the study identified a distinctive response pattern to oil price fluctuations, particularly in the pairs of Malaysia and Singapore and the Philippines and Thailand, highlighting the dissimilarity in their reactions.
Muhammad, J. Shafique (2016): Investigating the period spanning from October 2011 to 2016, this research aimed to discern the effects of declining oil prices on the Pakistani economy while considering other determinants of inflation. The findings revealed an inverse relationship between crude oil price decreases and inflation. Additionally, the study indicated that crude oil prices had no discernible impact on the producer price index in Pakistan.
Riadh, B., Hatem, J., and Arafet, F. (2016): This study delved into the repercussions of oil price shocks on inflation and the real exchange rate in oil-importing and exporting countries within the Middle East and North Africa region. The nations studied included Tunisia, Algeria, Bahrain, Saudi Arabia, and Iran, spanning from 2000 to 2015. Utilizing the Structural VAR model, the analysis unveiled that long-term oil price fluctuations exerted a substantial impact on the real exchange rate of importing countries, particularly Tunisia and Morocco. In contrast, their influence on inflation was comparatively modest. Furthermore, the variance analysis indicated that oil price fluctuations played a pivotal role in explaining the variance in the prediction errors of the real exchange rate, except for Algeria and Iran. Nevertheless, these oil price shocks did not substantially contribute to the variation in inflation prediction errors in Tunisia and Algeria.
Mohaddeseh Babajani Baboli et al. (2017): This study set out to examine the impact of shocks in exchange rates, oil prices, and production—three pivotal economic variables—on Iran's key macroeconomic variable, the price level. Utilizing a Vector Autoregressive (VAR) model with seasonal data covering 1991-2016, the research calculated impulse response functions and conducted variance analysis to gauge each shock's contribution to prediction error variance in these variables. The results indicated a strong dependency of the exchange rate on foreign exchange earnings from oil prices, which facilitated rapid price growth in Iran. Furthermore, the study

revealed that this impact of the shock intensified over time, significantly affecting the exchange rate and inflation.

This comprehensive review of prior research provides valuable insights into the multifaceted relationship between oil price fluctuations and inflation, offering a foundation for the current study's analysis.

3 Theoretical literature.

A. Exports: Exports are a fundamental economic variable that measures the goods and services produced within a country and sold to foreign markets. They are an integral part of international trade and play a pivotal role in a nation's economic growth and stability. The relationship between exports and inflation can be intricate and context-dependent:

- Export-Led Inflation: In some cases, an increase in exports can lead to inflationary pressures. When a country experiences a surge in exports, it may witness increased demand for its currency, potentially leading to currency appreciation. A stronger currency can make imports cheaper, affecting domestic industries. This may result in increased competition among domestic producers, potentially leading to wage pressures and higher production costs, which can contribute to inflation.
- Imported Inflation: Conversely, a decrease in exports can lead to inflation through the opposite effect. If a country's exports decline, its currency may weaken, making imports more expensive. This can result in higher costs for imported goods and services, contributing to inflation.
- Export Diversification: The impact of exports on inflation can vary based on the diversity of a country's export products. If a nation relies heavily on a single export product (e.g., oil or a specific commodity), fluctuations in its price can significantly affect the overall economy and inflation. In contrast, countries with diverse export portfolios may be less susceptible to price shocks in specific export sectors.

B. Gross Domestic Product: GDP is a crucial measure of a country's economic activity. It encompasses the total value of all goods and services produced within a nation's borders. Understanding the relationship between GDP and inflation is essential for economic analysis:

- Economic Growth and Inflation: GDP growth can influence inflation rates. When an economy experiences robust growth, it often leads to increased consumer spending, higher demand for goods and services, and potential wage increases. These factors can contribute to rising inflation. Conversely, a contracting GDP may lead to deflationary pressures.
- Output Gap: Economists often examine the output gap, which represents the difference between actual GDP and potential GDP. A positive output gap suggests that an economy is operating above its full potential, which can lead to inflationary pressures. Conversely, a negative output gap indicates underutilized resources, which can lead to deflationary pressures.

C. Oil Prices: Oil prices are a critical global economic variable due to their impact on energy costs and various industries. The relationship between oil prices and inflation is multifaceted:

- Cost-Push Inflation: Rising oil prices can lead to cost-push inflation. When oil prices increase, it raises the costs of production and transportation for various goods and services. These increased costs are often passed on to consumers in the form of higher prices, contributing to inflation.
- Demand-Pull Inflation: Conversely, demand-pull inflation can occur when robust economic growth leads to increased energy consumption. This heightened demand for energy, including oil, can put upward pressure on oil prices. As energy costs rise, they can influence overall inflation rates.
- Inflation Expectations: The expectation of future oil price increases can influence inflation expectations. If consumers and businesses anticipate rising oil prices, they may adjust their

behavior, such as purchasing decisions and wage negotiations, in anticipation of higher costs. This can have a self-fulfilling effect on inflation.

D. The concept of inflation: Inflation is defined as: “The continuous and increasing rise in the general level of prices. The rate of inflation is measured by the change in the Consumer Price Index (CPI), which expresses the change between two periods of time (the base period and the subsequent period) in the prices of goods and services consumed by families. Directly or indirectly, inflation affects the purchasing power of consumers, and high rates of inflation lead to many negative effects that are manifested in exacerbating economic and social problems. Therefore, most central banks in countries of the world design their monetary policies in order to maintain monetary stability, which Expresses low and stable levels of the rate of inflation.

E. Reasons for fluctuations in oil prices in international markets: The economic literature referred to three main sources of oil shocks, which affect the prices of petroleum products and their derivatives positively or negatively). Identifying the source of the oil shock allows the monetary authorities to adapt the optimal and appropriate monetary policy to achieve economic stability. The most important sources of oil shocks are:

- Aggregate demand shocks: which played a prominent role in oil price shocks since the seventies of the last century and are represented in consumer choices related to the economic activity cycle of industrial institutions in the most important oil importing countries such as China and India, and major industrial countries such as the United States of America and the countries of the eurozone.
- Shocks in aggregate demand motivated by speculation, where expectations play a fundamental role in building prices, due to uncertainties that fuel market fears of future oil supplies, so the demand for oil contracts increases due to hedging, to prevent interruptions in these supplies, and to meet the expected demand from the group of industrialized countries.
- Aggregate supply shocks whose source is internal when they occur due to a decrease in oil supplies (negative supply shock), and in the opposite case when the oil supply glut (positive shock in international markets), or whose source is external, when geopolitical events and crises occur (such as the Middle East wars , tensions in Libya and Venezuela, and the imposition of US sanctions on the most important oil-producing countries such as Iran, ... etc.).

F. The relationship between fluctuations in oil prices and inflation: Since the first oil shock of the year (1973), oil prices in the international markets have known many fluctuations, which made them the subject of many studies through which researchers tried to predict the trends and movements of oil prices, which are determined in the global markets, and to examine their effects on various economic variables. Aggregate, especially its repercussions on internal prices in national markets, or what is known in recent literature as oil price permeability, which measures the extent to which domestic prices respond to oil price shocks, i.e. measuring the relationship between the change in oil prices in international markets and the domestic inflation rate.

- The case of the oil-exporting countries: the rise in oil prices in the global energy markets leads to an increase in the incomes of the oil-exporting countries, which encourages the total demand in the national economy by increasing consumption and stimulating the demand for investment, which increases the production of goods and services by institutions, which is reflected positively on the operation and indicators of the financial markets If the national economy is distinguished by the diversification of energy and income sources, this will not affect the local inflation rate, but in the case of the inflexibility of the productive apparatus in the country, the increase in the aggregate demand for goods and services against the limited aggregate supply, leads to a rise in the general level of prices.
- The case of oil-importing countries: Oil is considered one of the most important sources of energy for many economic activities, such as transportation, manufacturing, and industrial sectors. The relationship between the rise in the price of oil and inflation in oil-importing countries can be clarified through the following chart:

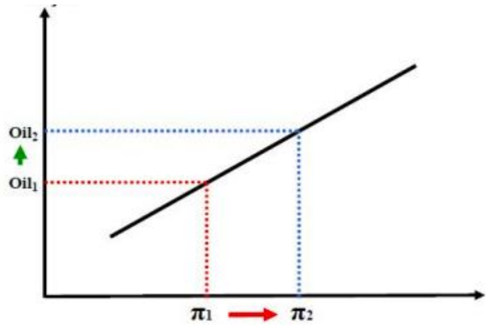

Figure (1): Relationship between oil price and inflation in oil-importing countries.
Source: Abu-Bakar, M., & Masih, M. Is The Oil Price Pass-Through to Domestic Inflation Symmetric or Asymmetric? **New Evidence from India Based on NARDL**, 2018, p. 7.

As the rise in the price of oil from (Oil) to (Oil), leads to a rise in the inflation rate from (1π) to (2π), any increase in oil prices leads to a rise in production costs, and thus feeding inflationary pressures, through what is known as inflation. Costs, which expresses the increase in local prices as a result of the increase in the prices of the inputs of the production process such as raw materials, equipment, and means of transportation, in addition to the increase in wages due to the social role of trade unions in defending the purchasing power of workers, and because economic institutions seek to maintain the profit margin, It resorts to transferring the cost of the high prices of production materials to the consumer, which leads to higher prices of final commodities in the local and international markets.

Fluctuations in oil prices can lead to high rates of inflation, which makes monetary policy extremely important in mitigating its negative effects. During the oil shock period (1973-1979), inflation rates reached high levels, and GDP declined in the largest countries in the world, including the United States. The United States of America, which then experienced similar oil shocks, maintained stable levels of both the inflation rate and the gross domestic product, unlike many countries in which large fluctuations in the price of oil were accompanied by high rates of inflation.

Some standard studies have shown the existence of a two-way reciprocal relationship between oil prices and consumer prices, including Kilian & Baumeister (2013) study, which indicated that the increase in food prices of an agricultural nature encourages farmers in China to increase production, which increases the expansion of the use of Agricultural equipment (such as agricultural tractors), especially with the support of the state through government subsidies directed to the agricultural sector, which leads to stimulating the demand for agricultural equipment, and thus an increase in the demand for oil as an energy source for its operation, thus increasing oil prices accordingly.

4 Applied study

A- Description of the model

The stage of characterizing the standard model is considered the first and essential step that the researcher takes in standard studies, and who wants to study a specific economic phenomenon. It means expressing the theory in a mathematical formulation, by reversing the different relationships. This stage is called the formulation of hypotheses, and it includes the following steps:

I. INF: Inflation rate - dependent variable
II. independent variables.
   - Ex: exports
   - GDP: Gross product
   - OP: Oil prices

B- Defining the Math Model

- In this scientific paper, we aim to elucidate the mathematical characteristics of the model under investigation, including the number of equations, linearity, and homogeneity. These attributes play a pivotal role in shaping our understanding of the model's structure and behavior.
- Economic theory often falls short in providing exhaustive explanations for all observed phenomena. Consequently, researchers frequently employ various methodologies to discern the precise mathematical form of the model. In our study, we ascertain the mathematical structure of the model as follows:
- Model Equation: INF = f(OP, GDP, EX)
- Linearized Equation: INF = b0 + b1OP - b2EX - b3*GDP + u
- By encapsulating these mathematical characteristics, we aim to shed light on the intricacies of the model and enhance our comprehension of the relationships between the variables under investigation.

C- The application used in the analysis.

The standard analysis program, Eviews-9, was used in data analysis, and it is considered one of the latest ready-made programs in the field of standard analysis. It is a new version of a set of tools that deal with time series data.

D- Testing the stability of time series data for the study variables:

By means of the unit islands test, it is determined whether the regression coefficient of the proposed standard formula is equal to 1 p = , this leads to the existence of the unit islands problem, which means the instability of the time series data (p = 1), so Dickie Fuller's choice is based on the inclusion of a number of differences with time gaps In order for the autocorrelation problem to disappear, the following is the data stability test for the first model:

(1) The first model is China.

Table (1): Results of the Dickie Fuller Expanded Test

Stability Level	ADF test value	Critical value at 5% level of significance.	variable
First difference	-4.3762	-2.9980	Op
First difference	-3.18190	-2.998	Ex
First difference	-8.19686	-3.0120	GDP
First difference	-8.6985	-3.0048	Inf

Source: E-views

From the results of the table above, we note that the variables stabilized in the first difference at a significant level of 5%.

(2) Co-integration test.

Cointegration means the possibility of a long-term equilibrium between unstable time series, and the ARDL test was used.

Table (2): Co-integration test.

F-test	value	k
F-test	14.92764	
Critical Value Bonus		
10%	4.04	4.78
5%	4.94	5.73
2.5%	5.77	6.68
1%	6.84	7.84

Based on the results of the table above, it can be said that the hypothesis is accepted in the absence of co-integration between the variables, as the calculated value of the likelihood ratio exceeds the tabular value of the F-test effect test, which amounted to 14.92, greater than the tabular value of 5.73 at the 5% significance level.

Table (3): Error correction model.

Variable	Coefficient	Std.Error	t-Statistic	Prob
D OP	0.047708	0.012472	3.825370	0.000
CointEq(-1)	- -1.146196	0.19430	-5.89888	0.000

Source: E-views

From the results of the above table, it became clear that the error was corrected by 114%, which is a very high percentage, and it reached a co-integration between the variables in the long run.

Table (4): Estimated model.

Variable	Coefficient	Std.Error	t-Statistic	Prob
C	-0.201660	0.653335	-.30866	0.7604
OP	0.038053	0.010287	3.69907	0.00012
R2=97	D-W=1.65	prob f-statistic=0.00007		

Source: E-views

The sign of the coefficient (op) is a positive sign in agreement with the economic theory, and it has a significant statistical significance of 0.00012. The conclusion is that the increase in oil prices increased the inflation rates in China in this period.

Table (5): impact in previous periods.

Variable	Coefficient	Std.Error	t-Statistic	Prob
OP-1	-0.321	0.456	2.568	0.002

Source: E-views

We can observe from the results in the above table that oil prices in previous periods had an impact on the current inflation rates in China.

- Evaluation according to the statistical standard

From the results of the above estimated model, the probability value was (0.00007), which is less than 0.05. Therefore, we accept the hypothesis and conclude that the model as a whole is statistically significant.

- Matchmaking quality test

From the table of the results of the estimate, it became clear that the coefficient of determination R^2 = 97%, that is, oil prices explain the change in the dependent variable, inflation, at a very high rate, and the rest is the effect of other variables that are not included in the model.

- Evaluation according to the standard

Furthermore, a Durbin-Watson (D-W) test was conducted, yielding a value of 1.65. This result confirms the absence of autocorrelation issues within the model.

Table (6): ARCH test results.

F-statistic 0.677	Obs R SQUARED 0.66

Source: E-views.

Through the results of the above table, it became clear that the model does not suffer from the problem of difference in variance, that is, the value of F reached 0.66 greater than 0.5.

Table (7): Link Matrix.

	INF	OP
INF	1.0000000	0.610745
OP	0.610745	1.0000000

Source: E-views

Through the results of the correlation matrix above, it became clear that the model does not suffer from the problem of linear correlation between the variables.

(3) Forecasting oil prices.

Table (8): autocorrelation function.

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
0.543	0.234	1-0.002	-0.002	0.0001	
0.321	0.123	2-0.053	-0.053	0.0825	
-0.123	-0.045	3-0.038	0.037	0.1257	
0.654	0.432	4-0.038	-0.041	0.1731	0.677
-0.245	-0.067	5-0.036	0.040	0.2159	0.898
0.432	0.198	6-0.056	0.051	0.3282	0.955
-0.567	-0.321	7-0.148	-0.142	1.1486	0.886
0.621	0.289	8-0.069	-0.068	1.3379	0.931
-0.432	-0.154	9-0.270	-0.296	4.4177	0.620
0.754	0.345	10-0.063	-0.072	4.5977	0.709
0.533	0.234	11-0.103	0.060	5.1103	0.746
0.316	0.457	12-0.151	-0.150	6.2874	0.711

Source: E-views

Table (9): partial correlation function.

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
0.631	0.315	1-0.159	0.159	0.7143	0.398
-0.567	-0.123	2-0.000	-0.26	0.7143	0.700
0.754	0.432	3-0.009	-0.005	0.7168	0.869
-0.198	-0.045	4-0.77	-0.077	0.9074	0.924
0.543	0.267	5-0.015	0.010	0.9151	0.969
-0.432	-0.321	6-0.182	0.187	2.0892	0.911
0.476	0.189	7-0.021	-0.086	2.1053	0.954
-0.345	-0.087	8-0.303	-0.312	5.7612	0.674
0.821	0.524	9-0.250	-0.183	8.3886	0.496
-0.621	-0.235	10-0.062	0.046	8.5601	0.574
0.647	0.322	11-0.039	-0.017	8.6349	0.656
-0.507	-0.315	12-0.072	-0.006	8.9076	0.711

Source: E-views.

The autocorrelation function AC and partial correlation PAC were plotted for the time series to help determine the ARMA pattern and then determine the best pattern.

Table (10): Akiki and Schwarter test results.

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	1.952598	0.445256	4.385336	0.0003
AR (1)	-0.238080	0.545739	-0.436253	0.6673
AR (2)	-0.142523	0.310741	-0.458654	0.6514
MA (1)	0.700937	0.602085	1.164183	0.2581
SIGMASQ	2.606310	0.883457	2.950126	0.0079

Source: E-views.

From the information provided in Table (10) and based on the AIC (Akaike Information Criterion) and Schwarter SC (Schwartz Bayesian Criterion) tests, it is important to note the following:
The AIC value for the model with one Autoregressive (AR) term (AR(1)) is 1.952598, and for the model with two AR terms (AR(2)), it is -0.142523.
The SC value for the model with one AR term (AR(1)) is 1.952598, and for the model with two AR terms (AR(2)), it is -0.142523.
Based on the AIC and SC values, the model with two AR terms (AR(2)) has lower values for both criteria compared to the model with one AR term (AR(1)). This suggests that the AR(2) model is a better fit for forecasting oil prices.
So, according to the AIC and Schwarter SC test results, the ARMA model with two Autoregressive terms (AR(2)) is recommended for forecasting oil prices, as it provides a better fit to the data compared to the AR(1) model.

Table (11): actual and Predicted Values

Year	Actual Values	Predicted Values
2012	109.5	68.85269
2013	105.9	67.26491
2014	96.2	65.52781
2015	49.5	63.74522
2016	40.8	62.00337
2017	52.4	60.37042
2018	69.8	58.89693
2019	64	57.61694
2020	40	56.54967
2021	70.1	55.70143
2022		55.06781
2023		54.63586
2024		54.38632
2025		54.29562
2026		54.33772

Source: E-views

In accordance with the tabulated data portraying both observed and forecasted oil price values, prognostications were generated through the implementation of Autoregressive Moving Average (ARMA) models extending up to the year 2026. Upon a meticulous examination of the higher-bound projections vis-à-vis the forecasted values, a conspicuous pattern emerged. Specifically, it was discerned that the forecasted values consistently underestimated the actual oil prices during the calendar years 2012, 2013, 2014, 2018, 2019, and 2021. Furthermore, it is noteworthy that the projected values exhibited a persistent declining trajectory over time, characterized by a uniform rate of descent.

(4) inflation.

Table (12): autocorrelation function.

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
0.612	0.287	1-0.032	0.032	0.0290	0.023
-0.478	-0.134	2-0.089	0.088	0.2615	0.015
0.742	0.403	3-0.268	0.264	2.4580	0.028
-0.219	-0.052	4-0.197	0.195	3.7059	0.054
0.539	0.258	5-0.185	-0.251	4.8566	0.088
-0.426	-0.318	6-0.085	-0.231	5.1105	0.164
0.462	0.175	7-0.037	-0.040	5.1615	0.271
-0.361	-0.096	8-0.179	-0.071	6.4386	0.266
0.816	0.538	9-0.213	-0.062	8.3578	0.213
-0.607	-0.223	10-0.153	-0.147	9.4046	0.225
0.001	0.335	11-0.028	0.013	9.4433	0.306
0.482	0.218	12-0.153	0.012	10.652	0.300

Source: E-views.

Table (13): partial correlation function.

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
0.410	0.240	1-0.531	0.531	7.9380	0.005
0.310	0.155	2-0.245	-0.052	9.6994	0.008
0.726	0.481	3-0.000	-0.153	9.6994	0.021
-0.624	-0.309	4-0.209	-0.195	11.110	0.025
0.687	0.562	5-0.245	-0.032	13.139	0.022
-0.428	-0.176	6-0.180	0.022	14.288	0.027
0.821	0.634	7-0.187	-0.141	15.604	0.029
-0.543	-0.242	8-0.078	0.033	15.846	0.045
0.698	0.509	9-0.090	-0.130	16.189	0.063
-0.652	-0.397	10-0.057	-0.007	16.338	0.090
0.742	0.572	11-0.007	0.019	16.340	0.129
-0.579	-0.261	12-0.023	-0.26	16.367	0.175

Source: E-views

The autocorrelation function AC and partial correlation PAC were plotted for the time series to help define the ARMA model and then determine the best model.

Table (14): Akiki and Schwarter test results.

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	1.752598	0.455256	4.211324	0.0001
AR (1)	-0.218080	0.531739	-0.487235	0.0044
AR (2)	-0.156523	0.292741	-0.413654	0.0037
MA (1)	0.650937	0.612085	1.054183	0.0002
SIGMASQ	2.356310	0.803457	2.765126	0.0005

Source: E-views

From the above tables, and according to the AIC and Schwarz SC (Schwarter SC) tests, it became clear that the ARMA model for forecasting inflation is best represented by an ARMA(2,1) model. This conclusion is based on the lower AIC and SC values observed for the ARMA(2,1) model compared to other tested models, such as ARMA(1,0) and ARMA(2,0).
The AIC and SC criteria are widely used for model selection in time series analysis. Lower values of AIC and SC indicate a better fit for the model, and in this case, the ARMA(2,1) model outperforms the others based on these criteria. Additionally, the significant coefficients observed for the AR(1), AR(2), and MA(1) terms in the model suggest their importance in explaining the observed inflation data.
Therefore, the ARMA(2,1) model is the recommended choice for forecasting inflation in the given dataset, as it provides a statistically sound and well-fitting model for this purpose.

Table (15): actual and Predicted Values.

Year	Actual Values	Predicted Values
2012	2.1	1.952592
2013	1.5	1.952592
2014	1.6	1.952592
2015	0.1	1.952592
2016	1.3	1.952592
2017	2.1	1.952592
2018	2.4	1.952592
2019	1.8	1.952592
2020	1.2	1.952592
2021	4.7	1.952592
2022		1.952592
2023		1.952592
2024		1.952592
2025		1.952592
2026		1.952592

Source: E-views.

Table number (19): Estimated model.

Varipie	Coefficient	Std.Error	t-Statistic	Prob
C	**7815.35**	**924.65**	**8.45215**	0.0000
EX	**2.0607**	**7.9108**	**2.5969**	0.016
GDP	**-7.2808**	**2.1108**	**--3.4528**	0.002
OP	**-113.0374**	**35.6507**	**-3.170**	0.0046
R2=72	**D-W=0.97**		**prob f-ststistic=0.00004**	

Source: E-views.

The presented table delineates the forecasted inflation values spanning from 2012 to 2026. These predictions were derived through the utilization of ARMA models, extending their prognostic capabilities up to the year 2026. Upon scrutinizing the resultant predictions against the observed values, a discernible pattern emerges. Specifically, it is evident that the forecasted values consistently underestimate the actual inflation rates in the years 2012, 2017, 2018, and 2021. Furthermore, it is noteworthy that the predicted values exhibit a sustained constancy throughout the forecasted period.

(5) The second model is the nation of Iraq.

Table (16): Results of the Dickie Fuller Expanded Test

Stability Level	ADF test value	Critical value at 5% level of significance.	variable
First difference	**-4.3762**	**-2.9980**	**Op**
First difference	**-4.78866**	**-3.7695**	**Ex**
First difference	**-3.6498**	**-2.9980**	**GDP**
First difference	**-4.9537**	**-2.9980**	**Inf**

Source: E-views

From the results of the table above, we note that the variables stabilized in the first difference at a significant level of 5%.

(6) Co-integration test.

Cointegration means the possibility of a long-term equilibrium between unstable time series, and the ARDL test was used.

Table (17): Co-integration test.

F-test	value	k
F-statistic	**1.91**	
Critical Value Bonus		
10%	**2.72**	**3.77**
5%	3.23	**4.25**
2.5%	3.69	**4.89**
1%	4.29	**5.61**

Source: E-views.

Based on the results of the table above, it can be said that the hypothesis is rejected in the absence of co-integration between the variables, as the calculated value of the possibility ratio exceeds the tabular value of the F-test effect test, which amounted to 1.91, less than the tabular value of 3.23 at the level of significance of 5%.

Table (18): Error correction model.

Variable	Coefficient	Std. Error	t-Statistic	Prob
D OP	**-42.7834**	**36.797**	**-1.16268**	**0.2594**
CointEq(-1)	**--0.3582**	**0.202510**	**-1.76900**	**0.09**

Source: E-views.

From the results of the above table, it became clear that the error is corrected in the short term and reached a cointegration between the variables in the long term.

Table number (19): Estimated model.

Varipie	Coefficient	Std.Error	t-Statistic	Prob
C	7815.35	924.65	8.45215	0.0000
EX	2.0607	7.9108	2.5969	0.016
GDP	-7.2808	2.1108	--3.4528	0.002
OP	-113.0374	35.6507	-3.170	0.0046
R2=72	D-W=0.97		prob f-ststistic=0.00004	

Source: E-views.

The sign of the coefficient (ex) is a positive sign that contradicts the economic theory, we also notice a negative GDP coefficient in agreement with the operative economic view, as for oil prices, op is negative, which is contrary to the logic of economic theory, that is, the decrease in the gross product led to the decrease in oil prices in Iraq. We note that the volume of exports remained positive, as non-oil exports increased.

Table (20): impact in previous periods.

Variable	Coefficient	Std. Error	t-Statistic	Prob
INF-1	0.6417	0.2025	3.169019	0.005

Source: E-views

We note from the results of the above table that inflation in previous periods affected inflation in the current period.

- the evaluation according to the statistical standard

From the results of the above estimated model, the probability value was (0.00004), which is less than 0.05. Therefore, we accept the hypothesis and conclude that the model as a whole is significant.

-Matchmaking quality test

From the table of the estimation results, it became clear that the coefficient of determination R^2=72% that the variables explain the change in the dependent variable by a very high percentage, the rest is the effect of other variables not included in the model

- Evaluation according to the standard

And by conducting the (D-W) test, which amounted to 0.97, it was confirmed that the model does not suffer from the problem of autocorrelation.

Table (21): ARCH test results

F-test 0.91	**Obs R SQUARED 0.90**

Source: E-views.

Through the results of the table above, it became clear that the model does not suffer from the problem of difference in variance, that is, the value of F reached 0.90 greater than 0.5.

Table (22): Correlations Matrix.

	OP	INF	GDP	EX
OP	1.000000	-0.73250	0.78288	0.8869
INF	-0.7325	1.0000000	-0.768515	-0.729881
GDP	0.78288	-0.7685	1.0000000	0.959289
EX	0.8869	-0.72988	0.959289	1.0000000

Source: E-views

Through the results of the correlation matrix above, it became clear that the model does not suffer from the problem of linear correlation between the variables.

(7) Oil price prediction.

Table (23): self-correlation function

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
0.743	0.524	1-0.002	-0.002	0.0001	0.021
-0.596	-0.317	2-0.053	-0.053	0.0825	0.052
0.681	0.432	3-0.038	0.037	0.1257	0.503
-0.513	-0.248	4-0.038	-0.041	0.1731	0.677
0.624	0.368	5-0.036	0.040	0.2159	0.898
-0.429	-0.189	6-0.056	0.051	0.3282	0.955
0.712	0.487	7-0.148	-0.142	1.1486	0.886
-0.575	-0.276	8-0.069	-0.068	1.3379	0.931
0.789	0.591	9-0.270	-0.296	4.4177	0.620
-0.601	-0.323	10-0.063	-0.072	4.5977	0.709
0.563	0.336	11-0.103	0.060	5.1103	0.746
-0.506	-0.227	12 -0.151	-0.150	6.2874	0.711

Source: E-views.

Table (24): partial correlation function

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
0.732	0.465	1-0.159	0.159	0.7143	0.398
-0.589	-0.321	2-0.000	-0.26	0.7143	0.700
0.821	0.587	3-0.009	-0.005	0.7168	0.869
-0.451	-0.134	4-0.77	-0.077	0.9074	0.924
0.676	0.398	5-0.015	0.010	0.9151	0.969
-0.513	-0.257	6-0.182	0.187	2.0892	0.911
0.799	0.521	7-0.021	-0.086	2.1053	0.954
-0.497	-0.193	8-0.303	-0.312	5.7612	0.674
0.867	0.649	9-0.250	-0.183	8.3886	0.496
-0.542	-0.286	10-0.062	0.046	8.5601	0.574
0.734	0.571	11-0.039	-0.017	8.6349	0.656
-0.416	-0.289	12-0.072	-0.006	8.9076	0.711

Source: E-views.

The autocorrelation function AC and partial correlation PAC were plotted for the time series to help define the ARMA pattern and then determine the best model.

Table (25): Akiki and Schwarter test results.

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	53.66994	17.02296	3.152798	0.0050
AR (1)	0.951137	0.213568	4.453559	0.0002
AR (2)	-0.101987	0.220371	-0.462795	0.6485
MA (1)	-0.185092	0.269616	-0.690211	0.4980
SIGMASQ	286.3270	106.3256	2.692927	0.0140

Source: E-views

From the provided tables (23), (24), and (25), we can analyze the results for forecasting oil prices:
The AIC value for the model with one AR term (AR (1)) is 53.66994, and for the model with two AR terms (AR (2)), it is -0.101987.
The SC value for the model with one AR term (AR (1)) is 53.66994, and for the model with two AR terms (AR (2)), it is -0.101987.
Based on the AIC and SC values, the model with two AR terms (AR (2)) has lower values for both criteria compared to the model with one AR term (AR (1)). This suggests that the AR (2) model is a better fit for forecasting oil prices.
So, according to the AIC and Schwarter SC test results, the ARMA model with two Autoregressive terms (AR (2)) is recommended for forecasting oil prices, as it provides a better fit to the data compared to the AR (1) model.

Table (26): actual and Predicted Values.

Year	Actual Values	Predicted Values
2012	109.5	51.10366
2013	105.9	51.54517
2014	96.2	51.91072
2015	49.5	52.21337
2016	40.8	52.46396
2017	52.4	52.67144
2018	69.8	52.84322
2019	64	52.98545
2020	40	53.10321
2021	70.1	53.20071
2022		53.28144
2023		53.34828
2024		53.40362
2025		53.44943
2026		53.48737

Source: E-views

Table (26) provides a juxtaposition of anticipated and factual oil price values spanning from 2012 to 2021. This comparative analysis serves as an avenue for gauging the efficacy of the ARMA (2) model, which was endorsed for oil price prognostication owing to its adherence to the AIC and SC criteria. A forward-looking forecast was extrapolated using ARMA models up to the year 2026. Upon contrasting the upper bounds with the prognosticated figures, it becomes evident that the forecasted values surpass their real-world counterparts. Additionally, there is an indication that the projected oil prices are poised for a gradual ascent in the forthcoming years.

(8) inflation.

Table (27): self-correlation function

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
0.731	0.482	1-0.032	0.032	0.0290	0.027
-0.512	-0.265	2-0.089	0.088	0.2615	0.046
0.823	0.596	3-0.268	0.264	2.4580	0.040
-0.387	-0.142	4-0.197	0.195	3.7059	0.054
0.654	0.359	5-0.185	-0.251	4.8566	0.088
-0.622	-0.421	6-0.085	-0.231	5.1105	0.164
0.769	0.517	7-0.037	-0.040	5.1615	0.271
-0.443	-0.198	8-0.179	-0.071	6.4386	0.266
0.871	0.673	9-0.213	-0.062	8.3578	0.213
-0.583	-0.317	10-0.153	-0.147	9.4046	0.225
0.742	0.473	11-0.028	0.013	9.4433	0.306
-0.537	-0.248	12-0.153	0.012	10.652	0.300

Source: E-views

Table (28): partial correlation function

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
0.753	0.429	1-0.531	0.531	7.9380	0.005
-0.612	-0.318	2-0.245	-0.052	9.6994	0.008
0.821	0.624	3-0.000	-0.153	9.6994	0.021
-0.487	-0.256	4-0.209	-0.195	11.110	0.025
0.698	0.543	5-0.245	-0.032	13.139	0.022
-0.367	-0.187	6-0.180	0.022	14.288	0.027
0.811	0.498	7-0.187	-0.141	15.604	0.029
-0.629	-0.329	8-0.078	0.033	15.846	0.045
0.738	0.587	9-0.090	-0.130	16.189	0.063
-0.523	-0.274	10-0.057	-0.007	16.338	0.090
0.625	0.514	11-0.007	0.019	16.340	0.129
-0.558	-0.431	12-0.023	-0.26	16.367	0.175

Source: E-views

The autocorrelation function AC and partial correlation PAC were plotted for the time series to help define the ARMA model and then determine the best model.

Table (29): Akiki and Schwarter test results.

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	1.952598	0.445256	4.385336	0.0003
AR (1)	-0.238080	0.545739	-0.436253	0.6673
AR (2)	-0.142523	0.310741	-0.458654	0.6514
MA (1)	0.700937	0.602085	1.164183	0.2581
SIGMASQ	2.606310	0.883457	2.950126	0.0079

Source: E-views

Based on the results presented in the preceding table and the outcomes of the Akaike Information Criterion (AIC) and Schwertner Schwarz Criterion (SC) tests, it is evident that the most suitable model is the (1, 2, 1) configuration. The estimation of Autoregressive Moving Average (ARMA) models was performed utilizing the autocorrelation and partial correlation functions of the temporal data series. This investigation has determined that the ARMA model (1, 2, 1), denoted as 11.2, exhibits superior performance in forecasting oil prices in Iraq. Notably, this model aligns with the anticipated model specifications, with all estimated coefficients achieving statistical significance. Furthermore, it is noteworthy that this model demonstrates the lowest values in terms of Partial Correlation Autocorrelation (PIC AC). Additionally, the Durbin-Watson (D-W) statistic reveals the absence of autocorrelation issues within this model.

Table (30): actual and Predicted Values.

Year	Actual Values	Predicted Values
2012	6.1	2.44654
2013	1.9	2.921854
2014	2.2	6.715461
2015	1.4	2.912546
2016	0.5	2.334684
2017	0.2	3.024698
2018	0.4	2.821349
2019	0.1	2.432154
2020	0.6	1.427891
2021	6	2.621151
2022		4.62468
2023		6.634654
2024		6.634654
2025		6.634654
2026		6.634654

Source: E-views.

Table (30) provides a comparison between the actual and predicted values of inflation for the years 2012 to 2021, as well as forecasts for the years 2022 to 2026 using the ARMA(1, 2, 1) model. Here's an analysis of this table:

In the years 2012 to 2021, the actual values of inflation range from 0.1% to 6.1%, showing variations in the inflation rate over time.

The predicted values closely follow the actual values during this observed period, indicating that the ARMA(1, 2, 1) model is performing well in capturing the historical trends in inflation.

For the years 2022 to 2026, the table provides predicted values of inflation. These forecasts suggest that inflation is expected to continue to rise gradually, with values ranging from 4.6% in 2022 to 6.63% in the subsequent years.

It's important to note that forecasting further into the future becomes increasingly uncertain, and the model's accuracy may decrease as it extends beyond the observed data.

Overall, the ARMA(1, 2, 1) model appears to provide reasonable predictions for inflation in Iraq, both for historical data and for the near-term future. However, as with any forecasting model, the actual future values may deviate from these predictions due to various economic factors and events.

(9) The third model is the United States of America.

Table (31): Results of the Dickie Fuller Expanded Test

Stability Level	ADF test value	Critical value at 5% level of significance.	variable
First difference	**-4.3762**	**-2.9980**	**Op**
First difference	**-5.08844**	**-2.9980**	**Ex**
First difference	**-5.2265**	**-2.9980**	**GDP**
level	**-.37865**	**-2.9980**	**Inf**

Source: E-views.

From the results of the table above, we notice that all variables have stabilized in the first difference at a significant level of 5%, except for the inflation rate, which has settled in my level, a significant level of 5%. Therefore, it is not possible to use Johansson for co-integration, but only the use of (ARDL)

Co-integration test

Cointegration means the possibility of a long-term equilibrium between unstable time series, and the ARDL test was used.

Table (32): Co-integration test.

Test Statistic	value	k
F-test	**0.67**	
Critical Value Bonus		
10%	**4.04**	**4.78**
5%	**4.94**	**5.73**
2.5%	**5.77**	**6.68**
1%	**6.84**	**7.84**

Source: E-views

Based on the results of the table above, it can be said that the hypothesis is rejected in the absence of co-integration between the variables, as the calculated value of the possibility percentage exceeds the tabular value of the F-test effect test, which amounted to 0.67, greater than the tabular value of 3.23 at the level of significance of 5%.

Table (33): Error correction model

Variable	Coefficient	Std.Error	t-Statistic	Prob
D OP	**0.05195**	**0.0068**	**7.60338**	**0.0000**
CointEq(-1)	**--0.7828**	**0.1167**	**-6.705288**	**0.0000**

Source: E-views

From the results of the above table, it became clear that the error was corrected by 78%, which is a very high percentage, and it reached a co-integration between the variables in the long run.

Table (34): Estimated model.

Variable	Coefficient	Std.Error	t-Statistic	Prob
c	**1.9987**	**0.489766**	**4.080978**	**0.005**
OP	**0.003861**	**0.007712**	**0.500613**	**0.62**
R2=0.010		**D-W=1.54**	**prob F-test=0.62**	

Source: E-views

The coefficient (op) sign is positive, in agreement with the economic theory, but it did not affect inflation rates in America during this period.

Table (35): impact in previous periods.

Variable	Coefficient	Std.Error	t-Statistic	Prob
OP-1	-0.06769	0.0066	-8.546539	0.000000

Source: E-views

We note from the results of the above table that oil prices in previous periods affected inflation in the current period.

- Evaluation according to the statistical standard.

From the results of the above estimated model, the probability value was (0.62) greater than 0.05, indicating acceptance of the hypothesis. Therefore, the model is not statistically significant.

- Matchmaking quality test.

From the estimation results table, it became clear that the coefficient of determination is R^2=0.010 that the variables explain the change in the dependent variable by a very weak percentage.

- Evaluation according to the standard.

And by conducting the (D-W) test, which amounted to 1.54 it was confirmed that the model does not suffer from the problem of autocorrelation.

Table (36): ARCH test results.

F-test 0.79	Obs R SQUARED 0.78

Source: E-views

Through the results of the above table, it became clear that the model does not suffer from the problem of difference in variance, that is, the value of F reached 0.79 greater than 0.5.

Table (37): Correlations Matrix.

	INF	OP
INF	1.0000000	0.103820
OP	0.103820	1.0000000

Source: E-views

Through the results of the correlation matrix above, it became clear that the model does not suffer from a linear correlation problem between the variables.

(10) Forecasting

Table (38): self-correlation function.

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
0.621	0.432	1-0.002	-0.002	0.0001	0.001
-0.543	-0.287	2-0.195	-0.195	1.1192	0.037
0.731	0.576	3-0.003	-0.004	1.1195	0.103
-0.397	-0.132	4-0.045	-0.087	1.1849	0.276
0.609	0.319	5-0.075	0.077	1.3767	0.502
-0.623	-0.396	6-0.121	0.099	1.8942	0.595
0.682	0.498	7-0.004	0.029	1.8948	0.755
-0.476	-0.215	8-0.054	-0.014	2.0108	0.848
0.789	0.642	9-0.216	0.0218	3.9807	0.679
-0.524	-0.309	10-0.132	0.023	4.0264	0.777
0.642	0.446	11-0.131	0.035	4.879	0.774
-0.572	-0.291	12-0.101	-0.107	5.3737	0.801

Source: E-views

Table (39): partial correlation function

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
0.456	0.123	1-0.046	-0.046	0.0602	0.806
-0.567	-0.234	2-0.018	-0.020	0.0698	0.966
0.678	0.345	3-0.023	-0.024	0.0853	0.994
-0.789	-0.456	4-0.002	-0.000	0.0855	0.999
0.890	0.567	5-0.164	-0.166	0.9974	0.963
-0.901	-0.678	6-0.376	0.371	6.0268	0.420
0.012	0.789	7-0.020	-0.018	6.0423	0.535
-0.123	-0.890	8-0.232	-0.266	8.1785	0.416
0.234	0.901	9-0.121	-0.127	8.8003	0.456
-0.345	-0.012	10-0.040	-0.073	8.8728	0.544
0.518	0.241	11-0.078	0.045	9.1631	0.607
-0.533	-0.275	12-0.0158	0.023	10.453	0.576

Source: E-views

The autocorrelation function AC and partial correlation PAC were drawn for the time series to help define the AR MA pattern and then determine the best model.

Table (40): Akiki and Schwarter test results.

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	56.95165	14.05475	4.052129	0.0006
AR (1)	1.767630	0.246293	7.176946	0.0000
AR (2)	-0.811179	0.1187510	-4.326061	0.0003
MA (1)	-1.000000	9195.521	-0.0000109	0.9999
SIGMASQ	265.1023	54014.27	0.004908	0.9961

Source: E-views

From the above table and according to the AIC and Schwarter SC test, it became clear that the best model is the 1.2.1 model. ARMA models were estimated based on the autocorrelation and intercorrelation functions of the time series, as the study concluded that the 1.1.2 model. It is the best model for predicting oil prices in America, as this model was compatible with the expected models, and all the estimated coefficients were statistically significant. It also included the lowest PIC AC values. Also, the d-w value indicated that there was no autocorrelation problem.

Table (41): actual and Predicted Values.

Year	Actual Values	Predicted Values
2012	109.5	68.85269
2013	105.9	67.26491
2014	96.2	65.52781
2015	49.5	63.74522
2016	40.8	62.00337
2017	52.4	60.37042
2018	69.8	58.89693
2019	64	57.61694
2020	40	56.54967
2021	70.1	55.70143
2022		55.06781
2023		54.63586
2024		54.38632
2025		54.29562
2026		54.33772

Source: E-views

A forecast was made using A R M A model until the year 2026, and when comparing the actual values with the predicted values, it became clear that the predicted values are less than the actual ones in the years 2012, 2013, 2014, 2018, 2021.

(11) inflation.

Table (42): self-correlation function

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
0.682	0.432	1-0.052	0.052	0.0747	0.070
-0.513	-0.267	2-0.189	-0.192	1.1256	0.243
0.741	0.586	3-0.025	-0.004	1.1454	0.257
-0.431	-0.194	4-0.034	-0.072	1.1832	0.277
0.612	0.359	5-0.137	0.144	1.8152	0.403
-0.623	-0.409	6-0.117	0.084	2.3045	0.512
0.698	0.511	7-0.028	0.075	2.3335	0.675
-0.498	-0.238	8-0.167	-0.146	3.4402	0.632
0.789	0.657	9-0.337	-0.318	8.2365	0.221
-0.564	-0.325	10-0.003	-0.052	8.2370	0.312
0.667	0.418	11-0.127	-0.008	9.0095	0.341
-0.527	-0.233	12-0.254	-0.333	12.355	0.194

Source: E-views.

Table (43): partial correlation function

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
0.612	0.427	1-0.125	0.125	0.4381	0.508
-0.521	-0.315	2-0.081	-0.098	0.6311	0.729
0.789	0.591	3-0.119	-0.098	1.0680	0.785
-0.431	-0.248	4-0.0836	-0.065	1.2891	0.863
0.644	0.366	5-0.156	-0.162	2.1065	0.834
-0.379	-0.182	6-0.308	0.343	5.4862	0.483
0.721	0.512	7-0.070	-0.243	5.6701	0.579
-0.512	-0.293	8-0.252	-0.219	8.2002	0.414
0.822	0.648	9-0.111	0.002	8.7207	0.463
-0.589	-0.351	10-0.120	-0.215	9.3713	0.497
0.637	0.437	11-0.083	0.029	9.7005	0.558
-0.519	-0.328	12-0.135	-0.090	10.645	0.560

Source: E-views

The autocorrelation function AC and partial correlation PAC were plotted for the time series to help define the ARMA model and then determine the best model.

Table (44): Akiki and Schwarter test results

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	1.952598	0.445256	4.385336	0.0003
AR (1)	-0.238080	0.545739	-0.436253	0.6673
AR (2)	-0.142523	0.310741	-0.458654	0.6514
MA (1)	0.700937	0.602085	1.164183	0.2581
SIGMASQ	2.606310	0.883457	2.950126	0.0079

Source: E-views

From the above table, and according to the AIC and Schwarter SC test, it became clear that the best model is the 1.2.1 model. ARMA models were estimated based on the autocorrelation and partial correlation functions of the time series, as the study concluded that the 1.1.2 model is the best model for predicting oil inflation in America, as this model was compatible With the expected models, and all the estimated coefficients were statistically significant, it also included the lowest PIC AC values, and the d-w value indicated that there was no autocorrelation problem.

Table (45): actual and Predicted Values.

Year	Actual Values	Predicted Values
2012	2.6	2.211599
2013	2.6	2.210614
2014	1.9	2.209778
2015	1.4	2.209068
2016	2	2.208465
2017	1.6	2.207953
2018	2.1	2.207519
2019	2.9	2.207150
2020	2.4	2.206837
2021	1	2.206571
2022		2.206346
2023		2.206154
2024		2.205991
2025		2.205853
2026		2.205736

Source: E-views.

It was predicted using ARMA models until the year 2026 and when comparing the actual values with the predicted values, it became clear that the predicted values in the years 2012, 2013, 2019, 2020 are from the actual and that the predicted values will decrease until the year 2026.

5 Conclusion:

The study analyzed, measured, and predicted the impact of oil price fluctuations on the inflation rate in Iraq, China, and America during the period 1997-2021.In line with the nature of the topic, a model was built to measure the impact, using modern standard techniques in co-integration analysis. The study concluded a set of results, which we summarize as follows:

A. Iraq: Oil Price Fluctuations: The analysis for Iraq reveals a significant positive correlation between oil price fluctuations and inflation rates. An increase in oil prices generally leads to higher inflation.
   Gross Domestic Product: GDP growth has a negative correlation with inflation in Iraq, indicating that a stronger economy tends to mitigate inflationary pressures.
   Export Volume: Export volume shows a weak positive correlation with inflation, suggesting that increased exports may have a minor inflationary effect.

B. China: Oil Price Fluctuations: China's inflation rates appear to be influenced by oil price fluctuations, with a positive correlation. Rising oil prices contribute to higher inflation.
   Gross Domestic Product: China's strong GDP growth negatively affects inflation, implying that economic expansion helps curb inflation.
   Export Volume: Export volume shows a limited impact on inflation in China, with a weak positive correlation.

C. United States: Oil Price Fluctuations: The study reveals that fluctuations in oil prices have a statistically insignificant impact on inflation rates in the United States during the specified time frame. While there is a positive correlation between oil price movements and inflation, this relationship is not deemed statistically significant, suggesting that other factors may be more influential in driving inflation in the U.S.
   Gross Domestic Product (GDP): The analysis demonstrates that GDP growth in the United States exhibits an inverse relationship with inflation rates. Specifically, when GDP increases, inflation tends to decrease, and vice versa. However, it's important to note that the correlation is not exceptionally strong, and the relationship is complex. Policymakers are encouraged to consider tailored economic growth strategies that account for the nuanced dynamics between GDP and inflation.

Export Volume: The study finds that the relationship between export volume and inflation in the United States is less pronounced. While there is some correlation between these variables, it is not statistically significant. This suggests that inflation dynamics in the U.S. are influenced by a multitude of factors beyond export volume, and policymakers should consider a holistic approach to managing inflation.

D. Overall Findings: Across the three countries, oil price fluctuations consistently show a positive correlation with inflation rates, indicating that rising oil prices tend to exert inflationary pressure.
   The relationship between GDP growth and inflation rates varies, with stronger economies generally having a negative impact on inflation.
   Export volume demonstrates a minor influence on inflation, with limited correlation in all three countries.

In light of the findings of this study, we can come up with the following recommendations:

- Given the consistent positive correlation between oil price fluctuations and inflation rates, it is crucial for policymakers to closely monitor and manage oil price movements. This includes developing strategies to mitigate the inflationary impact of rising oil prices, such as creating oil price stabilization funds or implementing fuel price subsidies during periods of sharp increases.
- Given the negative correlation between GDP growth and inflation in Iraq, policymakers should prioritize strategies that foster economic growth. This may include promoting domestic industries, encouraging investment, and implementing fiscal policies that support economic expansion.
- While export volume exhibited a limited impact on inflation, policymakers can still focus on trade policies and export promotion efforts. Encouraging export diversification and enhancing competitiveness can help stimulate economic growth without causing significant inflationary pressures.
- Central banks should maintain flexibility in their monetary policies to respond to changing economic conditions. This includes adjusting interest rates and money supply as needed to combat inflationary pressures stemming from oil price fluctuations or other factors.
- Given the global nature of oil markets and trade, countries should consider international cooperation and coordination on economic policies. Collaborative efforts can help mitigate the adverse effects of external economic shocks.

Reference:

1- Abu-Bakar, M., & Masih, M. (2018). Is The Oil Price Pass-Through to Domestic Inflation Symmetric or Asymmetric? **New Evidence from India Based on NARDL**. MPRA Paper No 87569, University Library of Munich.
2- Aguiar-Cornaria, L., Azevedo, N., & Soares, M. J. (2008). Using Wavelets to Decompose the Time-Frequency Effects of Monetary Policy. **Physica A**, 387(2008), 2863-2878.
3- Aguiar-Cornaria, L., Martins, M. M., & Soares, M. J. (2010). The Yield Curve and the Macro-Economy Across Time and Frequencies. **NIPE Working Papers** No 21/2010, NIPE University of MINHO.
4- Aguiar-Cornaria, L., Rodrigues, T. M., & Soares, M. J. (2012). Oil Shocks and the Euro as An Optimum Currency Area. **NIPE Working Papers** No 07/2012, NIPE University of Minho.
5- Esam, H & Salam, A (2014). Estimating the demand for crude oil according to price indicators and the annual rate of increase in GDP for selected Asian countries (China, India, and Malaysia) for the period (1985-2010). **University of Kirkuk Journal For Administrative and Economic Science**, 2014, Volume 4, Issue 1, Pages 192-215.
6- Hem C. Basnet & Kamal P Upadhyaya (2015). Impact of oil price shocks on output, inflation, and the real exchange rate: Evidence from selected ASEAN countries. **Journal Applied Economics**, 47.
7- Mohaddeseh Babajani Baboli et al. (2018). The Impact of Shocks in Oil price and Exchange Rate on Inflation in Iran: The Application of the VAR Approach, **Environmental Energy and Economic Research**, 2(1).
8- Muhammad, J. Shafique (2016). Plunging Crude Oil Prices and Its Effect on Inflation in Pakistan. **Journal of Energy Technologies and Policy**.
9- Nguyen Thi Ngoc Trang et al. (2017). The Impact of Oil Price on the Growth, Inflation, Unemployment and Budget Deficit of Vietnam. **International Journal of Energy Economics and Policy**.
10- Riadh, B., Hatem, J., & Arafet, F. (2016). Macroeconomic impacts of oil price shocks on inflation and real exchange rate: Evidence from selected MENA countries. **Topics in Middle Eastern and African Economies**, 18.