Cuadernos de Economía (2024) Volume 47, Issue 133, 153-165

Asociación Cuadernos de economía

Cuadernos de economía

www.cude.es

ARTÍCULO

Using the ARDL Approach, Measure the Impact of Global Oil Price Fluctuations on Foreign Reserves

Alaa Majed Jwair[1]*, Faten Zoghlami[2], Suhaib Mohammed Al-Khazaleh[3]

[1]Institut des Hautes Études Commerciales de Sousse (IHEC).
Email: aldlame77@gmail.com
[2]Professor in Finance, Manouba University.
ORCID iD: https://orcid.org/0000-0001-8771-6375
Email: faten.zoghlami@iscae.uma.tn
[3]Assistant Professor in Finance, Amman Arab University
ORCID iD: https://orcid.org/0000-0003-2591-2172
Email: s.alkhazaleh@aau.edu.jo

*Corresponding Author Email: s.alkhazaleh@aau.edu.jo

Jel Codes:

Keywords:
Global Oil Price, Fluctuations, Foreign Reserves, ARDL Approach, Iraq Stock Exchange.

Abstract: This paper seeks to analyse the effects of global oil price fluctuations on foreign reserves by employing the ARDL approach. The study period spans from 2004 to 2022. An appropriate model, the Autoregressive Distributed Lag (ARDL) model, was chosen due to its strong alignment with the time series test results obtained from the unit root tests. The research sample was carefully selected to cover a significant time period, from 2004 to 2022. The findings illustrate the possibility of evaluating monetary policy's effectiveness in regulating various forms of foreign reserve volume during the research. It is clear that the first system, the boom system, surpasses the second, the recession system. Additionally, the Iraqi government, which is responsible for managing the economy's cash liquidity, uses the central bank's monetary policy instruments. As expected, a decrease in global oil prices leads to a decline in revenue. This study suggests the importance of understanding the connections between global oil prices, foreign reserves, and the growth of the Iraq Stock Exchange. It also emphasizes the need for well-rounded policies that consider both the quantity of foreign reserves and the performance of the stock market. In order to accurately predict the level of foreign reserves and the performance of the Iraqi stock market, it is crucial for the government, policymakers, and investors to carefully assess potential fluctuations in oil prices, currency rates, foreign reserves, liquidity, and foreign direct investment. This study adds to and improves the existing body of literature in several ways. Firstly, numerous studies have investigated the different elements that impact foreign reserves, including income, technological advancement, renewable energy, natural resources, urbanization, healthcare expenses, tourism, geopolitical uncertainties, and globalization. However, despite their significant influence on both the supply and demand of environmental assets, there has been no specific study conducted to analyse the effects of global oil price fluctuations on foreign reserves in Iraq.

Author Correspondence: s.alkhazaleh@aau.edu.jo

https://doi.org/10.32826/cude.v47i133.1315

Introduction

Increasing awareness and urgency surrounding climate change and ecological degradation have made them crucial issues on the social, cultural, political, and economic agendas of nations and the international community. Efforts have been made on a global scale to address the environmental challenges and minimize the impact of climate change through the implementation of various policies and action plans. In its 2021 report titled "Net Zero by 2050: A Roadmap for the Global Energy Sector," the International Energy Agency (IEA) highlights the commitment of several nations to achieve net-zero carbon dioxide emissions. Additionally, the report emphasizes the implementation of numerous environmental regulations that are currently in effect.

A significant contributing factor to the increase in Earth's temperature is carbon emissions, which has raised global concerns about climate change (Stocker, 2014). When the Paris Agreement was signed by world leaders in 2016, it marked a significant moment in global recognition of climate change. This agreement, which took place in France under the United Nations Framework Convention on Climate Change (UNFCCC), aimed to reduce greenhouse gas emissions. The importance of addressing climate change was first acknowledged on a global scale during the Earth Summit in Brazil in 1992 (Adams Jr & Martinez-Aragon, 1992).

Despite global efforts to mitigate the impacts of climate change, many impoverished nations face significant challenges due to limited resources and funding, hindering their ability to make substantial progress. However, considering the trend of foreign direct investment (FDI) in developing nations, it is evident that these countries often face significant environmental challenges. This is primarily due to factors such as low-cost labor, inexpensive resources, and less stringent environmental regulations (Alzghoul, Alsheikh, & Yamin, 2023; Levinson & Taylor, 2008). The hypothesis of the Environmental Kuznets Curve (EKC), initially put forward by Grossman & Krueger (1991), illustrates a relationship between greenhouse gas emissions and a nation's economic growth that follows a U-shaped pattern. Based on this hypothesis, it is suggested that a country might prioritize economic growth over environmental concerns. However, as the growth continues, the hypothesis predicts that the level of environmental degradation will eventually decline (Rothman, 1998; Yamin et al., 2023).

Researchers and experts who analyse crude oil prices and their impact on the global market, while ensuring economic development and stability of foreign reserves, have dedicated significant attention to understanding the connection between oil prices and foreign reserves. Given Iraq's prominent role in this matter, it is the focus of our research.

The problem of the study is to measure the effectiveness of the monetary authority in managing foreign reserves in light of the fluctuations in global oil prices, and does Iraq still suffer from its inability to manage its assets following the requirements of the economy?

Therefore, the researcher aims to demonstrate the effectiveness of the monetary authority in managing foreign reserves following the political change from 2004 to 2022. This is particularly noteworthy considering the economy's heavy reliance on dollar imports, primarily derived from oil exports.

The significance of the study is emphasized by the fact that the subject of the research examines the efficacy of the monetary authority's tools. This topic delves into the relationship between the monetary authority and fluctuations in foreign reserves in response to shifts in oil prices. This study provides valuable insights into the relationship between the monetary authority, the stability of the local currency, and the growth of foreign reserves. By examining the impact on investment and foreign reserve rates, it sheds light on how these factors contribute to the overall financial stability of the country.

The study seeks to assess the role of the monetary authority in effectively managing foreign reserves. The study also seeks to provide clarity on the current status of foreign reserves, the progress and advancements they have undergone, and the significant role played by the central bank in this regard.

In order to achieve the goals of the research and validate its hypothesis, the researcher utilized the descriptive and analytical method to showcase the connection between monetary policy and foreign reserves in relation to the fluctuations in global oil prices. This was done by closely monitoring the development of various indicators and analyzing them throughout the duration of the study (2004-2022). A quantitative approach was utilized, following modern standard methods (ARDL) methodology, to test research hypotheses.

The spatial boundaries of this study were the Iraqi economy, given that the phenomenon studied is a macroeconomic phenomenon. As for the time limits, the study period was set between 2004 and 2022, which explains the development of indicators of foreign reserves in Iraq during the period of the study and its analysis, as well as indicators of fluctuations in global oil price.

This study seeks to contribute to the existing literature by enhancing it in various ways. Several studies have investigated the factors influencing foreign reserves, including income, technological innovation, green energy, natural resources, urbanization, healthcare costs, tourism, geopolitical risks, and globalization. However, there has been no specific study that has examined the impact of changes in global oil prices on foreign reserves in Iraq, despite their significant influence on both the supply and demand of environmental assets. Consequently, the aim of this research is to provide new insights into the impact of fluctuations in foreign reserves and oil prices on global energy supply and demand. Furthermore, previous research conducted on OPEC nations often overlooked the unique characteristics and differences among their individual members, treating them as a uniform group. Some nations, such as Iraq, have distinct characteristics that set them apart from other countries in the Middle East and the Arabian Gulf.

Recent research has utilized the ARDL model to achieve the study objectives. This strategy is highly suitable for this type of investigation and produces more reliable findings compared to other approaches. Surprisingly, research on the causes of environmental deterioration in wealthy nations that heavily depend on oil exports has been lacking. It is worth noting that Iraq, a prominent nation in the Middle East and a major player in the global oil market, has not previously utilized the ARDL model to analyze the effects of crude oil price fluctuations on its foreign reserves. Additionally, this study diverges from previous research by examining the global ramifications of oil price fluctuations on foreign reserves, rather than relying on linear estimate methods. Additionally, the study evaluates the practicality of the novel theories within the Iraqi context. In this study, the research paper aims to contribute to the existing literature by providing new insights into the impact of global oil price changes on foreign reserves in the Iraqi economy. To accomplish this,

the study employs ARDL and system-variant model estimations, as well as diagnostic tests of the estimated model. By doing so, the paper aims to address the gaps in the current academic understanding of this topic. In addition, it closely monitors the LCC in Iraq as a new case. Here is the rest of the paper. Section 2 provides a comprehensive overview of the literature review. Section 3 provides a comprehensive coverage of the methodology and approaches. The discussion and estimated findings are presented in Section 4. Section 5 concludes the paper and discusses its policy implications.

Literature Review and Hypotheses Development

Oil Markets

Based on the above, the oil market is defined as "the place that combines the unity of supply of oil by oil-producing and exporting countries, and the unity of demand for oil by consuming countries. If there is agreement between the unity of demand and the unity of point supply and the mutual influences between them, it leads to a balance." In the oil market, if any imbalance occurs between them, the imbalance will appear in the oil market, either an excess in the oil supply or a shortage in the oil supply (Almasria et al., 2024).

Consequently, Prices fluctuate due to various economic and political factors, which can impact the process of finding a balance and determining prices. The oil market is defined by the existence of a limited number of sellers (producers), with each producer responsible for a significant portion of oil production, while being met by a large number of consumers. This is what is commonly referred to as oligopoly marketing. It involves producers forming a cartel to control the international oil market. However, there are also other producers outside of the cartel, such as the North Sea Group, Russia, and America, as well as the emergence of new producers.

One key characteristic of global oil markets is the limited number of producers, with each contributing a significant portion of the total output. Prices and quantities produced are monopolized. The demand for oil is inelastic. There are no viable alternatives, especially in the transportation sector. When prices rise, the demand does not decrease, and when prices fall, the demand does not significantly increase. Despite attempts to find alternatives, none have been successful. The oil market experiences volatility and crises due to significant uncertainty surrounding future demand and prices, exacerbated by political factors (Faza et al., 2023).

In the oil market, there are two parties: the seller and the buyer. Each party is influenced by a set of variables that impact the supply and demand sides. Producing countries represent the supply of crude oil, while consuming countries represent the demand. The price of oil is determined based on these variables, along with other factors including political factors, environmental variables, and conflicting interests of consumers, producers, and oil companies. These factors will be further discussed in the following paragraphs (Al-khazaleh et al., 2023).

Types of Oil Markets

Regular Markets

Transactions occur directly between the consumer and the producer, without the involvement of intermediaries. These transactions typically occur between two neighbouring countries, with one country being an oil exporter and the other an importer. The prices in the spot market and futures market impact these markets (Hamilton, 1989; Mecagni & Kincaid, 2021).

Spot Markets

The spot or cash market refers to a market where buyers and sellers aim to finalize a transaction within a defined timeframe and at a predetermined price for a particular shipment at a specific location. The free market operates on the principles of supply and demand, without being confined to a specific location. It is a significant market model. The Rotterdam market in the Netherlands is a prominent market in the world (Shayan Nasr et al., 2021).

Futures Markets

The term "oil futures markets" refers to the practice of buying future petroleum contracts and holding them for an extended period of time, typically several months or years from the date of purchase. The prices of these contracts are determined by the trading activity in these markets, which operate without strict supervision. It is important to note that certain futures contracts for different commodities may involve the physical delivery of the assets. However, nowadays, most contracts are settled in cash. Futures contracts are primarily used to hedge against spot price fluctuations, thereby mitigating the risks associated with trading oil during periods of significant price volatility. Additionally, these contracts offer speculators the opportunity to profit from these price fluctuations (Fattouh, Kilian, & Mahadeva, 2013).

Oil Price Fluctuations

This concept illustrates the occurrence of unforeseen and rapid shifts in oil prices, which can have significant economic consequences for both consumers and producers, albeit in different ways. Some refer to these fluctuations as an oil price shock. Due to its impact on the global economy, economic shocks can have far-reaching consequences for countries around the world, particularly those heavily reliant on oil. In some cases, these shocks can even trigger a global recession, causing widespread suffering (Gebrehiwo, 2016; Park & Hong, 2013; Roubini & Setser, 2004).

Some people see it as a law that is influenced by supply and demand in the global market, which aligns with the cyclical fluctuations of the global economy over time. Nevertheless, in the immediate term, there are fluctuations due to geopolitical factors, speculative operations, changes in the US dollar exchange rate, OPEC policy, and the flow of financial and investment credits in the real investment market (Eriqat & Al-Khazaleh, 2024).

Therefore, oil price fluctuations can be described as significant shifts in oil prices caused by various factors that influence supply and demand in the global market. These factors include economic policies of major countries, global political conditions, and the level of stability. It is also important to consider the impact of speculation on these prices.

Foreign Reserves

Foreign Reserves Concepts

Foreign reserves consist of foreign currencies, gold balance, Special Drawing Rights units, and the net reserve position with the International Monetary Fund. These reserves are distinct from the deposits that commercial banks hold with the World Bank. These deposits are subject to the legal monetary reserve ratio and act as a safeguard for commercial banks.

In order to address potential risks, it is important to consider a range of securities that offer both equity and debt options. These securities should have strong financial liquidity and be traded frequently. For example, US

Treasury bonds with a maturity of up to 30 years can be a good choice. It is advisable to avoid securities that are not listed in financial markets or lack sufficient liquidity to be considered reserve assets (Christina et al., 2006).

Objectives of Foreign Reserves

Monetary policy aims to maximize the availability of foreign assets and place them under the control of monetary authorities in order to achieve strategic objectives (Shakweer, Awadalla, & Al Shazly, 2014):
Ensure that the foreign reserves are balanced and adequate to meet specific goals. (a) Focusing on maximizing the return from investing these reserves in low-risk financial instruments. Supporting confidence in managing the exchange rate of money and finding solutions to support the local currency. (b) striving to uphold foreign currency liquidity while mitigating vulnerability to unfavorable external circumstances in order to tackle crises. (c) Seeking to instill trust in the markets by enabling the state to meet its international commitments. (d) Assisting the government in acquiring foreign exchange and fulfilling its requirements. (e) Ensuring the availability of funds to address unforeseen circumstances and emergencies (Chowdhury, Uddin, & Islam, 2014; Narayan & Smyth, 2008).
Furthermore, there are additional motives to consider: (a) Economic motives: It relies on foreign exchange reserves to carry out commercial transactions. (b) Hedging motives: to address potentially unfavorable sudden situations. (c) Maintaining local currency exchange rates at a specific level is crucial for achieving economic stability and boosting exports. (d) Enhancing the country's creditworthiness boosts its capacity to secure loans from international banks. (e) Attaining economic stability through the implementation of economic reform as directed by the International Monetary Fund (Al-Khazaleh, Zulkafli, & Dargiri, 2021).

Significance of Foreign Reserves

As a result, the monetary authority aims to acquire and build up international reserves in order to meet its objectives (Al-Jaberi, Al-Dabbas, & Al-Khafaji, 2016; Al-Shammari & Jubouri, 2018). (a) Utilize these reserves as a monetary policy tool to bolster the strength of the local currency in international trade, providing a safeguard that enhances the trust of traders. (b) Offering global purchasing power to aid the international economy during imbalances in the balance of payments, while also bolstering the country's international credit rating. (c) It is resilient against unexpected external shocks, particularly those that arise in financial markets. It also serves as an indication to countries worldwide regarding their financial stability and their capability to honour their international financial commitments. (d) The central bank's capacity to intervene and effectively manage reserves during periods of high revenues, as well as utilize them during times of revenue decline. (e) Considering the liquidity and risks involved in managing these reserves, there is the potential to operate and invest them both locally and internationally, with the aim of generating returns in the short or long term.

Components of Foreign Reserves

Foreign reserves encompass a range of assets with different levels of liquidity and interest, which can be utilized during times of crisis. These reserves consist of the following.
Foreign Currency Reserves: It refers to a currency that can be exchanged for another foreign currency, without the requirement of being converted into gold. Additionally, it can be utilized for payments and external financial responsibilities. These reserves include various currencies, securities, and deposits, as mentioned in Al-Hijaz (Matthiesen, 2010). It is worth noting that these currencies may be deemed acceptable within the country. In both domestic and international contexts, the currency serves multiple purposes. It acts as a reliable store of value, provides a standard for assessing the costs of imported goods, and facilitates smooth transactions across borders (Abdel-Qader et al., 2010; Badwan, Al-Zoubi, & Al-Khazaleh, 2023).
Non-currency Reserves: These assets consist of monetary gold, special drawing rights, the foreign reserve position with the International Monetary Fund, and other reserve assets. Let's break them down (Fattah & Ragaa, 2018).
Monetary Gold: refers to the amount of gold held by countries and under the control of monetary authorities, encompassing gold bullion and gold deposits in accounts that are not allocated to individuals outside the country (Ozturk & Acaravci, 2010). The exclusive means of payment for foreign supplies was gold until 1914, resulting in a monetary system that was fundamentally governed by the gold standard.
Special Drawing Rights: Established in 1969 by the Monetary Fund, they were created in response to countries' quotas. These quotas are utilized for external payments, alongside gold and foreign currencies, as well as for commercial transactions and foreign services. It is important to note that they are exclusively used with the central banks of member countries of the International Monetary Fund. Special drawing rights are a form of currency that is not considered legal tender. Instead, these are book entries carried out by the Fund among its member partners, with their values determined based on the unit of measurement used by the International Monetary Fund or other international organizations (Muhammad, Ahmad, & Dos-Santos, 2020).
Foreign reserve position at the International Monetary Fund: It consists of foreign currencies that members can conveniently withdraw from, along with the indebtedness to the International Monetary Fund as per the loan agreement.
Additional reserve assets consist of the current value of financial engineering tools and their derivatives with non-residents. Long-term loans to finance the balance of payments. Additional financial assets, such as shares in investment funds that cannot be easily traded. Acquire assets that can be obtained upon request and are under the control of the monetary authority.

Research Gap

There is a limited amount of research available on smaller economies such as Iraq. Most previous studies have primarily focused on industrialized nations or larger economies like China, the US, and EU member states. The aim of this study was to address this discrepancy. This study aimed to investigate the impact of global oil price fluctuations on Iraq's foreign reserves. Here are several ways that this research project will build upon previous investigations.
Firstly, this study is the first of its kind to analyse the impact of global oil price fluctuations on foreign reserves in Iraq. Additionally, the investigation utilized the novel ARDL dynamic simulation model developed by Jordan & Philips (2018). This innovative model can automatically estimate, stimulate, and plot the graphs of changes in variables, both positive and negative, as well as their short- and long-term connections. However, the ARDL model developed by Pesaran, Shin, & Smith (2001) has its limitations when it comes to estimating the relationships between variables in the long and short term.

Based on the literature discussion above, the study starts from a main hypothesis from which sub-hypotheses emerge, as follows:
The main hypothesis "null hypothesis", states that:
H1: There is no cointegration relationship between oil price fluctuations and foreign reserves.
H1a: The null hypothesis states that there is no autocorrelation problem between the independent variable and the dependent variable.
H1b: The model is described correctly, and the function does not suffer from the problem of indeterminacy.
H1c: There is a linear relationship between the independent variable and the dependent variable.

Design and Methodology

Results of Analyzing the Relationship Between the Study Variables

In this section of the study, the data on the selected variables are analyzed using econometric models. Quarterly time series data from the Central Bank of Iraq and OPEC were utilized for all variables.
An appropriate model, the Autoregressive Distributed Lag (ARDL) model, was chosen based on its strong alignment with the time series test outcomes, as indicated by the unit root tests (Menegaki, 2019; Nkoro & Uko, 2016). The research sample was carefully selected to cover the period from 2004 to 2022. Looking at previous research, it is evident that numerous studies have approached the subject matter from a similar perspective. For instance, Alimi (2014); Ali & Anwar (2017) and Al-Bidairi & Al-Saadi (2022) conducted studies on monetary policy in the oil-rich Algerian economy, which bears similarities to the Iraqi economy.
Several other studies have explored the topic of the economy. Various factors, such as the size of foreign reserves and the exchange rate system in Iraq, play a crucial role in determining the effectiveness of monetary policies in managing the nation's reserves. These findings have been highlighted in recent studies conducted on the country (Al-Bayati, 2022; Karaki, Al_kasasbeh, & Alsheikh, 2023; Ponomarenko, 2019). The focus is on Iraq's capacity to attract external capital and its proficiency in managing its foreign reserves.
These studies used various econometric models to examine the connection between the study variables, including the Linear regression model, the Autoregressive model, the Multiple regression analysis model, and the VAR model. Many previous studies have failed to consider the impact of repeated oil price shocks on monetary variables over time. For this study, two models were utilized. One model was linear, aiming to demonstrate the genuine relationship between the variables. The other model was non-linear, intended to highlight the intensity of the relationship between the independent and dependent variables.

Model Description, Descriptive Statistics of The Study Data, and Correlation Matrix

Table 1 displays the variables of the study. The size of the foreign reserve, measured in the Iraqi dinar (RES), is influenced by the independent variable (OIL). An evaluation is conducted by taking the natural logarithm of the independent and dependent variables to account for any measurement errors. This helps in assessing the difference between the price of Brent oil and international crude oil prices.
Significant findings for both long-term and short-term relationships were achieved by eliminating the impact of unexpected events in the time series and representing it as a random variable (dummy variable). Furthermore, to demonstrate the direct influence of the variables on the outcome in the event of unexpected occurrences It is worth noting that fluctuations in the price of crude oil on a global scale are analyzed using a non-linear model (Regime Switching Models).

Table 1: Study Variables.

Variables	Definition	Description
RES	Size of foreign reserves	Dependent
OIL	Global crude oil price (Brent oil)	Independent

Source: Authors own creation

The mathematical formula used to estimate relationships involves the function of the dependent variable and the independent variables:

$$RES = f(OIL) \quad (1)$$

The statistical formula after taking the natural logarithm of the variables is as follows:

$$\Delta LNRES = \mathrm{c} + \lambda \mathrm{LN}RES_{\mathrm{t-1}} + \beta_3 LN\mathrm{OIL}_{\mathrm{t-1}} \sum_{\mathrm{i=1}}^{\mathrm{n}} \mathrm{a}_1 \Delta \mathrm{LNRES}_{\mathrm{t-i}} + \sum_{\mathrm{i=0}}^{\mathrm{m}} \mathrm{a}_4 \Delta \mathrm{LNOIL}_{\mathrm{t-i}} + \mu_{\mathrm{t}} \ldots (2)$$

Where:
(LN RES) In the model, the dependent variable is the size of the foreign reserve (OIL), and the independent variable is global crude oil prices. (C) the constant term, (P) the number of optimal lag periods, (β_i) the parameters of the long-run relationship, (λi) the parameters of the short-run relationship, and (μ_t) the random error term.

Results and Discussion

Descriptive Statistics

From Table 2, we can observe the descriptive statistics of the study data. The sample size was 216, covering the period from 2005 to 2022. It is worth mentioning that the coefficients of the normality tests for the residuals' distribution show non-significant values above 5%. This suggests that the residuals are normally distributed according to the Jarque-Bera estimates.

Table 2: Descriptive Statistics of Data.

Variables	LNRES	LNOIL
Mean	15.91023	4.276285
Median	16.02655	4.251348
Maximum	16.86046	4.944780
Minimum	13.99588	3.257712
Std. Dev.	0.454690	0.334396
Skewness	-1.424746	-0.203721
Kurtosis	6.098336	2.478531
Jarque-Bera	159.4736	3.941459
Probability	0.097903	0.139355
Sum	3436.610	923.6776
Sum Sq. Dev.	44.44983	24.04149
Observations	**216**	**216**

Source: Prepared by the researcher based on the outputs of the statistical program E-Views 12

Correlation Matrix Analysis

The correlation matrix is a valuable tool for examining relationships between variables in an ARDL model. They can be used to identify variables that have strong or weak relationships, as well as variables that may have linear or nonlinear relationships (Cosslett & Lee, 1985; Patterson, 2002). Table 3 shows that the correlation value between the variables for the models falls within the range of 0.403 to 1, regardless of the sign. It is crucial to include both variables in the model as a common average due to their strong correlation.

Table 3: Correlation Matrix.

	LNRES	LNOIL
LNRES	1.000	--
LNOIL	0.260	1.000

Source: Prepared by the researcher based on the outputs of the statistical program E-Views 12

Unit Root Tests-Stationary Time Series
Stationary Time Series

Prior to conducting any analysis, it is essential to visually represent the time series in order to understand its characteristics and patterns (Pesaran, Shin, & Smith, 2000; Renault, 2009; Tsay & Chen, 2018). When examining the time series, it becomes apparent that it may experience imbalances over time, often characterized by random behaviour. This unpredictability is a result of various factors such as structural changes, shocks, and decisions, which make it challenging to determine the series' behaviour over time.

The graphical curve of the time series provides an initial indication of the possible nature of the time series. For instance, if this curve demonstrates a general trend (up or down), it suggests that the time series is unstable, implying that its average fluctuates over time.

By employing econometric and statistical analysis, it becomes evident that the time series of the study variables exhibit instability and random behaviour over time due to various factors (Frühwirth-Schnatter, 2006), as previously mentioned. Figure 1 illustrates the continuous fluctuations in the study variables over time, with both decreases and increases observed. It demonstrates a broad pattern and lacks stability.

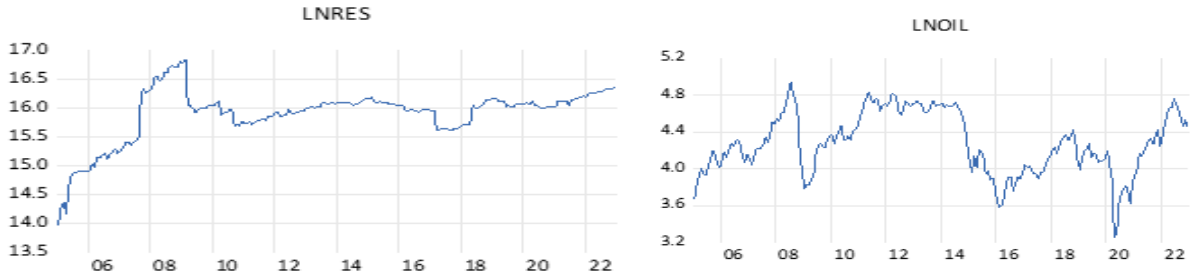

Figure1: A Graph of The Behaviour of Variables Over Time.
Source: Outputs of the statistical program EViews 11.

Unit Root Tests

In this study, the unit root tests were conducted using the expanded Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test. Table 4 indicates that certain time series remained stable at the level in the ADF test, regardless of the presence of a secant or a general trend. This suggests that these time series are free of a unit root and do not exhibit a spurious regression. These variables, LNRES and LNOIL, have been found to be statistically significant at a significance level of 1%-10%.

Regarding the PP test, the time series being analyzed exhibited stability at the first difference, except for the dependent variable (LNRES), which remained stable at the original level (Shabi, Bn Bozian, & Mohammed, 2016). The series also showed integration of degree (I). Regardless of the presence or absence of a definitive or overall pattern, this outcome enables us to utilize the (ARDL) model to establish the fundamental requirement for the stability of the time series at the level, the first difference, or a combination of both.

Table 4: Unit Root Tests for Time Series.

Variables	Level		First Difference	
	ADF	PP	ADF	PP
LNRES	-4.34388***	-4.0143***	-15.2284***	-15.3305***
LNOIL	-3.0386**	-2.6988	-11.4942***	-11.2554***

Note: *, **, ***) indicate the significance of the coefficients at 1%, 5%, and 10%, respectively
Source: Prepared by the researcher based on the outputs of the statistical program E-views 12.

Choosing The Optimal Lag Period Through the Vector Error Correction (VAR) Model

It is crucial to determine the optimal lag time for the variables in the model using the vector error correction (VAR) model (Dijk, Teräsvirta, & Franses, 2002). This will allow for accurate estimation of parameters in both the long and short runs, as well as facilitate cointegration tests. This is achieved through various important standards in this field.

In order to determine the optimal lag time (lag selection): The number of optimal lag periods is displayed in Table 5. The criteria (SC, HQ) were utilized to determine the optimal lag structure that effectively addresses the issue of autocorrelation in the model. The residuals for both the independent and dependent variables (Y) are 2. (2, 2) represents the value of (X).

Table 5: Choosing The Optimal Lag Period for The Study Variables.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-494.7057	NA	0.001421	4.795247	4.859430	4.821199
1	1087.056	3087.478	4.11e-10	-10.26016	-9.709420	-10.05350
2	1105.855	35.97131*	4.00e-10*	-10.28707*	-9.939239*	-10.13039*

Source: Prepared by the researcher based on the outputs of the statistical program E-views 12'

Estimating an Autoregressive Distributed Lag (ARDL) Model

Table 6 displays the results of analyzing the connection between the size of foreign reserves and the global crude oil price. The model reveals the relationship between the variables being studied, allowing us to determine the significance of the model in estimating short- and long-term parameters based on statistical indicators such as the

F-statistic and R-squared. Based on the statistical measures (Adjusted R-squared) and (AIC) criterion, the chosen model according to the (ARDL) methodology has a rank of (4.4). This rank represents the lowest value of the (AIC) criterion and suggests that the selected (ARDL) model is optimal.

Initial estimation of the ARDL model: The model's overall significance, as measured by the F-Statistic, was 163.28 at a significance level of 0.0000. This result indicates that the estimated model is highly statistically significant. Once the initial model (ARDL) has been estimated, we proceed to analyze the results of the tests related to it both statistically and economically.

Table 6 displays the findings from the initial estimation of the (ARDL) model. The estimation involved considering four lag periods for the dependent variable (LNRES) of the estimated model and four lag periods for the independent variable (LNOIL) included in the model. The third case was taken into account during the estimation process (Rest Trend).

According to Table 6, the model's explanatory power, as indicated by the value of R-squared, was 0.93. The explanatory variable accounts for 93% of the changes in the dependent variable, while the remaining 7% is attributed to random variables not considered in the model. This indicates the estimated quality of the model.

Table 6: Results of the Initial Test of The ARDL Model.

Estimate variables	Coefficient	Std. Error	Prob.*	R^2	Adjusted R^2	F	D.W
LNRES	0.802743	0.070677	0.000	0.94	0.93	163.28	1.85
LNOIL	-0.017847	0.071315	0.8027				

Source: Authors own creation.

Bounds Tests for Co-Integration

The objective of this test is to assess the extent to which the independent variable LNOIL and the dependent variable LNRES exhibit a long-term equilibrium relationship or cointegration in the estimated model. Bounds tests are commonly employed for this purpose (Pesaran et al., 2001). The table test is commonly employed in academic settings to compute the F statistic. The resulting outcome is presented below: The calculated value of (F) for the estimated model was 7.174476, as shown in Table 7, and this value exceeds the maximum and minimum tabular values at all significance levels. It can be concluded that the alternative hypothesis, which suggests a long-term equilibrium and cointegration relationship between the independent and dependent variables, is accepted over the null hypothesis.

Table 7: Co-Integration Test for Study Variables According to Bound Test.

Bounds test	K	3
	F-Statistic	7.174476***
		I(0)	I(1)
	10%	3.47	4.45
	5%	4.01	5.07
	2.5%	4.52	5.62
	1%	5.17	6.36

Note: (***) indicates the significance of coefficients at 1%
Source: Prepared by the researcher based on the outputs of the statistical program E-views 12.

Results of Estimating Long-Term and Short-Term Error Correction Parameters (Elasticities)

Once the presence of a stable and lasting connection between the variables of the model has been confirmed through the bounds test, it is necessary to calculate the short-term and long-term estimates of the model's parameters, as well as the error correction parameter. See Table 8.

Table 8: Results of the Short-Run Relationship of The ARDL Model.

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	2.956795	0.545410	5.421232	0.0000
@TREND	0.001429	0.000308	4.646372	0.0000
D(LNRES(-1))	-0.098139	0.066024	-1.486415	0.1388
D(LNRES(-2))	-0.036420	0.065858	-0.553007	0.5809
D(LNRES(-3))	-0.025832	0.066030	-0.391223	0.6961
D(LNOIL)	-0.017847	0.068765	-0.259529	0.7955
D(LNOIL(-1))	-0.089604	0.071320	-1.256372	0.2105
D(LNOIL(-2))	0.040158	0.070696	0.568035	0.5707
D(LNOIL(-3))	0.049561	0.069802	0.710019	0.4786
CointEq(-1)*	-0.099119	0.018359	-5.398949	0.0000

Source: Prepared by the researcher based on the outputs of the statistical program E-views 12.

From the table provided, it is observed that the error correction factor for the estimated CointEq model (-1) has a negative value of (-0.099119) and is statistically significant at a level of (0.0000). This indicates that approximately 9.91% of short-term errors naturally resolve themselves over time, leading to a state of equilibrium in the short term. In the past year, a significant portion of the imbalance caused by the shock has been corrected. This suggests a relationship between the independent variable, which affects the size of the foreign reserve, and the foreign reserve itself as a dependent variable. This relationship appears to be balanced in the short term.

Table 9: Results of the Long-Run Relationship of The ARDL Model.

Variable	Coefficient	Std. Error	T-Statistic	Prob.
LNOIL	0.788263	0.381678	2.065255	0.0402

Source: Prepared by the researcher based on the outputs of the statistical program E-views 12

In terms of the long-term outcomes regarding the estimation of the connection between the variables, Table 9 reveals that the relationship between the independent variables (LNOIL) and the size of foreign reserves (LNRES) in the estimated model is distinct. It is worth noting that international oil prices exhibited a positive relationship, with statistical significance below 5%, in the long term.

Evaluating The Quality of The Economically Estimated Model

To evaluate the outcomes of estimating standard model parameters and analyzing them economically, one must examine the results of the partial elasticities of the general price level with the chosen independent variable (LNOIL), as displayed in Table 10.

Table 10: Partial Elasticity of The General Level of Prices in The Long and Short Run for The ARDL Model.

Variables	Definition	Short term flexibility	Long term flexibility
LNOIL	Global crude oil prices	0.040158	0.788263

Source: Prepared by the researcher based on data from tables (20, 21)

According to the data in Table 10, global oil prices had a negligible short-term impact. However, in the long term, there was a significant and positive relationship (0.788263) between oil prices and foreign reserves. This finding aligns with economic theory and suggests that an increase in global crude oil prices corresponds to a growth in foreign reserves. Put simply, the government is striving to allocate the excess funds generated by the rise in global crude oil prices towards foreign reserves held in foreign currency or gold.

Evaluating The Quality of The Estimated Model Using Standard Diagnostic Tests

The quality of the model's estimation is assessed through various diagnostic tests to ensure that it is free from any common issues, the most important of which are the following:

Test for Autocorrelation and Heteroscedasticity

The Breusch-Godfrey Serial Correlation LM Test is utilized to examine the estimated models to ensure they are devoid of the issue of autocorrelation (serial correlation between values). The Heteroskedasticity Test: ARCH is utilized to examine the estimated models and ensure they are devoid of any issues related to heterogeneity of variance, with a significant level of 5%, for the relationship between variables. According to the results of the Breusch-Godfrey Serial Correlation LM Test, it can be observed from Table 11 that the estimated (ARDL) model does not exhibit any autocorrelation issue or serial correlation between the residuals. Put simply, given that the values of Prop. F and Prob. Chi-Square are not statistically significant at the 5% significance level, we can conclude that we accept the null hypothesis, which states that there is no autocorrelation issue, and reject the alternative hypothesis.
Additionally, it is worth mentioning that the estimated model successfully addresses the issue of heterogeneity, as evidenced by the Prop. Heteroskedasticity Test (ARCH) value, which indicates the stability of the variance of the random error term.

Table 11: Test for Autocorrelation and Heteroscedasticity.

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	1.335219	Prob. F	0.2654
Obs*R-squared	2.792763	Prob. Chi-Square	0.2475
Heteroskedasticity Test: ARCH TEST			
F-statistic	0.072171	Prob. F (1,210)	0.7885
Obs*R-squared	0.072834	Prob. Chi-Square (1)	0.7873

Source: Prepared by the researcher based on the outputs of the statistical program E-views 12

CUSUM Test for The Stability of The Structural Function of The ARDL Model

This test is conducted to assess the potential for structural changes in the short- and long-term parameters of the data utilized in this study throughout the specified estimation period of the (ARDL) model. A suitable test for this involves the CUSUM test, which calculates the cumulative sum of the recursive residuals. Another test to consider is the CUSUM Q test, which calculates the cumulative sum of the squared residuals. These tests help determine the structural stability of the coefficients estimated using the error formula of the ARDL model. The CUSUM test graph fell within the critical limits at a significance level of 5% and fluctuated around zero.
Therefore, the stationarity of the short-term parameters of the ARDL model has been demonstrated. Regarding the (CUSUM Q) test, it exceeded the critical limits at a significance level of 5%. There seems to be a structural imbalance in the time series in the long term, which can be attributed to the fluctuations in global oil prices during the study period and their exposure to various shocks. This makes economic sense. Figure 2 displays the outcomes of the tests conducted on the study variables in the estimated model.

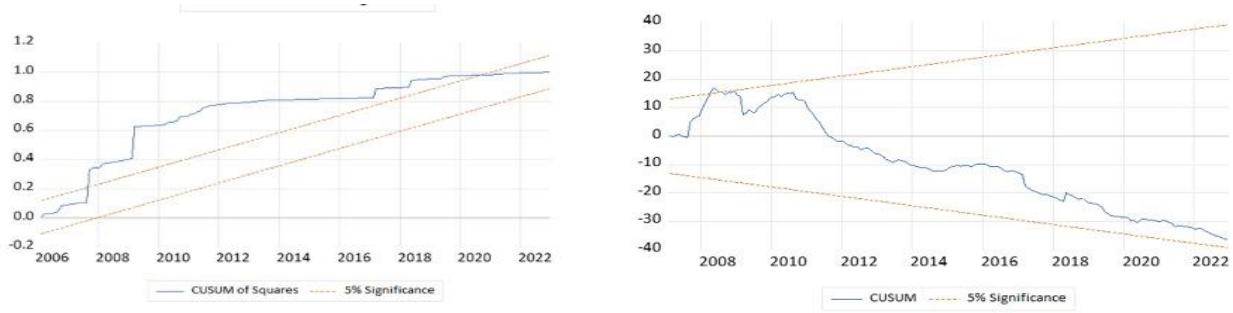

Figure 2: CUSUM Test.
Source: Prepared by the researcher based on the outputs of the statistical program E-views 12

The figure above demonstrates that the path of the accumulated residuals of the model's parameters remains within the upper and lower limits at a significance level of 5%. This indicates that the parameters are stable, which is a positive characteristic of this model for short-term use in the CUSUM test. Regarding the (CUSUM Q) test, it indicates that the cumulative sum of the squares of the recursive residuals exceeds the limits at a 5% significance level over a relatively extended period. This suggests that the model includes structural changes that lead to instability in the long-term parameters compared to the short-term. It is necessary to utilize other models, such as Regime Switching Models, which are nonlinear models that may yield more accurate results in estimation.

Ramsey RESET Test

From Table 12, it is evident that the probability value of the estimated model is (0.3401), which exceeds the significance level of 5%. This suggests that the model is not affected by the issue of indeterminacy, indicating that this test is suitable for evaluating the model's functional form. This results in the acceptance of the null hypothesis, indicating that the model has been accurately described and that the function remains unaffected by the indeterminacy issue.

Table 12: Test for Autocorrelation and Heteroscedasticity.

Ramsey RESET Test			
F-statistic	0.914377	Prob. F (1,202)	0.3401
Obs*R-squared	0.961994	Prob. Chi-Square (1)	0.3267

Source: Prepared by the researcher based on the outputs of the statistical program E-views 12

Regime Switching Models

An analysis was conducted on Markov models with smooth transition for variable systems, specifically focusing on the autoregressive (AR) model (Enders, 2015; Goldfeld & Quandt, 1973; Meitz & Saikkonen, 2021):

$$X_t = \mu + \theta_1 X_{t-1} + \theta_2 X_{t-2} + \cdots + \theta_p X_{t-p} + Z_t \quad (3)$$

Since (μ, θ_1, θ_2, $\cdots$, θ_p) the parameters of the model (Z_t) are random variables that are not related to each other with an arithmetic mean of zero and a variance of (σ_z^2), meaning that:

$$E(Z_t) = 0$$

$$E(Z_t Z_{i+k}) = \begin{cases} 0 & k \neq 0 \\ \sigma_z^2 & k = 0 \end{cases}$$

By examining the time series data of the Iraqi economy, we selected global crude oil prices as an independent variable and the size of foreign reserves as a dependent variable. We estimated two basic systems to analyze the relationship between these variables. The first system represents the period of economic growth or price increase (the period of economic recovery). The parameters of the regime and the probabilities associated with the variables and transitions are estimated, while the second system focuses on the recession or price decline, considering the unique characteristics of the Iraqi economy due to the structural shocks it experienced during the research period. The increase in crude oil prices, seen as a positive development, or their decrease, seen as a negative trend, have a direct correlation with the magnitude of public revenues and foreign reserves. The findings are presented in Table 13.

One notable observation from the table is the significant value of the linear model. The chi-square (likelihood test) reached a substantial 322.79, indicating a strong rejection of the null hypothesis. This hypothesis suggests a linear relationship between the variables. Instead, the alternative hypothesis, which proposes a non-linear relationship, is supported. It is worth mentioning that the table highlights the relationship between the variables in the best regression model, specifically at AR (1), AR (2), AR (3), and AR (4). This relationship aligns with the principles of economic theory that dictate the connection between the independent and dependent variables. The autoregressive model is used to provide a value that demonstrates the validity of the relationship both statistically and economically.

In the first system (Regime 1), it is worth noting that the broad money supply variable has a significant impact. Specifically, a 10% increase in the broad money supply results in an 11.98% decrease in the size of foreign reserves. However, the variables of internal public debt and global crude oil prices did not show any significant effects. The results hold significance due to their lack of statistical significance. In contrast, the second system (Regime 2) demonstrates the significance of all variables, with an inverse negative value.

Table 13: MSAR Estimation Results.

Variables	Coefficient	Std. Error	z-Statistic	Prob.
		Regime 1		
LNOIL	-0.034629	0.027929	-1.239916	0.2150
C	14.21582	0.927920	15.32010	0.0000
LOG(SIGMA)	-3.276644	0.056799	-57.68832	0.0000
		Regime 2		
LNOIL	-0.619975	0.098284	-6.307985	0.0000
C	34.10515	0.664344	51.33655	0.0000
LOG(SIGMA)	-2.191828	0.126522	-17.32370	0.0000
		Common		
AR(1)	0.804941	0.064075	12.56246	0.0000
AR(2)	0.332852	0.056667	5.873857	0.0000
AR(3)	-0.068816	0.034135	-2.016002	0.0438
AR(4)	-0.101636	0.023761	-4.277402	0.0000
		Transition Matrix Parameters		
P11-C	3.773192	0.529823	7.121613	0.0000
P21-C	-2.422163	0.598476	-4.047218	0.0001
Mean dependent var	15.94236	S.D. dependent var		0.392782
S.E. of regression	0.108137	Sum squared resid		2.315325
Durbin-Watson stat	1.740403	Log-likelihood		322.7984
Akaike info criterion	-2.894325	Schwarz criterion		-2.640997
Hannan-Quinn criteria.	-2.791936			

Source: Prepared by the researcher based on the outputs of the statistical program E-views 12

The transition matrix was as follows:

$$\begin{bmatrix} 0.977538 & 0.022462 \\ 0.081498 & 0.918502 \end{bmatrix}$$

The likelihood of a shift in the first regime (Regime 1) during period (t) of the popular system is 97.75%, indicating that the system, which is influenced by the size of the foreign reserve and its correlation with international oil prices, predominantly operates under the high percentage system. Based on the data, there is a high likelihood, around 91.85%, of a transition occurring in the popular system during the next period (t+1). This suggests that the prevailing system is likely to have a high percentage.

From an academic perspective, this outcome can be attributed to the correlation between economic recovery and the rise in crude oil prices. This can be seen during periods of prosperity, when global demand for oil increases.

This leads to a rise in public revenues, primarily from oil revenues, which make up the majority of public spending in Iraq. As a result, financial surpluses are generated, which can be used to increase foreign reserves. This is a logical way to allocate the excess funds from the increased public revenues, considering the lack of sovereign funds.

The estimated model results indicate a 2.24% probability of transitioning to the recession regime (Regime 2) during the period (t). It is uncommon for foreign reserves to grow when public revenues decline. Regarding the likelihood of its occurrence during a period of reduced spending, it is worth noting that the revenue percentage for the following period is a disappointing 0.43%.

In Figure 3, we can observe the different switch smoothing transitions and the alterations in the relationship between the four variables as per the estimated model. Several transitions occurred between the two systems, with the lowest form representing the regime in the recession system that prevailed in 2006 and 2007 due to security conditions in Iraq. This resulted in a decrease in foreign reserves and low oil production during that period. However, there was a shift in the middle period. From 2007 to 2010, and then again after 2010 until the end of the research period, the economy experienced numerous shocks. These shocks were a result of various factors, including the security situation and the crises caused by the repeated declines in global oil prices. Unfortunately, these challenges had a negative impact on the Iraqi economy.

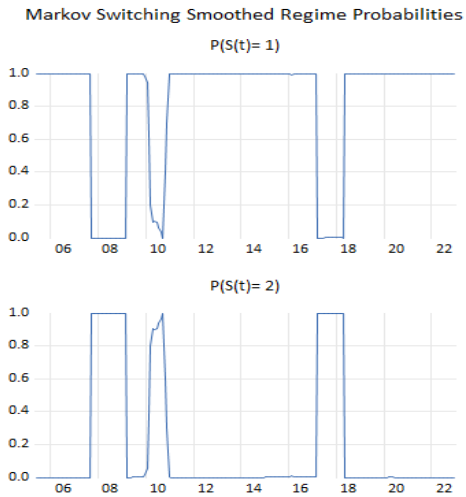

Figure 3: Smooth Transitions for The Markov Model.
Source: Prepared by the researcher based on the outputs of the statistical program E-views 12

The higher figure reflects the prevalence of the system in the boom period from the end of 2007 until 2010. This period coincided with the global financial crisis and record-high crude oil prices, with one barrel estimated at 147 dollars. The system had a positive impact during this time. The decline in global prices for commodities will have a significant impact on the Iraqi economy, particularly considering the heavy reliance on crude oil revenues to finance the federal general budget. During that period, the monetary policy focused on transferring the majority of the surpluses as foreign reserves. Additionally, a portion of the Iraqi external public debt was paid off. These actions were carried out for similar reasons as mentioned in the interpretation of the previous system. The study period extended until 2010.

Conclusions and Policy Implications

Through a unique dynamic simulation of time series data spanning from 2005 to 2022, this research conducted an experimental analysis on the impact of oil price fluctuations on foreign reserves and the performance of the Iraq Stock Exchange Market. This study seeks to examine the effects of Iraq's changing global oil prices on the foreign reserves maintained by the Iraqi Stock Exchange. Due to its significant role in the country's economic development, economists and policymakers recognize that the stock market and financial market play a crucial role in representing both developing and emerging nations. The performance of the Iraqi Stock currency and the country's financial sector is impacted by various internal and external factors, such as foreign direct investment, oil prices, currency rates, and personal remittances. The fluctuation of oil prices is influenced by global supply and demand balances.

Through the previous analysis, it is possible to judge the effectiveness of monetary policy in controlling the levels of foreign reserve volume of all types during the study period. This is clear in the first system (the boom system), which is higher than the second system (the recession system), as well as the monetary policy tools used by the central bank of the Iraqi government, which controls the volume of cash liquidity within the economy, is somewhat prevalent. The decline in global oil prices leads to a decline in revenues, of course.

This situation highlights the role of monetary policy as an intervener to increase domestic liquidity. It involves withdrawing a portion of the foreign reserve to address the deficit in public revenues and finance the federal general budget in both the short and long terms. This finding validates the decrease in the significance of the second system (the recession system).

In the past, numerous researchers employed basic ARDL in their experiments. Estimations of the relationships between variables can be made using a basic ARDL model developed by Pesaran et al. (2001), which takes into account both long-term and short-term connections. However, to examine the effects of actual shifts in global oil prices on foreign reserves and the performance of the Iraq Stock Exchange, we employed Jordan & Philips (2018) dynamic ARDL simulation model, which is known for its innovation. The new ARDL dynamic simulation model has a notable advantage in its capacity to automatically estimate, motivate, and anticipate graphs. It analyzes, evaluates, and forecasts the real-world shifts in the independent variables and their impact on the dependent variable.

Based on the unit root test findings and Ng-Perron analysis, it was determined that all variables in the study are stationary. Consequently, we decided to utilize the

innovative dynamic ARDL model for our analysis. An investigation was conducted on the linear random trend of the research variables using various unit root tests, including the Kwiatkowski Phillips Schmidt Schein (KPSS), Phillips-Person (Phillips & Perron, 1988), and Augmented Dickey-Fuller (Dickey & Fuller, 1979) tests.

In order to examine various aspects of the model, diagnostic tests were utilized. By employing the Breusch Godfrey LM test, it was found that the model did not exhibit any serial correlation problem. Based on the results of the Breusch Pagan Godfrey LM test and the ARCH, it was determined that there were no concerns regarding heteroscedasticity. The Ramsey RESET test results indicate that the model has been applied accurately. In addition, the residuals of the model exhibit normality, as indicated by the results of the Jarque-Bera test. The findings of the dynamic ARDL simulation indicate that fluctuations in global oil prices have a positive impact on the growth of Iraq's foreign reserves and stock market.

This analysis shows that increasing oil prices have a positive effect on the growth of the Iraqi Stock Exchange instead of negatively affecting foreign reserves and stock market performance. In addition, this analysis shows that fluctuations in global oil prices have a positive impact on foreign reserves, liquidity volume, and the performance of the Iraq Stock Exchange. This study suggests the importance of understanding the connections between global oil prices, foreign reserves, and the growth of the Iraq Stock Exchange. It also highlights the need for cohesive policies that address both the quantity of foreign reserves and the performance of the stock market.

In order to accurately predict the level of foreign reserves and the performance of the Iraqi stock market, it is recommended that the government, policymakers, and investors carefully analyze potential fluctuations in oil prices, currency rates, foreign reserves, liquidity, and foreign direct investment.

This study also indicates that in order to facilitate the involvement of foreign investors and nationals in the stock market and consequently enhance the number of foreign reserves in the Iraqi financial market and the Iraqi Stock Exchange, it is crucial for the government to ensure a stable exchange rate and efficiently handle the country's fiscal and monetary policies.

In addition, our study demonstrates how foreign exchange reserves can assist nations in mitigating potential volatility caused by unstable and low oil prices. Foreign exchange reserves can serve as a potential funding source for gasoline subsidies, among other options available. Further investigation is needed for similar resources, such as the sovereign wealth funds found in many oil-rich nations.

Moreover, it is necessary to consider a more comprehensive approach to the process of phasing out fuel subsidies. Do nations make efforts to implement long-term economic reforms when they observe a decrease in oil prices? As an example, the government of the United Arab Emirates has taken steps to diversify the country's economy in order to decrease its dependence on oil (Shayah, 2015). Using this to the story we just told, can we anticipate that nations with low oil prices and ongoing instability will diversify their economies? Or should we anticipate that if oil prices rebound, these nations would reinstate their prior levels of gasoline subsidies?

Limitations and Future Research Avenues

There are several factors and considerations that can be taken into account to expand this investigation. Researchers can conduct a detailed analysis of the factors mentioned in the study to explore how these different factors impact financial markets in different scenarios.

In theory, the factors that influence changes in oil prices can be categorized into various internal and external factors. Exploring the diversity of long- and short-term volatility, for example, can be beneficial. Researchers can compare their findings with the research in this publication by using top-down techniques to study the spill over risks of changes in oil prices using dynamic empirical techniques. In addition, various machine learning techniques can be utilized to develop risk warning models. By conducting comparative analysis, the most effective model can be identified.

Another area of study is the impact of local and international renewable energy programs on the utilization of fuel subsidies. As an example, a resolution was reached at the recently concluded UN Climate Change Conference (COP28), which stated that all participating countries must shift away from carbon-based energy sources by 2050 in a manner that is fair, organized, and just (Nilsson, 2023). This agreement highlights the growing consensus and urgency among certain nations to reduce their dependence on fossil fuels such as oil. As a result, countries with ample oil resources would face increasing pressure to discontinue practices such as gasoline subsidies.

Reducing fuel subsidies is a politically sensitive issue, thus the international movement encouraging nations to consume less of this kind of energy may also give political cover for governments to withdraw subsidies more readily. However, further study is necessary to address and tackle the problems brought on by changes in the price of oil globally and their relationship to each nation's foreign reserves. This research should focus on connecting the usage of fuel subsidies to variables like climate change and clean energy programmes.

References

Abdel-Qader, D. H., Harper, L., Cantrill, J. A., & Tully, M. P. (2010). Pharmacists' Interventions in Prescribing Errors at Hospital Discharge. *Drug Safety, 33*(11), 1027-1044. doi: https://doi.org/10.2165/11538310-000000000-00000

Adams Jr, T. L., & Martinez-Aragon, J. (1992). Setting the stage for the Earth Summit: Brazil 1992. *Envtl. L. Rep. News & Analysis, 22*, 10190. Retrieved from https://heinonline.org/HOL/LandingPage?handle=hein.journals/elrna22&div=29&id=&page=

Al-Bayati, S. (2022). legal comment On the decision of the Iraqi Oversight Council No. 24 of 2020. *Alrafidain of Law, 24*(80), 365-370. doi: https://doi.org/10.33899/arlj.2022.175381

Al-Bidairi, K. H. A., & Al-Saadi, Z. Y. A. (2022). Coordination between monetary and fiscal policies and its impact on unemployment in Iraq. *AL-Qadisiyah Journal For Administrative and Economic sciences, 24*(3), 695-706. Retrieved from https://www.iasj.net/iasj/article/253043

Al-Jaberi, M. H., Al-Dabbas, M. A., & Al-Khafaji, R. (2016). Assessment of heavy metals contamination and sediment quality in Shatt Al-Arab river, S Iraq. *The Iraqi Geological Journal, 39-49*(1), 88-97. doi: https://doi.org/10.46717/igj.39-49.1.7Ms-2016-06-29

Al-khazaleh, S., Ibrahim, H., Mia, M. A., & Badwan, N. (2023). Board Structure And Firm Performance: Evidence From Non-Bank Financial Institutions In Jordan. *Journal of Namibian Studies: History Politics Culture, 35*, 1059-1092. doi: https://doi.org/10.59670/jns.v35i.3488

Al-Khazaleh, S. M. S., Zulkafli, A. H., & Dargiri, M. N. (2021). A Conceptual Model For The Role Of Corporate Governance In Increasing Venture Capitalist Firms Performance In The Uae. *Turkish Online Journal of Qualitative Inquiry, 12*(5), 2736-2744. Retrieved from https://www.tojqi.net/index.php/journal/article/view/2767

Al-Shammari, S. H., & Jubouri, M. M. L. (2018). Role of the Procurement Strategy in Achieving Integrated Industrial Distribution/Case Study in the General Company for the Distribution of Oil Products. *Iraq Journal of Market Research and Consumer Protection, 10*(2), 39-54. Retrieved from https://www.iasj.net/iasj/article/155564

Ali, S. Z., & Anwar, S. (2017). Exchange rate pass through, cost channel to monetary policy transmission, adaptive learning, and the price puzzle. *International Review of Economics & Finance, 48*, 69-82. doi: https://doi.org/10.1016/j.iref.2016.11.010

Alimi, R. S. (2014). ARDL Bounds Testing Approach to Cointegration: A Re-Examination of Augmented Fisher Hypothesis in an Open Economy. *Asian Journal of Economic Modelling, 2*(2), 103-114. doi: https://doi.org/10.18488/journal.8.2014.22.103.114

Almasria, N. A., Aldboush, H. H., Al-Kasasbeh, O., Lutfi, A., Alhajahmad, F. B., Al Barrak, T., & Alsheikh, G. (2024). Oil Price Volatility and Economic Growth: Evidence from the Middle East. *International Journal of Energy Economics and Policy, 14*(3), 417-421. doi: https://doi.org/10.32479/ijeep.15484

Alzghoul, A., Alsheikh, G. A. A., & Yamin, I. (2023). The Relationship Between Savings and Investment: Evidence From Jordan. *International Journal of Professional Business Review, 8*(3), e01724. doi: https://doi.org/10.26668/businessreview/2023.v8i3.1724

Badwan, N., Al-Zoubi, L., & Al-Khazaleh, S. (2023). Financial Risk Management in the Supply Chain Using Business Intelligence and Big Data. *International Journal of Management and Business Research, 7*(1), 1-27. Retrieved from https://journals.srbiau.ac.ir/article_22370_6cfc47d9f204594b49dfbc7950d6e600.pdf

Chowdhury, M. N. M., Uddin, M. J., & Islam, M. S. (2014). An econometric analysis of the determinants of foreign exchange reserves in Bangladesh. *Journal of World Economic Research, 3*(6), 72-82. doi: https://doi.org/10.11648/j.jwer.20140306.12

Christina, M., Angelika, H.-L., Bernd, P., & Martina, P. (2006). Simultaneous detection of a cell surface antigen and apoptosis by microwave-sensitized TUNEL assay on paraffin sections. *Journal of Immunological Methods, 316*(1-2), 163-166. doi: https://doi.org/10.1016/j.jim.2006.08.013

Cosslett, S. R., & Lee, L.-F. (1985). Serial Correlation in Latent Discrete Variable Models. *Journal of Econometrics, 27*(1), 79-97. doi: https://doi.org/10.1016/0304-4076(85)90045-4

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the Estimators for Autoregressive Time Series With a Unit Root. *Journal of the American Statistical Association, 74*(366a), 427-431. doi: https://doi.org/10.1080/01621459.1979.10482531

Dijk, D. v., Teräsvirta, T., & Franses, P. H. (2002). Smooth Transition Autoregressive Models—A Survey of Recent Developments. *Econometric Reviews, 21*(1), 1-47. doi: https://doi.org/10.1081/ETC-120008723

Enders, W. (2015). *Applied Econometric Time Series* (4th ed.). John Wiley & Sons. Retrieved from https://www.wiley.com/en-us/Applied+Econometric+Time+Series%2C+4th+Edition-p-9781118808566

Eriqat, I. O., & Al-Khazaleh, S. (2024). The Impact of Corporate-and Country-level Governance Mechanisms on the Firm's Disclosure Quality: Evidence from MENA Countries. *Global Business & Finance Review, 28*(7), 122-137. Retrieved from https://www.researchgate.net/publication/377265529

Fattah, A., & Ragaa, F. (2018). The Role of Central Banks in Financing the Transition to the Green Economy. *Economic Development Review, 3*(2), 239-250. Retrieved from https://www.asjp.cerist.dz/en/downArticle/336/3/2/77070

Fattouh, B., Kilian, L., & Mahadeva, L. (2013). The role of speculation in oil markets: What have we learned so far? *The Energy Journal, 34*(3), 7-33. doi: https://doi.org/10.5547/01956574.34.3.2

Faza, M., Badwan, N., Hamdan, M., & Al-Khazaleh, S. (2023). The Effect of Accounting Disclosure on Investment Decision-Making—A Case Study Sample of Investors in Companies Listed on Palestine Stock Exchange. *IntechOpen*. doi: https://doi.org/10.5772/intechopen.112609

Frühwirth-Schnatter, S. (2006). *Finite Mixture and Markov Switching Models*. Springer. doi: https://doi.org/10.1007/978-0-387-35768-3

Gebrehiwo, K. G. (2016). The impact of human capital development on economic growth in Ethiopia: Evidence from ARDL approach to co-integration. *Bahir dar Journal of Education, 16*(1), 34-55. doi: https://doi.org/10.4314/bdje.v16i1

Goldfeld, S. M., & Quandt, R. E. (1973). A Markov Model for Switching Regressions. *Journal of Econometrics, 1*(1), 3-15. doi: https://doi.org/10.1016/0304-4076(73)90002-X

Grossman, G. M., & Krueger, A. B. (1991). *Environmental Impacts of a North American Free Trade Agreement* (NBER Working Papers No 3914). National Bureau of Economic Research, Inc. doi: https://doi.org/10.3386/w3914

Hamilton, J. D. (1989). A New Approach to the Economic Analysis of Nonstationary Time Series and the Business Cycle. *Econometrica: Journal of the Econometric Society, 57*(2), 357-384. doi: https://doi.org/10.2307/1912559

Jordan, S., & Philips, A. Q. (2018). Cointegration Testing and Dynamic Simulations of Autoregressive Distributed Lag Models. *The Stata Journal, 18*(4), 902-923. doi: https://doi.org/10.1177/1536867X1801800409

Karaki, B. A., Al_kasasbeh, O., & Alsheikh, G. (2023). FinTech and FinTech Ecosystem: A Case of Jordan-based SWOT Analysis. *Review of Economics and Finance, 21*(1), 2061-2067. doi: https://doi.org/10.55365/1923.x2023.21.222

Levinson, A., & Taylor, M. S. (2008). Unmasking the Pollution Haven Effect. *International Economic Review, 49*(1), 223-254. doi: https://doi.org/10.1111/j.1468-2354.2008.00478.x

Matthiesen, T. (2010). Hizbullah al-Hijaz: A history of the most radical Saudi Shi'a Opposition Group. *The Middle East Journal, 64*(2), 179-197. doi: https://doi.org/10.3751/64.2.11

Mecagni, M., & Kincaid, G. R. (2021). *Growth and Adjustment in IMF-Supported Programs for Middle East and Central Asia*. International Monetary Fund. doi: https://doi.org/10.5089/9781513594477.017

Meitz, M., & Saikkonen, P. (2021). Testing for Observation-Dependent Regime Switching in Mixture Autoregressive Models. *Journal of Econometrics, 222*(1), 601-624. doi: https://doi.org/10.1016/j.jeconom.2020.04.048

Menegaki, A. N. (2019). The ARDL Method in the Energy-Growth Nexus Field; Best Implementation Strategies. *Economies, 7*(4), 105. doi: https://doi.org/10.3390/economies7040105

Muhammad, A., Ahmad, N., & Dos-Santos, M. J. P. L. (2020). Forecast foreign exchange rate: the case study of PKR/USD. *Mediterranean Journal of Social Sciences, 11*(4), 129-137. doi: https://doi.org/10.36941/mjss-2020-0048

Narayan, P. K., & Smyth, R. (2008). Energy consumption and real GDP in G7 countries: new evidence from panel cointegration with structural breaks. *Energy Economics, 30*(5), 2331-2341. doi: https://doi.org/10.1016/j.eneco.2007.10.006

Nilsson, J. (2023). *A Changing Energy Security Environment-A Review of Alternative Energy Carriers for Light Duty Vehicles* (Master's thesis, Swedish Defence University). Retrieved from https://www.diva-portal.org/smash/get/diva2:1774053/FULLTEXT01.pdf

Nkoro, E., & Uko, A. K. (2016). Autoregressive Distributed Lag (ARDL) cointegration technique: application and interpretation. *Journal of Statistical and Econometric Methods, 5*(4), 63-91. Retrieved from https://www.scienpress.com/Upload/JSEM/Vol%205_4_3.pdf

Ozturk, I., & Acaravci, A. (2010). CO2 emissions, energy consumption and economic growth in Turkey. *Renewable and Sustainable Energy Reviews, 14*(9), 3220-3225. doi: https://doi.org/10.1016/j.rser.2010.07.005

Park, J., & Hong, T. (2013). Analysis of South Korea's economic growth, carbon dioxide emission, and energy consumption using the Markov switching model. *Renewable and Sustainable Energy Reviews, 18*, 543-551. doi: https://doi.org/10.1016/j.rser.2012.11.003

Patterson, K. D. (2002). *An Introduction to Applied Econometrics: A Time Series Approach*. Springer. Retrieved from https://link.springer.com/book/9780333802458

Pesaran, M. H., Shin, Y., & Smith, R. J. (2000). Structural analysis of vector error correction models with exogenous I (1) variables. *Journal of Econometrics, 97*(2), 293-343. doi: https://doi.org/10.1016/S0304-4076(99)00073-1

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics, 16*(3), 289-326. doi: https://doi.org/10.1002/jae.616

Phillips, P. C. B., & Perron, P. (1988). Testing for a Unit Root in Time Series Regression. *Biometrika, 75*(2), 335-346. doi: https://doi.org/10.1093/biomet/75.2.335

Ponomarenko, A. (2019). *Foreign Exchange Reserves and Money Supply*. Central Bank of the Russian Federation. Retrieved from http://cbr.ru/Content/Document/File/87618/analytic_note_190521_dip.pdf

Renault, E. (2009). Moment-Based Estimation of Stochastic Volatility Models. In T. Mikosch, J.-P. Kreiß, R. A. Davis, & T. G. Andersen (Eds.), *Handbook of Financial Time Series* (pp. 269-311). Springer Berlin Heidelberg. doi: https://doi.org/10.1007/978-3-540-71297-8_12

Rothman, D. S. (1998). Environmental Kuznets Curves—Real Progress or Passing the Buck?: A Case for Consumption-based Approaches. *Ecological Economics, 25*(2), 177-194. doi: https://doi.org/10.1016/S0921-8009(97)00179-1

Roubini, N., & Setser, B. (2004). *Bailouts or Bail-Ins?: Responding to Financial Crises in Emerging Economies*. Peterson Institute. Retrieved from https://www.piie.com/bookstore/bailouts-or-bail-ins-responding-financial-crises-emerging-economies

Shabi, A., Bn Bozian, M., & Mohammed, S. (2016). Using Nonlinear Modeling in the Quantitative Analysis to Explain. *Journal of Economic and Financial Research, 3*, 73-96.

Shakweer, M. M., Awadalla, A. A., & Al Shazly, S. M. (2014). Reliability of MRI assisted by MRS in early detection of MS. *AAMJ, 12*(3), 150-167. Retrieved from https://www.researchgate.net/publication/313437906

Shayah, M. H. (2015). Economic Diversification by Boosting Non-Oil Exports (Case of UAE). *Journal of Economics, Business and Management, 3*(7), 735-738. doi: https://doi.org/10.7763/JOEBM.2015.V3.276

Shayan Nasr, M., Shayan Nasr, H., Karimian, M., & Esmaeilnezhad, E. (2021). Application of Artificial Intelligence to Predict Enhanced Oil Recovery Using Silica Nanofluids. *Natural Resources Research, 30*(3), 2529-2542. doi: https://doi.org/10.1007/s11053-021-09829-1

Stocker, T. (2014). *Climate Change 2013 – The Physical Science Basis: Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press. doi: https://doi.org/10.1017/CBO9781107415324

Tsay, R. S., & Chen, R. (2018). *Nonlinear Time Series Analysis*. John Wiley & Sons.

Yamin, I., Al_Kasasbeh, O., Alzghoul, A., & Alsheikh, G. (2023). The Influence of Public Debt on Economic Growth: A Review of Literature. *International Journal of Professional Business Review, 8*(4), e01772. doi: https://doi.org/10.26668/businessreview/2023.v8i4.1772