THE EFFECT OF COVID-19 AND EXCHANGE RATE ON IRAQI FOREIGN TRADE WITH SAUDI ARABIA

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TABLE OF CONTENTS

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I certify that in my opinion the thesis submitted by Majeed Alı Majeed AL-KHAZRAJI titled "THE EFFECT OF COVID-19 AND EXCHANGE RATE ON IRAQI FOREIGN TRADE WITH SAUDI ARABIA " is fully adequate in scope and in quality as a thesis for the degree of Master of Economics.

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FOREWORD

First of all, I would like to thank and praise Allah for the blessings He has given me during my life, especially during my higher education and the successful completion of my master's degree.

I am proud to express my sincere gratitude to Assist. Prof. Dr. Essia Ries Ahmed ABU RIES for his kindness and efforts in supervising this study and for his scientific guidance and comments, which played a significant role in completing this study.

I would like to dedicate this work ...To the one who made me proud and honoured to carry his name, my father, may God have mercy on him ...To the eyeball that bore me, gave birth to me, stayed awake, and laboured a lot for my comfort, my mother, may God have mercy upon her... To the one who was supportive and supportive in completing my first scientific career, my brother, may God have mercy upon him. To the one who strived, persevered, stayed up all night and got tired mentally and physically to support me complete this scientific study with pride, my supervisor...To Rehana, the heart of her father, my dear daughter (Layan)…To my dear life partner, my dear wife (Umm Layan)... To my dear brother and my support in this life, my dear brother (Abu Abdullah). To my dear sisters.

ABSTRACT

The aim of this study is to investigate the impact of the COVID-19 and exchange rate on Iraqi Foreign Trade with Saudi Arabia. This is achieved by using a quantitative approach and on-time series and quarterly data for the period from the first quarter of 2017 up to the fourth quarter of 2021. Use the standard statistical software EVIEWS 12 to analyse the data of this study and extract the results based on the automatically distributed time delay model (ARDL). The results of study found that there is no statistically significant effect of the COVID-19 on Iraqi exports to Saudi Arabia in the short term as well as the long term. As well as, the results found a positive effect of the interchange rate of the dollar in the parallel market against the Iraqi dinar on Iraqi exports to Saudi Arabia in both the short and long terms. in terms of Iraqi imports from Saudi Arabia. In addition, the study found that there is no statistically significant effect of the COVID-19 on imports in the long term, but in the short term, there is an inverse relationship between the index of militancy (the second indicator of the COVID-19 in the study) and Iraqi imports from Saudi Arabia. Moreover, the study concludes that the interchange rate of the dollar in the parallel market has a positive effect on Iraqi imports from Saudi Arabia in both the short and long terms. Study made several recommendations the most important of which are: Iraq should invest in its economic and health infrastructure, develop an advanced electronic base foster an electronic culture in society and form specialized teams to face emergency situations such as war epidemics or natural disasters. implementing a comprehensive economic reform program in Iraq including building a sound economic structure for the country enterprises rebuilding factories and production facilities and encouraging the national product to gradually reduce imports and lessen dependence on oil exports. The study also recommended the Iraqi monetary authorities should avoid being affected by internal and external political pressures, including the pressures of international organizations such as the International Monetary Fund. The value of the Iraqi dinar against the dollar must be devalued properly, gradually, and without exaggeration, in order to limit import operations and encourage national products to compete.

Keywords: COVID-19 Pandemic, Interchange Rate, Iraqi Foreign Trade, Saudi Arabia.

ÖZ

Bu çalışma, COVID-19 salgınının ve doların Irak dinarı karşısındaki döviz kurunun Suudi Arabistan Krallığı ile Irak dış ticaretine paralel pıyasadaki etkisini analiz etmeyi ve ölçmeyi amaçlamaktadır. 2017'nin ilk döneminden 2021'in dördüncü çeyreğine kadar olan dönem için nicel yaklaşıma, zaman serilerine, üç aylık ve mevsimsellik verilere dayanarak. Bu çalışmada, verileri analiz etmek ve sonuçları çıkarmak için (Eviews 12) istatistik programı kullanılmıştır. dağıtılmış gecikmeli otoregresif ARDL modeline dayanarak, çalışma bir takım sonuca ulaştı ve bunlardan en önemlileri:

COVID-19 salgınının Irak'ın Suudi Arabistan'a ihracatı üzerinde uzun ve kısa vadede önemli bir manevi etkisi yoktur, Irak'ın Suudi Arabistan'a yaptığı ihracatta uzun ve kısa vadede paralel piyasadaki dolar kurunun Irak dinarı ile doğru orantılılığının varlığı, Çalışma, Suudi Arabistan'dan Irak'a yapılan ithalat üzereinde uzun vadede Covid pandemisinin manevi bir etkisinin olmadığını gösterdi,

Ayrıca Kısa vadede, çalışma, mevcut çalışmamızda COVID-19 pandemisinin ikinci göstergesi olan (kapatma endeksi) ve Irak'ın Suudi Arabistan'dan ithalatı) arasında ters bir ilişki olduğunu kanıtladı, Çalışma paralel piyasada doların dinar karşısındaki kurunun kısa ve uzun vadede Irak'ın Suudi Arabistan'dan yaptığı ithalatla doğru orantılı olduğu sonucuna varmıştır.

Araştırmacı, araştırmasında birkaç tavsiyede bulundu, bunlardan en önemlileri şunlardır: Irak, ekonomik ve sağlık altyapısına yatırım yapmalı, gelişmiş bir elektronik temel geliştirmeli toplumda bir elektronik kültürü teşvik etmeli ve savaş salgınları veya doğal afetler gibi acil durumlarla yüzleşmek için uzman ekipler oluşturmalı. Irak'ta, fabrikaları ve üretim tesislerini yeniden inşa eden ülke işletmeleri için sağlam bir ekonomik yapı inşa etmek ve ithalatı kademeli olarak azaltmak ve petrol ihracatına bağımlılığı azaltmak için ulusal hasılayı teşvik etmek de dahil olmak üzere kapsamlı bir ekonomik reform programının uygulanması... Araştırmacı ayrıca Irak para otoritelerinin Uluslararası Para Fonu gibi uluslararası kuruluşların baskıları da dahil olmak üzere iç ve dış siyasi baskılardan etkilenmemesini tavsiye etti. İthalatı

sınırlamak ve yerli ürünleri rekabete teşvik etmek için Irak dinarının dolar karşısındaki değeri doğru, kademeli ve abartısız bir şekilde düşürülmelidir.

Anahtar Kelimeler: COVID-19 pandemisi, döviz kuru, Irak dış ticareti, Suudi Arabistan Krallığı.

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ABBREVIATIONS

GDP **:** Gross Domestic Product

WHO **:** World Health Organization

OECD **:** Organization for Economic Co-operation and Development

ADB **:** Asian Development Bank

UNCTAD **:** United Nations Conference On Trade And Development

UNDB **:** United Nations Development Program

IMF **:** International Monetary Fund

ARDL **:** The Autoregressive Distributed Time Lag Model

SUBJECT OF THE RESEARCH

The effect of Covid-19 and exchange rate on İraqi foreign trade with Saudi Arabia

PURPOSE AND IMPORTANCE OF THE RESEARCH

The study is of great importance as it is the first study to address the impact of the COVID-19 on Iraqi foreign trade. It discussed the major global event (the COVID-19) and its impact on the Iraqi economy, focusing on Iraq's non-oil foreign commerce with Saudi Arabia, which is considered among the most important neighbouring countries in economic and political terms, and knowing the extent to which this trade was affected by the pandemic The researcher considered it necessary to address obstacles caused by the pandemic and to take into account fluctuations in the parallel interchange rate in Iraq, which can have an impact on citizens' purchasing power and on foreign trade.

METHOD OF THE RESEARCH

The study used an analytical-descriptive approach to understand the theoretical aspects of the current study, as well as quantitative. data and the standard statistical approach to examine variables and achieve the desired objectives. The standard statistical program EVIEWS 12 is used to analyse the data and extract the results based on the auto-regressive distributed time lag model (ARDL). This study used quarterly data from the first quarter of 2017 to the fourth quarter of 2021, with regard to the independent variable (the COVID-19) and its effect on foreign trade this study relied on the comparison method before and during the COVID-19 , and it is the best way to obtain accurate results, As for the variable (the interchange rate) and its effect on foreign trade, the researcher adopted in his study the interchange rate of the dollar against the Iraqi dinar in the parallel market.

HYPOTHESIS OF THE RESEARCH / RESEARCH PROBLEM

The study's problem emerged, with the first confirmed case of infection being recorded in Iraq in February 2020. Due to the strict preventive and health measures and measures implemented by the Iraqi authorities to limit the spread of this epidemic, especially after the increase in infection cases in the country and the emergence of deaths. A curfew has been imposed, most borders are closed, air traffic has come to a complete or almost complete halt. That caused economic problems. The most important of which are the disturbances in foreign trade, and the decline and distortion of the (GDP) growth rate. Likewise, the parallel interchange rate in Iraq has a great impact on goods and products in the Iraqi markets, and directly affects capacity of Iraqi nationals in procurement, especially the poor.

The study was built on the following four hypotheses:

Hypothesis (H1): There is a negative effect of the COVID-19 on the volume of Iraqi exports to Saudi Arabia.

Hypothesis (H2): There is a negative effect of the COVID-19 on the volume of Iraqi imports from Saudi Arabia.

Hypothesis (H3): There is a positive relationship between the rise in the interchange rate of the dollar and Iraqi exports to Saudi Arabia.

Hypothesis (H4): There is an inverse relationship between the rise in the interchange rate of the dollar and Iraqi imports from Saudi Arabia.

SCOPE AND LIMITATIONS / DIFFICULTIES

The limitations of the study lie in two parts:

1) Scope limitations: From a spatial point of view, the study was conducted in the Republic of Iraq and Saudi Arabia,

2) Time limitations: 2017-2021.

1. INTRODUCTION

The first chapter aims to discuss the introduction of the study. It begins with a discuss the background of the study related to the COVID-19 and the interchange rate as well as their impact on foreign commerce. The first chapter also includes the research problem and study constraints, and the importance of studying. At the end of this chapter, the structure of the study was explained.

1.1. Background of Study

At the end of 2019, the COVID-19 appeared in China in 2020. This pandemic at an alarming rate, there was an outbreak in most countries of the world due to a severe infection among people. The World Health Organization (WHO) warned all countries of the world against these epidemic and their health and economic its effect. Preventive measures were taken in most parts of the country to reduce the spread of this disease, but these measures harmed the majority of economic facilities, particularly global trade supply, and economic growth, causing the world to face serious economic and economic disruption (Vo & Tran, 2021).

As for Iraq, the COVID-19 has spread throughout the country, and the Iraqi Ministry of Health recorded the first confirmed infection on February 24, 2020. A few days later, the Iraqi Ministry of Health announced the registration of the first death due to the pandemic, and after that, the number of infections and deaths began to increase throughout the country. On February 25, a crisis cell was formed to confront this pandemic. This, in turn, several preventive measures in the country were taken, like the rest of the world, so it almost completely closed borders and airports, especially in the affected countries, as well as imposed a curfew in the country, disrupting official working hours in universities and schools and cancelling celebrations and religious and social gatherings (Lami et al, 2021). However, these preventive measures that were imposed have caused negative effects and repercussions on the Iraqi economy and on most of the economic facilities in the country. It affected foreign trade, especially imports, Iraq relies heavily on imports from other countries, importing food and animal products worth $40 billion a year. The spread of the pandemic in Iraq has also

distorted other economic sectors, including the contraction in GDP (Al-Karawi & Almashhadani, 2023).

The COVID-19 was not the only one that affected Iraq's non-oil foreign trade, especially with neighbouring countries. Rather, it is the "parallel interchange rate" or "black market interchange rate" that affects the continuous fluctuations between decline and rise in the Iraqi market. The interchange rate in Iraq directly affects the purchasing power of Iraqi citizens (Awwad & Sobhi, 2022; Al-Dulaimi & Al-Dulaimi, 2019). Iraq's neighbouring countries have become relatively important in their foreign trade, as Iraq is one of the main markets for their exports. In this study, the effect and measurement of the COVID-19 pandemic and the interchange rate in Iraqi foreign commerce (non-oil) with Saudi Arabia were investigated. Where Saudi Arabia is considered the third country of the neighbouring countries in the volume of foreign trade with Iraq after (Turkey and Iran). Through this study, it is possible to know the extent of the impact of the pandemic and the parallel interchange rate on this Iraqi commerce with Saudi Arabia. Quarterly (quarterly) data were used in this study for the period from (Q1 2017 to Q4 2021).

1.2. Problem Statement

Iraq experienced a dual economic crisis in 2020, characterized by the Covid-19 and its ensuing ramifications. The emergence of the initial case of this pandemic in Iraq on February 24, 2020, prompted the Iraqi authorities to implement numerous preventive and healthcare measures to contain its spread. These measures encompassed the implementation of partial curfews and, at times, complete lock-downs, a near-complete halt in air travel, the closure of specific borders, and the maintenance of select borders to trade essential goods and products, notably food items and health supplies, subject to stringent health safety requirements. Consequently, these measures gave rise to economic predicaments within Iraq, notably a decline in the nation's Gross Domestic Product (GDP), partial closures of medium and small-scale economic ventures and enterprises, disruptions and fluctuations in Iraq's total non-oil foreign commerce, and a reduction in oil prices due to diminished global demand (Juma & Mahmoud, 2021; Alnasrawi et al., 2020). Data and reports compiled by the General Authority for Statistics elucidate fluctuations in the volume of non-oil

commerce between Iraq and Saudi Arabia (General Authority for Statistics - Saudi Arabia, 2020).

The second economic crisis pertains to the financial deficit precipitated by the pandemic, that caused in the devaluation of the Iraqi dinar against the US dollar by the Central Bank of Iraq in October 2020. Fluctuations in interchange rates within Iraq are not a recent development limited to 2020; they have persisted for numerous years. However, the substantial and abrupt devaluation of the Iraqi dinar in 2020 occurred amidst challenging circumstances faced by the country. Statistical data reveals the sustained oscillations of Iraq's parallel interchange rate (i.e., the market interchange rate) over the years.

Economic theories assert that the persistent fluctuations in interchange rates and the devaluation of the Iraqi dinar, which have persisted for an extended period, impact Iraqi citizens' purchasing power, particularly those of the impoverished class. Consequently, these developments can influence non-oil exports and imports to Iraq (Al-Khayyat, 2020; Al-Taweel & Rashid, 2021).

1.3. Questions of the Study

The study questions will be as the following:

1) Are there negative effects of the COVID-19 on Iraqi exports to Saudi Arabia?
2) Are there negative effects of the COVID-19 on Iraqi imports from Saudi Arabia?
3) Is there a relationship between the parallel interchange rate in Iraq and the Iraqi exports to Saudi Arabia?
4) Is there a relationship between the parallel interchange rate in Iraq and the Iraqi imports from Saudi Arabia?

1.4. Objectives of the Study

1. To identify the impact of the COVID-19 on Iraqi foreign trade (exports and imports) with Saudi Arabia.
2. To identify the impact of the parallel interchange rate on Iraqi foreign trade (exports and imports) with Saudi Arabia.

1.5. Study Signification

According to the researcher's knowledge, the study is of great importance as it is the first study to address the impact of the COVID-19 on Iraqi foreign trade. It discussed the major global event (the COVID-19) and its impact on the Iraqi economy, focusing on Iraq's non-oil foreign trade with Saudi Arabia, which is considered among the most important neighbouring countries in economic and political terms, and knowing the extent to which this trade was affected by the pandemic. The study considered it necessary to address obstacles caused by the pandemic and take into account fluctuations in the parallel interchange rate in Iraq, which can have a significant impact on foreign trade. In addition, a study of whether those fluctuations have positive or negative effects on Iraqi foreign trade (non-oil) with Saudi Arabia.

1.6. Study Scope

The scope of the study includes identifying the impact of the COVID-19 and interchange rate on Iraqi foreign trade (exports and imports) with Saudi Arabia. The years 2017-2021 make up the scope of this investigation's time frame. Time was the source of many of the challenges that arose throughout the course of this research since it took some time to collect the data that was required.

1.7. Outline of the Study

Chapter One: Introduction to the study, background of the study, statement of the problems, its questions, objectives of the study, and its significance and scope, Chapter Two: Includes the theoretical frame of the study to gain more insights and understanding about the topic of the study, literature review of several studies related to COVID-19 and interchange rate on foreign trade, in addition to the hypotheses of the studies, Chapter Three: Deals with the methodology of the present study, data collection method and data analysis, Chapter Four: Deals with data analysis using the Eviews software, To answer the study questions and to test its hypotheses, Chapter Five: Discussion of data analysis, conclusion, and recommendations.

2. LITERATURE REVIEW

This chapter provides some theoretical aspects and related literature on COVID-19, interchange Rate and foreign trade. As well as a review of some previous studies on COVID-19 , interchange rate and foreign trade. The study hypotheses and study framework were also presented.

2.1. Theoretical Aspect

2.1.1. Theoretical Aspect of COVID-19 Pandemic

COVID-19 is considered one of the most contagious diseases of the 21st century, plunging the world into health, economic, social, and political chaos (Ceylan, 2020).

COVID-19, the new Coronavirus, first emerged in late December 2019 in the seafood markets of Wuhan, China, and the epidemic spread rapidly around the world. The World Health Organization (WHO) officially announced on March 11, 2020, that COVID-19 had become an epidemic, because it contains three criteria: easy transmission between people, new identification, and continuous spreading (Çapar, 2021). Since the start of the COVID-19 epidemic's rapid spread throughout the world, senior researchers and scientists have been speculating on its origin. Some believe the virus is a biological weapon made in China, while others theorise it is an industrial virus created by the US military, dumped in China, or is part of an economic conspiracy. However, the World Health Organization's investigations revealed that the virus is of animal origin and likely originated in the Huanan seafood market in Wuhan (Hussein & Karim, 2020). Scientists suspect COVID-19 evolved from animals, particularly bats, snakes, and dogs, and was transmitted from these animals to humans either directly or through an intermediate animal from wet markets in Wuhan (Ali et al, 2020).

After China, the pandemic began to emerge in different countries, as Thailand's Health Ministry reported the country's first case of the epidemic on January 13, 2020, Japan and South Korea followed suit two days and five days later, respectively. In the United States, the first case of the COVID-19 was recorded on January 23, 2020, while Vietnam and Singapore reported their first cases on January 24 and 25, 2020. Canada

and Italy, respectively, also had their first cases on January 27 and 31, 2020. Iraq, being close to Iran, one of the most serious hotspots of the virus in the world, experienced its first case on February 24, 2020 (Abbas, 2020). The spread of COVID-19 began in Africa with the first case detected in the Arab Republic of Egypt on February 15, 2020 (Kumar, 2020). On February 19, Iran announced its first infection, and Italy on February 24 recorded the most cases of the virus in Europe. On February 26, Brazil reported its first case in Latin America and Saudi Arabia followed on March 5. By March 7, the virus had infected a hundred countries; consequently, Italy declared a comprehensive quarantine on March 10 to contain the rapid expansion of the epidemic (Budak & Korkmaz, 2020).

The World Health Organization warned in March 2020 that the pandemic would have serious repercussions for the world, due to its rapid transmission between countries. Dr Tedros Adhanom Ghebreyesus noted the gravity of the situation, urging decisive action across all nations. As a result, economic, health, psychological, and social disruption was felt worldwide, and each government responded with measures according to their capabilities (Cucinotta & Vanelli, 2020). On 11 March, 2020, the Republic of Turkey reported its first COVID-19 infection. In response to the rising number of infections, Spain enforced a quarantine on 14 March 2020. The European Union then implemented strict travel laws and restrictions on 17 March to limit the virus's spread. Several countries including Italy and New Zealand subsequently closed their borders on 19 March. On January 31, 2020, the World Health Organization declared the COVID-19 a very large health emergency. They highlighted how it posed an epidemic threat to public health, its effect of causing chaos and health, economic, and social disasters worldwide, and how it had spread rapidly throughout most nations (Budak & Korkmaz, 2020).

Joseph Borrell, the Vice-President of the European Commission, emphasised the necessity of global cooperation in combating the COVID-19. He highlighted four characteristics as an effective approach: conducting studies measuring the effectiveness of vaccinations and medicines on a global and country scale, collecting resources and coordinating with organisations and health authorities to reopen closed borders, instituting health controls, and minimising economic damage through securing international trade and collaboration. Additionally, he also noted the need for a Joint International Committee to prevent contamination as well as misinformation

and false news about the pandemic (Sülkü et al, 2021). The rapid outbreak of the COVID-19 worldwide has taken a heavy toll on human lives. These countries have adopted convergent approaches to contain this pandemic, these countries I showed drastic differences in morbidity and mortal-it (Chang et al, 2022).

2.1.1.1. Definition of COVID-19

The WHO defining COVID-19 as the illness caused by an emerging Coronavirus called SARS-CoV-2, that was first identified in the city of Wuhan, the People's Republic of China, on December 31, 2019 (WHO, 2023). As noted by Al-Jourany (2020), Coronavirus COVID-19 is an infectious, potentially hazardous group of viruses that can cause various degrees of respiratory illness. It is a strain from the family of Severe Acute Respiratory Syndrome (SARS) and was first discovered in the Chinese Republic. Symptoms of this outbreak range from mild colds to more severe ones. Moreover, according to (Bandyopadhyay, 2020), the COVID-19 outbreak is a wide-ranging pandemic that is easily to spread. It belongs to viruses known as severe respiratory syndrome or universally known as SARS. This virus is highly transmissible between humans and animals. However, Atzerot et. al, in (2020) defined the COVID-19 virus as the virus that causes the pneumonia shortness of breath. SARS-CoV-2 has characteristics of past human corona-viruses, with close genomics similarities to SARS-CoV, which can be fatal in vulnerable individuals.

2.1.1.2. The Economic Effects Caused by the COVID-19 Pandemic in the World

Epidemics, or collective health shocks, often lead to substantial economic costs, particularly in cases of rapidly spreading viral outbreaks such as the current COVID-19. In a world where globalization has enabled ever closer inter-connectivity and technological advancement has greatly accelerated, the repercussions of COVID-19 have been seen far and wide. Studies have indicated that countries with higher levels of globalization tend to experience more severe detriment to their (Güney & HopoĞlu, 2021).

The COVID-19 and the associated preventive measures have had an immense effect on the global economy and international trade. The virus has spread rapidly, resulting in a sudden decrease in labour and production, leading to the shutdown of most economic sectors around the world and causing a large contraction (Alnasrawi et al, 2020). At an official conference, Richard Kozel, head of UNCTAD's Globalization and Development Strategies Department, reported that the COVID-19 has had a major effect on the world economy - creating a downward spiral in many nations, reducing investor confidence in governments, and diminishing international trade (Latif, 2020).

The COVID-19 has dealt a heavy blow to the airline industry, with many companies instituting lay-offs of up to 90% of their staff and airports reducing or ceasing operations altogether. In the first and second quarters of 2020, the tourism sector also suffered, as preventive measures led to tourist attractions around the world shutting down, making it distinct from the more gradual spread of past pandemics. Due to these developments, the global unemployment rate has spiked (Yamin, 2020). As for the logistics services sector, it was heavily affected by the global pandemic. The level of the detriment it sustained in the first half of 2020 changed across many countries. This sector relies on trust and stability, thus making it an integral component of foreign trade (import, export, and transportation). This pandemic has caused great shock and damage to this sector (Akçacı & Çınaroğlu, 2020). In response to the outbreak, governments across the globe implemented policies that further effected budgets and disrupted the shipment and consumption of goods. This disturbance in the economies of countries, particularly developing ones (Güner, 2021).

Also, the COVID-19 has had a wide-reaching effect on the energy sector (oil, gas, and coal). The global demand has plummeted, which has triggered an extensive reduction in prices across the industry, further deepening the economic crisis experienced throughout the first half of 2020 (Duran & Mustafa, 2020). As for sports, the sector has been disproportionately affected by the COVID-19, with stadiums closed and tournaments suspended. This led to a significant economic downturn due to the lack of production of sports apparel and equipment, as well as the cessation of stadium and training centre construction. Unfortunately, this has caused some European teams to declare bankruptcy. It is clear that this sector has great potential for economic growth in countries that are characterised by sports championships, large audiences, and corporate sponsors (Turkmen & Ozsarı, 2020). In March 2020, a global

pandemic and concomitant restrictions led to the largest, and most dangerous, decrease in stock and securities indices, banks, and even the biggest international companies share prices, dropping by as much as 80%. this worst performance was mainly observed in the United States of America, Spain, Japan, Ukraine, Portugal, and Germany (Cinel, 2020).

2.1.1.3. COVID-19 in Iraq

According to Al-kuraishy et al, (2020) the first confirmed case of COVID-19 in Iraq was on February 24, 2020 in Najaf, brought in by a religious student from Iran before travel restrictions were imposed. The first death was recorded by the Iraqi Ministry of Health on March 3, 2020 in Sulaymaniyah, followed by another death in Baghdad on March 4, 2020. The virus quickly spread to other governorates and cities, with Salah al-Din Governorate being the last to report a case on March 27, 2020, making all governorates in Iraq affected by the pandemic (Al-Mosawi, 2020). Iraq's Prime Minister issued Diwani Order No. (55) one day after the first COVID-19 infection in Iraq on February 25th, which established a crisis cell to control the spread of the pandemic. The Minister of Health was appointed as the head of the cell, and relevant officials were selected as members. Secondary crisis cells were also formed in each Iraqi governorate with members from the Department of Health and other supportive authorities to follow up on the Crisis Cell Committee's decisions and implement them (Obaid & Hussein, 2020). The Crisis Cell Committee in Iraq took several decisions during the outbreak of the epidemic, including: Restrictions on border crossings and travel, preventing Iraqis from traveling to countries with high infection rates, stopping the entry of arrivals from affected countries, and closing borders almost entirely. Chinese staff working in Iraq were also prevented from entering the country without providing certified medical examinations (Reza, 2020). Likewise, Al-Jumaili & Hamed added in his study (2020) from the procedures of the Crisis Cell Committee, such as Suspending working hours in institutions, ministries, universities, and schools. Cinemas and theatre were closed. Restrictions and partial closures were imposed on religious places, prohibiting gatherings in places of worship, and closing most of the markets and shops.

The COVID-19 has had significant economic repercussions in Iraq, due to the preventive measures implemented, such as closures, bans, and border closures. These measures have caused fear among the population and led to reduced economic activity. The oil sector was hit the hardest, as global demand for oil decreased, causing a collapse in oil prices. Since 90% of Iraq's annual public budget relies on oil revenues, this has had severe consequences for the Iraqi economy. In addition, the pandemic has affected all sectors of Iraqi foreign trade which led to a distortion in exports and imports and a direct impact on small and medium enterprises in the country (Hussein, 2021). The financial and banking sector has also faced significant pressure, with government banks bearing the burden of non-performing loans, old internal assets, and external borrowing, which has been compounded by the unfair economic conditions imposed on Iraq during the lending process. Unfortunately, Iraq is one of the countries lagging behind in financial inclusion programs (UNDP, 2020).

Staff Report for The 2020 Article Iv Consultation IMF in Iraq. This report showed several things: caused by the COVID-19, Real GDP contracted by an estimated 11 percent in 2020 in Iraq. A slowdown in oil and non-oil activity. The UNICEF and World Bank estimates that 4.5 million Iraqis of could be pushed into poverty by the COVID-19 (IMF, 2021).

Iraq was ill-equipped to handle the COVID-19 due to several factors, including the aftermath of the war on ISIS, mass displacement, and widespread protests in 2019. Additionally, the country faced financial and administrative corruption, leading to a health battle to protect citizens from the virus and an economic battle to prevent the collapse of the country's economic system (Al-Jumaili, 2021). And in terms of health. in the beginning of the, Iraq achieved successes in different areas,

But the spread of conspiracy theory, the underestimation of the, and the considerable weakness in the decision-making process, led to a lack of attainment of the required level and optimum prevention in the country, according to several international and domestic reports, which indicated that Iraq had significant irregularities and health and preventive violations against the pandemic (Al Janabi & Chung, 2022).

Table 1: The life cycle of the COVID-19 in Iraq (number of infections and deaths) since the pandemic entered Iraq until the end of 2021.

Year	Quarter	Injuries	Deaths
2020	First	694	50
2020	Second	48,415	1,893
2020	Third	313,872	7,238
2020	Fourth	232,310	3,632
2021	First	255,633	1,510
2021	Second	494,980	2,863
2021	Third	657,399	5,074
2021	Fourth	90,437	1,968
Total	Q1 2020 - Q4 2021	2,093,740	24,228

Source: Iraqi Ministry of Health and Environment, Directorate of Public Health.

Table. 1. Presents the life cycle of the COVID-19 in Iraq and the severity of the situation, based on the official numbers of infections and deaths reported by the Iraqi Ministry of Health. The pandemic began in quarter One of 2020 with low numbers of infections and deaths compared to later periods, with 694 cases and 50 deaths. However, the numbers increased despite strict preventive measures in place, with 48,415 cases and 1,893 Deaths in the Q2 of the first year of the 2020 epidemic. The Q3 of 2020 saw the highest number of deaths in the study period, with 7,238 deaths recorded. The number of COVID-19 infections in Iraq continued to increase, with the third quarter of 2021 registering the highest number of infections at 657,399. Overall, from 2020-2021, there were over 2 million infections and 24,228 deaths. These figures indicate the severity of the in Iraq compared to neighbouring Arab countries. However, there was a significant decrease in infections and deaths in the fourth quarter of 2021. Likewise, The Iraqi Ministry of Health and Environment has recorded a total of over two million infections (2,093,740) and more than twenty-four thousand deaths (24,228) in Iraq due to the COVID-19 in the years 2020 and 2021.

2.1.2. Theoretical Aspect of Interchange Rate

In the framework of economic policy making, the interchange rate is a crucial macroeconomic variable, and governments take a keen interest in it. as a significant cost to the economy as a whole; economic actors, and economic reform efforts in general (Obadan, 2006). A country's local economy is only able to interact with the global economy through the medium of the interchange rate. In addition to being a major factor in establishing competitiveness and moulding the balance of payments, inflation is also linked to economic growth. The currency rate also affects exports and imports, bringing a country into parity with others throughout the world (Nassira & Nozha, 2019).

That first attempt to establish a global monetary arrangement with fixed interchange rates was the Bretton Woods system, which relied on the collaboration of central banks throughout the world and the oversight of the International Monetary Fund (IMF). Indeed, this system went into effect in 1946, and it ultimately failed due to two basic issues (the trust problem and the adjustment problem) that year (Kugler & Straumann, 2020). In the wake of the fall of the Bretton Woods system in 1971, the European Union embarked on a path of serious monetary integration, culminating in the creation of the European Monetary System in the 1980s and the European Economic and Monetary Union in the 1990s. Many nations have adopted this strategy as an alternative to the floating interchange rate regime (Farese et al, 2023).

2.1.2.1. Definition of Interchange Rate

Reserve Bank of Australia in (2018) defines interchange rate as the price at which one currency can be interchange d for another currency, or for a group of foreign currencies. Saleh and Saleh (2022) define it as a ratio used for exchanging foreign monetary units with local monetary units over a specific period of time. Fawzia (2016) defines it as the rate at which a country's local currency is interchange d with foreign currency units. While Taha and Bakr (2021) states that the specific interchange rate is the value of a country's domestic currency, compared to the value of other foreign currency.

2.1.2.2. Types of Interchange Rates

Interchange rates can be categorized into different types, including:

The Nominal Interchange Rate: Madani and Riwaq, (2019) define the nominal the value of one nation's currency in comparison to the currency of another nation is known as the interchange rate. The interchange rate can be established either by the system of interchange rates utilized in the nation or by the conditions of supply and demand. Or, according to the definition provided by Hamad (2018), it is the price of a group of a country's local currency units in proportion to the price of one unit of a foreign currency, or vice versa. The official interchange rate and the parallel interchange rate are two subcategories that can be further subdivided under the umbrella of the nominal interchange rate. The rate that is utilized for formal trade transactions in the country is referred to as the official interchange rate, while the rate that is circulating in the markets is referred to as the parallel interchange rate. In addition, the official interchange rate, as defined by (Draghi, 2020), is the applicable rate for official commercial interchange s during stable economic and political conditions, with the ultimate goal of seeking social welfare, improving living standards, and achieving economic development.

- **Real Interchange Rate:** According to Abdul-Jabbar and Al-Saleh, (2016) the real interchange rate is a useful measure of market competitiveness. A higher real interchange rate indicates that a country is more competitive relative to other countries, while a lower real interchange rate suggests that a country's competitiveness has improved compared to other countries**.**
- **The Equilibrium Interchange Rate**: Khalifa and Mustafa, (2019) state that a sustainable balance of payments requires an interchange rate that aligns with the natural rate of growth in the economy. This interchange rate must be maintained in a balanced economic environment that is not susceptible to economic shocks.
- **The Actual Interchange Rate:** The index of a local currency against a collection of foreign currencies for a specified period is denoted by its weighted average and indicates the progress or deterioration of the former compared to the latter (Klau & Fung, 2006).

2.1.2.3. Interchange Rate Systems

The interchange rate of a country's currency may differ from that of other countries, and the best system for each country to use must be determined. It is important to consider the rules, foundations, and options that show how to identify the optimal interchange rate system for the economy of the nation in question.

- **Fixed interchange rate system:** The government or central bank fixes the currency rate based on factors like global demand and economic might. The goal of this action is to provide the local currency a stable value in relation to other major currencies throughout the world (Syed, 2019). Many developing countries which attained political independence relatively recently have adopted the fixed interchange rate system in an effort to attain economic stability and reduce the effect of external economic shocks on their still struggling economies (Matthew, 2020). One of the most important reasons for the supporters and users of this system is to reduce the risk of speculation in other foreign currencies, and also that one of the positive things of the fixed interchange rate system is to encourage investors and the rest of the countries to invest and trade in this country, which is characterized by a fixed and stable interchange rate (Al-Sayed & Al-Beltagy, 2022) conversely, the fixed interchange rate system has drawbacks, as it necessitates that the national monetary authorities possess large amounts of foreign currency to uphold stability in the currency. These foreign reserves can be difficult to acquire, causing extra strain on the involved parties. Additionally, such a system reflects the poor economic performance of the country with the fixed interchange rate when it is compared to the local currency (Barbour, 2008: 37).
- **A free-floating interchange rate:** According to this system, the interchange rate is determined based on demand and supply in foreign interchange markets without government intervention, known as the floating or free interchange rate. This strategy is typically favoured globally for stability (Issa, 2016). The floating interchange rate system offers various advantages, such as the the market value of the currency interchange rate being driven by market forces of supply and demand. This leads to a more efficient allocation of resources and increases the chances of speculators making a profit. Additionally, this system allows for monetary policy

autonomy, as the central bank cannot interfere in the policy regardless of size (Nassira & Nozha, 2019).

- **Managed interchange rate system:** A hybrid interchange rate system, which combines features of both a fixed and free rate, is often cited as the best middle ground between the two. This system involves state interventions to maintain the interchange rate in certain directions, albeit granting it some freedom as there are no official limits governing its movement (Zanboua & Habib, 2016). Celia explains, in his (2020) study, that the monetary authorities do not actively engage in the process of establishing the interchange rate when the system is one with a fixed interchange rate. Instead, they use secondary methods such as purchasing and selling foreign interchange with the local currency or adjusting the interest rate to influence the interchange rate. These methods can help maintain the desired interchange rate for the country.

2.1.2.4. Factors Affecting the Interchange Rate

There are various factors, both economic and non-economic, that can cause fluctuations or changes in interchange rates, both internally and externally. Some of these factors include:

- **Interest Rates** : Interchange rates are heavily influenced by interest rates because money flows from nations with lower interest rates to those with higher interest rates in search of greater returns. The rising demand for the local currency caused by this infusion of foreign money also increases the supply of foreign currency, which raises the value of the local currency. As a result, the value of a country's currency will rise steadily in a country with higher interest rates than another one with lower interest rates (ul Islam & Raza, 2014).
- **National Product (NP):** The national product has a significant effect on interchange rates. When there is an increase in the production of goods and local services, it leads to exporting the surplus to other countries and reduces the need for foreign imports. This enhances the competitiveness of the country and helps in reducing prices, which in turn raises the value of the national or local currency (Al-Jubouri & Al-Azzawi, 2017).

- **Military and Political Factors:** Due to the disruption of money movements into and out of a nation, the interchange rate is significantly impacted by military and political unrest. Investment, manufacturing, foreign trade, and agriculture are all vulnerable to disruption, whereas spending on the military and weapons systems tends to rise during times of unrest. Consequently, the interchange rate suffers because fewer people are willing to trade or invest in the currency of a country where there is a high risk of losing money. Another way political unrest might cause a country's currency to lose value is if it causes a drop in production of products and services. This would result in lower exports and higher imports (Patel et al, 2014). Similarly, military actions and wars can be detrimental to a country's economy. Exports may drop while imports rise if economic and production infrastructure are damaged or destroyed. To fund their war operations, governments may also need to have access to foreign interchange resources, particularly hard currencies (Berneh, 2016).

- **The Amount of Money:** Inflation caused by excessive money printing makes domestic goods less competitive against their international counterparts. The outcome is more demand for foreign currency and lower demand for the domestic currency as a result of increased imports and decreased exports. People lose faith in the local currency, which further lowers its value (Al-osta, 2020). According to (Habib, 2015) Ricardo was the first to suggest Quantum Theory, which American economist Irving Fisher developed further in 1911. Fisher uncovered three key indicators that together provide compelling evidence of a link between the money supply and price levels. This is how it goes: To begin, shifts in the price ratio track shifts in the money supply. Second, there is an inverse connection between the quantity of money in circulation and its purchasing power, such that as money supply grows, so do prices. Finally, the supply of money is a major determinant of both the level of prices and the value of money.

- **Rumors and News:** The foreign currency market is very susceptible to speculation and news. These swaying factors may or may not be reliable. There are many rumours and news stories that might affect the foreign currency market since the interchange rate is influenced by so many different economic factors (Celia, 2020).

- **Inflation Rates:** Inflation is a significant factor in determining the value of a country's local currency. If the inflation rate of a country, such as Iraq, is lower compared to other countries, it will lead to an increase in demand for the country's exports and a decrease in imports. This will subsequently increase the demand for the local currency, in this case, the Iraqi Dinar, to purchase locally-produced goods and products (Mohamed et al, 2021).

2.1.2.5. The Interchange Rate Mechanism in Iraq

The official interchange rate in Iraq had remained stable for some time, although the Iraqi dinar had faced severe instability and collapses due to the wars and economic sanctions imposed on Iraq. These collapses caused significant distortions, damage, and imbalances in the Iraqi economy. Following the US occupation of Iraq in 2003, there was a significant change in the US interchange rate for Iraq (Yassin, 2021). Specifically, the Central Bank of Iraq abandoned the fixed interchange rate system and adopted a "managed floating" interchange rate system. Under this system, the interchange rate is determined based on market supply and demand but is still under the supervision of the Central Bank due to the interchange rate's crucial role in the Iraqi economy (Dagher & Maarij, 2015). One of the monetary policy tools used in Iraq is currency auctions, which align with Iraq's economic developments, particularly its trade openness with the world, including neighbouring countries. Currency auctions have played a critical role in controlling inflation in Iraq, where foreign imports make up a significant part of the local market (Khudair & Hassan, 2022).

Iraq, like many other countries in the world, has another interchange rate (market interchange rate) known as the parallel interchange rate. This type of interchange rate is of great importance to the country's economy, as is the case in many other countries. While the official interchange rate is the first part of the nominal interchange rate and remains relatively stable, the parallel interchange rate is subject to continuous fluctuations, depending on the changes in supply and demand for it in the Iraqi markets. The parallel interchange rate is primarily affected by the country's foreign trade with other countries, relevant wars, and rumours (Asaad et al., 2020).

2.1.3. Theoretical Aspect of Foreign Trade

Foreign trade plays a crucial role in promoting economic interdependence and facilitating the interchange of goods and services between countries. It enables countries to overcome shortages and benefit from mutual economic interests, making it of significant importance worldwide. Many countries consider trade as an engine for growth and development. These countries have successfully utilized trade as a means of getting rich, reducing poverty among their people, and joining the ranks of developed countries (Farole et al., 2010). Adam Smith, the Scottish economist, believed that those who think about global trade are great and wise. Smith argued that international trade brings mutual benefits and interests between countries and their peoples, based on the principle of self-interest. The primary goal of trading is to earn profits, but it also aims to fulfil the needs of countries that cannot be met domestically. By trading with other countries, they can obtain the goods and services they need, leading to economic growth and development (Williams, 2015).

The importance of foreign trade is, highlighted through Abdullah's study (2018), 1- Foreign trade is a significant source for achieving economic development in any country by obtaining foreign capital through exports. 2- Foreign trade is crucial in determining a country's trade balance, which can either be a surplus or deficit.3- Foreign trade and economic relations foster the opening and integration of countries, leading to a more stable and cooperative world across many fields. 4- The importance of foreign trade is increasing as countries exploit natural resources and share production processes. Also, these points are further expanded in a study by Tayuh, (2015) which includes: 5- Foreign trade enables countries to export their surplus domestic production to other countries, which helps all countries to obtain the goods and services they need. 6- Developing countries can benefit from foreign trade by obtaining technology equipment, labour experience, and capital flows through foreign investments.7- Foreign trade has a direct effect on intensifying industries of all kinds, which leads to increased competition among countries on the quality and durability of these industries. 8- Foreign trade also creates job opportunities in logistical operations, transportation of all kinds, and insurance.

A study Ahsan (2020) highlights some key reasons for the establishment of foreign trade, 1- Technological development, expertise, and specialization in the production of certain commodities differ between countries. 2- Some countries have a surplus of goods and services that must be sold, while other countries lack these products or resources, making foreign trade essential. 3- Foreign trade generate significant profits and income, contributing to the economic well-being of many countries. 4-The variation in geography, environment, and natural resources between countries means that some countries possess valuable minerals, waterways, or other resources, allowing them to exploit these assets. (Bakhit, 2023) added two more reasons for the importance of foreign trade: 5- Different preferences among people around the world for certain commodities in terms of quality or other factors, leading to a search for these products in global markets. 6-Differences in the price of products and commodities, where some imported products may be less expensive than locally produced ones.

Adam Smith strongly advocated for the freedom of foreign trade and emphasised its importance, stating that internal trade originates from the expansion of foreign trade, and that foreign trade helps to solve market problems. At the tail end of the 18th century, economists David Ricardo and Adam Smith established the Classical School of Economics with the intention of providing justifications for international commerce. Whereas Adam Smith was the first to describe the significance of international commerce through the use of the absolute advantage argument. According to this school of thought, nations need to focus their agricultural efforts on the production of certain goods, and the promotion of international commerce should be encouraged because it is beneficial to all parties (Muhammad & Saleh, 2017). Adam Smith's book "Wealth from Countries" provides insights on how countries can benefit from international trade by specializing In the production and export of products and commodities that characterize them, The key idea is that countries should focus on producing specific commodities with high efficiency and exporting them to other countries in need. At the same time, countries should import commodities that other countries specialize in producing. This approach can maximize the benefits of international trade for all parties involved (Al hemzawi, 2021).

According to theory Mercantile of Foreign Trade: the value of gold remains precious and does not change over time. Additionally, countries must adopt an

approach of exporting before importing since exports are considered beneficial for these countries economically and socially. This theory was prevalent in several Western European countries, such as, Spain Britain, and France. It emerged during the sixteenth century AD and posits that a country that possesses gold is considered powerful and great in the world (Al-Kalidar & Nasser, 2014). According to the theory of relative expenditures by David Ricardo, who was a prominent in the early 19th century, he criticized the theory of absolute advantage, which was advocated by his colleague Adam Smith, regarding foreign trade. Ricardo argued that not all countries have an absolute advantage due to their limited experience, lack of expertise, and inability to establish large projects It is very difficult for a country to have its own and distinct product from the rest of the country (Naglaa & Anas, 2021).

Either according the Theory of Similar Tastes in Foreign Trade: The economist Estevan Linder presented this theory, which challenges the traditional focus on supply-side factors in foreign trade, and instead emphasizes the importance of demand-side factors. Linder argued that the individual income levels of countries play a crucial role in determining the volume of their foreign trade, and that countries with similar tastes also tend to have similar incomes. While the theory was successful in explaining trade patterns in Linder's home country of Sweden, it failed to apply to other countries, including Korea, Japan, and non-Christian nations. This theory is considered a modern approach to understanding international trade (Assaf et al., 2022). As for Heckscher-Ohlin theory: It is a modern theory that originated from Swedish economists Eli Heckscher and Bertil Olin, who belonged to the Stockholm School of Economics. This theory is based on the relative availability of labour and capital in different countries. A country with a wealth of capital and labour exports was highly intensive and, conversely, imported labour-intensive goods and products. Finally, countries will specialize in the production and sale of services and goods to other lacking countries of the world (Lam, 2015). As for the Technology Gap Theory in Foreign Trade: Proposed by economist Posner in 1961, this theory emphasizes the significant role of technology in determining trade patterns. According to Posner, technological progress is achieved through research and development, and developed countries have monopolized certain industries due to their technological advancements. Developing countries may opt to compete by utilizing cheaper labour, leading to a break in the technological monopoly of more developed nations. The theory highlights the

importance of bridging the technological gap between countries for equal participation in global trade (Çakmakçi, 2018).

2.1.3.1. Definition of Foreign Trade

Although various definitions exist, the concept of foreign trade is generally understood to involve the interchange of goods and services across international borders. Different definitions use varying terminology, but the underlying logic remains consistent. Economic factors often have multiple definitions, and foreign trade is no exception. Foreign trade can be defined as the interchange of goods and services, including imports and exports, between countries (Nashur, 2020). It is the transfer of goods and services between different countries, regulated by commercial laws and regulations (Walid & Mirdif, 2021). Yakub et al. (2019) explain the foreign trade as the interchange of products and services between countries to fulfil their commodity and service needs while efficiently using local resources.

As for the definition provided by Jbeil, (2018), foreign trade as a branch of the economy focuses on the study of trade movements involving services and productive goods among the world's countries. As for the definition of trade equilibrium, according to Mabadeje (2021), it is the difference between a country's total exports and total imports within a certain time period is what constitutes the trade balance for that country. To determine it, start by deducting the entire amount of a country's exports from the total amount of its imports over the relevant time period. This difference in the trade balance helps determine if the country has a surplus or deficit in its trade. There are three equations that express the state of a country's trade balance. The first equation states that when exports exceed imports, there is a surplus in the trade balance. The second equation states that when imports exceed exports, there is a deficit in the trade balance. Finally, the third equation states that when exports are equal to imports, there is a balance in trade balance (Fatima, 2022).

2.1.3.2. Foreign Trade Policy

Trade policy refers to the measures and actions taken by countries to intervene in their foreign trade for the purpose of achieving specific goals, such as improving the

interchange rate, promoting economic development, and balancing payments in a way that benefits the country (Naima, 2011). This involves the creation of a government plan or program, known as a trade policy, which outlines various methods and tools that can be used to influence foreign trade within a specific time-frame. The trade policy aims to achieve economic, political, or social goals that may be difficult to attain through the free market approach (Tirish, 2011).

In a study conducted by Muhammad & Al-Arabi (2016) trade policies vary among countries depending on their economic systems, whether advanced or developing, socialist or capitalist. The study identifies some of the objectives of foreign trade policy, including economic objectives. These objectives are: Protecting the national market from the risk of dumping. Maintaining a favourable balance of payments by avoiding deficits that could negatively affect this balance. Shielding emerging industries from the risk of global markets. Improving individuals' standard of living and providing as many job opportunities as possible. Efficiently utilizing human and natural resources to derive the desired economic benefits. In the study conducted by Bakhit (2023). He stated that there are two kinds of foreign trade policies. The first: Trade protection policy, which seeks to increase the surplus in the balance of payments by increasing the proportion of exports over imports, leading to greater financial revenues (Mahmoud, 2017). The second: The trade freedom policy: which aims to lift restrictions and obstacles to the flow of exports and imports between countries, thus reducing the government's role in foreign trade interventions. Proponents of this policy argue that foreign trade is a natural right for most peoples of the earth, and no one has the right to restrict or prevent it. Therefore, all obstacles that impede trade interchange between countries should be removed, such as means and tariffs. Adam Smith and Ricardo are pioneers in the classical school that advocated the liberalization of foreign trade. Subsequently, this trade policy was supported by the World Bank, which promoted trade between different countries of the world (Aabi, 2019).

2.1.3.3. A Glimpse of Iraqi Foreign Trade with the Saudi Arabia

Iraq and Saudi Arabia are neighbouring Arab countries sharing a border of approximately 812 km in length, which accounts for 23.5% of Iraq's total borders with its neighbouring countries, with a total length of 3,462 km (Jbeil, 2018). Historically,

their foreign trade has experienced fluctuations, including interruptions due to unstable political relations between the two countries, resulting in a direct effect on trade. Recently, cautious development between Iraq and Saudi Arabia has led to a great rapprochement between them, reflected positively on foreign trade (Bourdon, 2019). The countries have established a number of agreements in energy, petrochemicals, and other fields, which have opened up opportunities for investment and companies between the two countries. In particular, Saudi companies are seeking fertile markets for their products in Iraq, and the two countries have agreed to enhance non-oil trade interchange (Rawabet Center for Research and Strategic Studies, 2017). Iraq's inability to revive its agricultural sector and rebuild its productive and industrial sectors due to wars, political instability, and neglect has made the country heavily dependent on foreign imports. This has created an incentive for neighbouring countries, including Saudi Arabia, to compete for the Iraqi market. Additionally, Iraq's weak institutions and exaggerated commercial openness have allowed other countries to flood the market with their goods, further increasing Iraq's economic dependence on its neighbours (Hassan, 2021). Iraq's external exports, which are non-oil face significant structural imbalances due to several factors such as the country's high dependency on oil exports, limited diversity of export goods, wars, and widespread administrative and financial corruption. Furthermore, weak strategies and plans to tackle economic challenges have contributed to the infrastructure collapse of the industrial sector, leading to the closure of most production companies and factories (Faraj, 2018). Despite Iraq's difficult circumstances, Saudi Arabia sees the country as an important economic partner in the region. Saudi Arabia's "Vision 2030" project, launched in 2016, aims to diversify its sources of income and industries and expand economic and investment relations with neighbouring countries, including Iraq. This includes the electrical interconnection project between Saudi Arabia and Iraq. Saudi companies are also intensifying agreements and treaties with Iraq in an effort to expand their presence in the Iraqi market and increase exports (Strategic Thought Center for Studies, 2022).

2.2. Literature Review

2.2.1. Studies Dealing with The Effect of The COVID-19 on Foreign Trade

A study by Rohmi et al. (2021) looked at how COVID-19 affected Indonesian foreign trade using data from November 2018 to January 2021. This study compared Indonesian foreign trade data from before and during the COVID-19 using the double-sample (T) method. The analysis was done using the standard program SPSS. The study concluded that COVID-19 did not have any effect on non-oil exports or consumer imports in Indonesia. but impacted Indonesia's foreign trade in terms of Indonesian capital goods imports, and oil and gas exports.

Chinyere and Aras (2022) investigated the impact that the COVID-19 had on the export industry in Nigeria. In order to assess the data from the National Bureau of Statistics of the State of Nigeria for the years 2018-2021, regression and variance analyses were carried out. According to the findings, the pandemic had a detrimental impact on the total amount of exports, notably with regard to oil exports. Pelit and Irmak (2022) explored the effects of the COVID-19 and the resulting closures and preventive measures on Turkey's foreign trade (exports and imports) were evaluated. Using official data from the Turkish state on imports and exports before and during the, it was observed that the pandemic had a significant negative effect on Turkey's foreign trade in 2020. However, in 2021, exports and imports started to recover. “Effects of COVID-19 on International Trade and Supply Chains: A Descriptive Analysis” by Yousefi and Zerfawi (2021) employed the descriptive analysis method to evaluate the possible effects of the COVID-19 on international trade and supply chains. The study yielded a pessimistic scenario that illustrated the disruption of global supply chains at the beginning of the pandemic, particularly in the auto sector in East Asia. In contrast, an optimistic scenario showed a rapid recovery of international trade and global supply chains after the pandemic had ended. Furthermore, the pandemic caused the termination or limitation of border closures, as well as decreasing hours and days of internal bans.

A study by Ali (2021) examined the effect of the COVID-19 on Saudi foreign trade. Monthly exports and import data from official sources in Saudi Arabia from 2019 to 2020 were analysed, with graphic analysis and standard analysis. The ARDL

and Error Correction Model were also employed. The findings concluded that a statistically significant effect of COVID-19 on both exports and imports to Saudi Arabia was present. Another study, done by Amin and Fateh (2021), looked into the economic consequences of the Coronavirus COVID-19, specifically those brought by containment measures such as quarantines. The analytical-descriptive method was used to focus on global foreign trade, particularly that of Algeria which faced a sharp reduction in the volume of foreign trade with the rest of the world due to the pandemic's spread. In a study by Fang et al. (2022) China's foreign trade before and during the COVID-19 was compared and significant drops in the first half of 2020, which were eventually reversed in the latter half, were discovered. The study used monthly data from 2019-2020 and focused on the electrical, mechanical, and technical industries.

2.2.2. Studies Dealing with the Effect of the Exchange Rate on Foreign Trade

Yakub et al. (2019) examined nominal interchange rate changes and their influence on Nigeria's international trade flows from 1997 to 2016. The time period covered by their study was from 1997 to 2016. The GARCH model, the ARDL boundary test, and the Granger causality were utilized in the performance of the experimental study. According to the findings, there is a deteriorating connection between interchange rate differentials and Nigerian trade in the short run. The objective of the second study, which was carried out by Bhattacharyya and Rit (2018), was to determine the nature of the link that exists between the nominal interchange rate and the quantity of Indian exports using quarterly data spanning the years 1996 to 2014. It put out the hypothesis that the changes in the nominal interchange rate had some kind of effect, either directly or indirectly, on Indian exports. The findings led researchers to the conclusion that while there is no significant direct evidence directly relating variations in the nominal interchange rate to export operations, there was, however, a relationship between the relative price ratio and export activities. Furthermore, prices were 54% higher than the interchange rate over the long run, which suggests that the nominal interchange rate may have an indirect influence on Indian exports through the pricing of local goods and services. The effects of changes

in nominal interchange rates on Vietnamese exports were investigated by Thuy (2019), a research that was just published. An Auto-regressive Distributed Lag (ARDL) model was utilized in conjunction with quarterly data beginning in the first quarter of 2002 and continuing through the fourth quarter of 2014 in order to investigate the correlation between shifts in the value of the Vietnamese dong and changes in exports. In addition to this, the study investigated the impact that wealth and consumption in other countries had on exports. According to the findings, variations in nominal interchange rates have a long-term impact that is detrimental to both the value and quantity of exports from Vietnam, but a devaluation of the domestic currency has a beneficial impact on both variables. Kili and Yildirim, (2015) conducted a research in which they evaluated the impact that shifts in the real interchange rate have on the exportation of manufactured goods from Turkey. In order to accomplish this goal, 22 different industrial sectors were chosen, and statistical programmes and the plate model were utilized to conduct an analysis of the quarterly data that was gathered beginning in the first quarter of 2005 and continuing through the second quarter of 2012. The findings led researchers to the conclusion that changes in the actual interchange rate had a beneficial and significant impact on exports from the 22 selected industrial sectors.

Another study that was conducted by Kesgingoz in (2015) focused on analyzing the impact that shifts in the interchange rate have on the volume of international commerce that takes place between Turkey and Kyrgyzstan. Following the use of a descriptive and standard analysis, which was then followed by the application of a causal model (Granger), it was shown that the association between variations in the interchange rate and exports and imports between the two countries is only marginally significant. The fact that Kyrgyzstan is a developing and non-industrial country that imports the majority of its essentials led researchers to conclude that economic dependency is the element that has the biggest impact on the volume and value of this trade. This study, which was conducted by Kadhum and Al-Ethary (2019), investigated the impact of Iraq's currency rate on the country's overall international commerce, which was exemplified by exports and imports. The data for this investigation ranged from 1991 all the way up to 2016. Both the official and the alternative interchange rates utilized a nominal currency interchange rate. According to the findings, when there is an increase in the official interchange rate, this leads in a

fall in the amount of imports, but there would be an increase in the volume of imports if there was an increase in the parallel interchange rate. As for exports, the study identified a negative association between the official interchange rate and Iraqi exports. On the other hand, the study discovered a positive influence of the parallel interchange rate (market interchange rate), where an increase in the parallel interchange rate boosts Iraqi exports. Overall, the study indicated that the official interchange rate has a negative relationship with Iraqi exports.

A study carried out by Mohamed et al. (2018) to investigate the impact that the interchange rate between the Libyan dinar and the US dollar has on the whole amount of Libya's international commerce. This covers both the country's exports and its imports. The study took a quantitative approach and based its findings on yearly data covering the years 1966 to 2015. According to this study, there is not a statistically significant relationship between the country's interchange rates and either its long-term or short-term imports and exports. This conclusion is based on the researchers' findings.

2.3. Research Contribution

This study is distinct from previous ones due to the following:

1) It is the first to examine the effect of the COVID-19 on Iraqi foreign trade.
2) It is the first study that employs quarterly data, as Iraqi scholars and economists have used annual data. By virtue of the methodology, results, recommendations, and solutions presented, this study constitutes a scientific contribution for researchers, economists, and official authorities concerned in Iraq.

2.4. Research Hypotheses

2.4.1. The Relationship Between COVID-19 and Foreign trade (Exports and Imports)

During 2020-2021, global foreign trade has been greatly influenced by the COVID-19, declined by about $2.5 trillion in 2020 compared with the level in 2019. Yet, in 2021 foreign trade has recovered compared to last year the reason for the

recovery comes after the significant easing of lockdown measures. This proves the negative relationship of the COVID-19 on foreign trade (Grynspan, 2022). 2020 was marked by the worst year reductions in output and foreign trade volumes since World War II. Due to the COVID-19 and the restrictions and measures taken against the pandemic, the decline in global industrial production and commodity trade was very significant. However, in 2021, which was considered less bad than 2020, trade continued to recover little by little, and has compensated some, but not all, of the accumulated losses seen earlier in 2020 (OECD, 2022). The impact of the COVID-19 has been detrimental to most countries around the world. However, this effect was different from one country to another, International Foreign Trade and supply chains has declined worldwide by (8%) compared to 2019. This came according to UNCTAD reports (Ugurlu & Jindřichovská, 2022). COVID-19 affected majority of production companies in the world either directly or indirectly, and International reports revealed that the COVID-19 caused Most companies have stopped, which hurt foreign trade (Vo & Tran, 2021).

A study, done by Erokhin and Gao (2020), looked at 45 developing nations, found that least developed countries and middle-income economies felt the consequences of COVID-19 the most. Whereas the major outcome of this study appeared to be that the unique health crisis had a severe impact on the economics of the least developed countries, as food supply networks were disrupted as a result of the imposed restrictions. The global spread of the COVID-19 epidemic has an effect on the trade of agricultural commodities between poor nations. Considering the unfavourable correlation between the COVID-19 epidemic and international commerce, the results of this study of 45 developing nations are unmistakable. As the COVID-19 epidemic continues to spread, several countries have begun temporarily closing their borders and restricting travel. The result was a precipitous drop in output and industry as a result of these policies. This further supports the hypothesis that the COVID-19 epidemic has a deleterious effect on international trade (Miteva-Kacarski et al, 2020).

Based on the empirical findings and studies addressed above, the study hypothesized the first and second hypotheses as follows:

Hypothesis (H1): There is a negative effect of the COVID-19 on the volume of Iraqi exports to Saudi Arabia.

Hypothesis (H2): There is a negative effect of the COVID-19 on the volume of Iraqi imports from Saudi Arabia

2.4.2. The Relationship Between the interchange rate and Foreign trade (Exports and Imports)

A study done by Kaba (2019) emphasizes the significant role that the interchange rate plays in foreign trade. Fluctuations in the local currency's value, particularly against influential foreign currencies, can have an effect on a country's foreign trade. Hence, most countries aim to set their local currency's value according to their preferences. Kang's (a principal economist at the Economic Research and Regional Cooperation) (2016) research, which was carried out at the Asian Development Bank (ADB), proved that the devaluation of the local currency does not contribute as much to the development and recovery of exports as economic theory predicts it should. On the other hand, import intensity for those countries whose national currencies have appreciated over the past several months has increased. This appreciation of the currency also contributed to a significant growth of their exports. Devaluations may not spur export volume as much as was expected - or it may increase. This contributes to the already murky nature of the connection between the currency interchange rate and international commerce in general. After the expansion and rapid growth of foreign trade between the countries of the world recently. At the same time, several obstacles were noted in the way of this trade. Among the most prominent of these obstacles, is interchange rate volatility. This research investigated the extent to which the currency interchange rate influences international trade (both exports and imports) over a period of ten years and for a total of one hundred nations. The findings point to the fact that variations in interchange rates do have an effect on international commerce directly and substantially, local currency undervaluation, and found to restrict imports, and promote exports (Nicita, 2013). This leads the study to propose the third and fourth theories:

Hypothesis (H3): There is a positive relationship between the rise in the interchange rate of the dollar (the depreciation of the Iraqi dinar) and Iraqi exports to Saudi Arabia.

Hypothesis (H4): There is an inverse relationship between the rise in the interchange rate of the dollar (the depreciation of the Iraqi dinar) and Iraqi imports from Saudi Arabia.

2.5. Research Framework

The theoretical study framework for the current study is the underlying structure of the dependent variable, represented Foreign trade including exports and imports. The first independent variable, the COVID-19, represented (X1) the dummy variable and (X2) the closure index (militancy). The third independent variable, represented (X3) The dollar interchange rate.

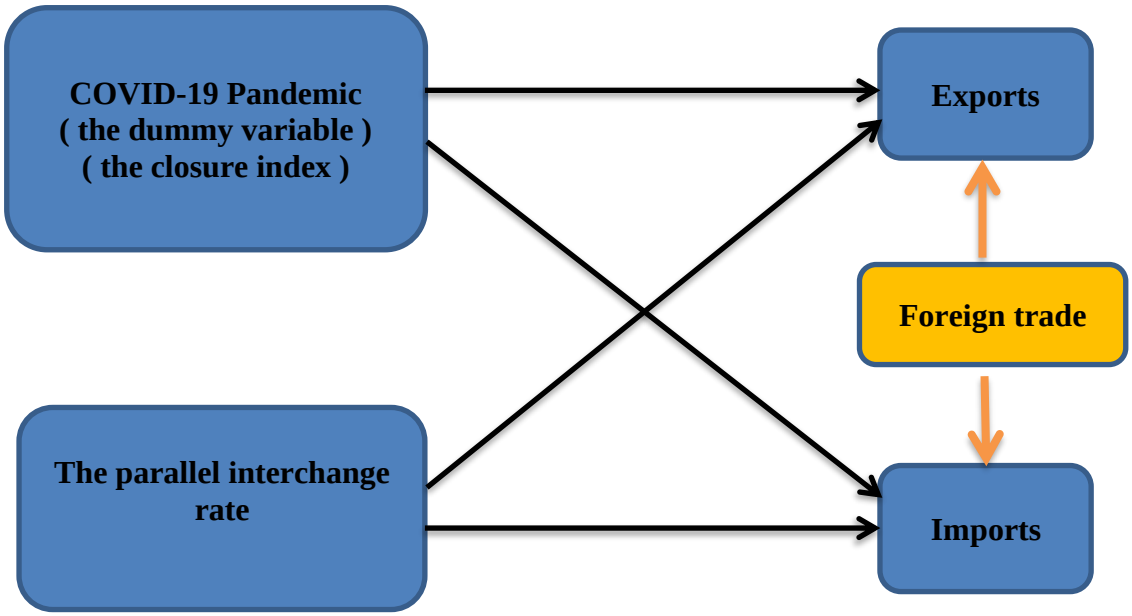

Figure 1: Schematic Diagram of Research Framework

3. METHODOLOGY

The methodology of the study is one of the most important chapters of the scientific study, through which it is possible to evaluate the credibility of the scientific study. This chapter presents the study methodology. As an overview of the methodology of this study, it starts with: the study design, study population and samples, variables of study, variables measurement as well as the way of collecting data. At the end of the chapter, the method of analyzing the data used by this study is presented.

3.1. The Study Design

The study used an analytical-descriptive approach to understand the theoretical aspects of the current study, as well as quantitative data and the standard statistical approach to examine variables and achieve the desired objectives. The study measured the impact of the COVID-19 and the interchange rate on Iraqi foreign trade with Saudi Arabia based on the ARDL model. It used quarterly data from the first quarter of 2017 to the fourth quarter 2021. With regard to the independent variable (the COVID-19) and its effect on foreign trade, this study relied on the comparison method before and during the COVID-19, and it is the best way to obtain accurate results, as it was in the previous studies, such as (Megits et al, 2020; Ali, 2021; Rohmi et al, 2021). As for the variable (the interchange rate) and its effect on foreign trade, the study adopted in his study the interchange rate of the dollar against the Iraqi dinar in the parallel market. and which is determined by supply and demand, and affects the purchasing power of goods and services directly and reflects a direct effect on non-oil imports and exports.

3.2. Study Population and Samples

This study used COVID-19 and the interchange rate on foreign trade between Iraq and Saudi Arabia for five years from 2017-2021.

3.3. Variables and Measurements

This section explained the independent and dependent variables and its measurements that used in the current study.

Independent Variable (X1): The period of COVID-19 used as a dummy variable. It is the primary agent of the COVID-19, with 0 placed in the period preceding the, i.e., from the first quarter of 2017 to the fourth quarter of 2019; and 1 placed in the period, i.e., from the first quarter of 2020 to the fourth quarter of 2021. This was cited and based on previous studies, as in (Nielsen et al, 2022; Zainuddin et al, 2021; Ing & Vadila, 2022; 2021 et al Zainuddin).

Independent Variable (X2): The closure index (militancy). which is a basic measure that shows the divergence of government responses to the COVID-19, including the Iraqi government. This index consists of seven indicators that are measured according to ordinal scores and by a percentage (0 to 100). So the study collected the data for Iraq, which is represented by the Iraqi government's actions in the country. These seven indicators represent the measures taken by governments to limit the pandemic, which are: (Cancelling public events, restricting internal movement, closing universities and schools, closing workplaces, closing public transportation, imposing restrictions on gatherings, requirements to stay at home). This measure was developed by the Blavatnik School at the University of Oxford in the United Kingdom. The current study employed this index, citing previous studies such as (Barbero et al, 2021; Hayakawa & Mukunoki, 2021; Xu et al, 2021; Khorana et al, 2021).

Independent Variable (X3): The parallel interchange rate to the dollar**.**

Iraqi foreign trade with Saudi Arabia. Represented (non-oil commodity exports and imports).

Dependent Variable (Y1): Exports**.** (Iraqi exports to Saudi Arabia)

Dependent Variable (Y2): Imports. (Iraqi imports from Saudi Arabia)

3.4. Data Collection Method

Quarterly data were collected from the General Authority for Statistics and The Central Bank for the independent and dependent variables in this study as follows.

X1: The dummy variable. A hypothetical indicator set by the study.

X2: The closure index (militancy). Data for this measure was collected from the "Knoema" global website, which is a private economic information technology company based in New York, USA. The Knoema website downloaded this measure on a daily basis. So, the researcher collected the data for Iraq, which is represented by the Iraqi government's actions in the country, on a quarterly basis.

X3: The parallel interchange rate to the dollar: Data on the interchange rate of the dollar in the parallel market were obtained from the Central Bank of Iraq through monthly data, where the researcher collected the monthly data and extracted the quarterly rate.

Y1: exports, and Y2: imports. Data for the dependent variables (exports and imports) were obtained from the General Authority for Statistics - Saudi Arabia.

3.5. Data Analysis Method

Standard econometric models are commonly used to quantitatively analyse various economic phenomena, including economic crises, shocks, and cycles. The data in this study was analyzed the use of (Eviews 12) software. Based on the (ARDL) Auto-regressive Distributed Lag Model. That the ARDL (Autoregressive Distributed Lag) model is a modern econometric method used for estimating time series models. The model, developed by Pesaran and Shin in 1999 and later by Pesaran et al. in 2001, aims to study the relationship between economic variables. It consists two parts, the autoregressive (AR) part, which explains the dependent variable based on its past values, and the distributed lag (DL) part, which interprets the dependent variable based on past values of independent variables. As a linear parametric model, the ARDL model has proven useful in econometric analysis (Al-Abdali, 2018). In this study, the various modern tests were used to determine the presence of stationarity in time series and to examine the characteristic of stationarity among economic variables. The most commonly used tests in recent studies include:

Augment Dickey-Fuller (ADF): The Expanded Dickey-Fuller (ADF) test is a widely used statistical tool to determine the presence of stationarity in time series data. It is designed to overcome the issue of autocorrelation in the random error limit. If the time series data lacks stationarity at the level, the ADF test can be applied using first and second differences (Sarker & Khan, 2020).

Philips-Perron (PP) **test:** Is recommended due to its superior accuracy, particularly for small sample sizes. One key difference between the PP test and the extended Dickey-Fuller test is that the former does not consider lagging values of the differences, but instead uses non-parametric correction. When there are inconsistent or inconclusive results from both tests, relying on the results of the PP test is preferable. To estimate the equation for the PP test, it is worth noting that the Philips-Perron (PP) test and the expanded Dickey-Fuller (ADF) test use the same hypotheses (alternative or null) and critical values. Thus, there is no difference between the two tests in this regard (Al-Ramli, 2020).

The Johansen-1992 and Johansen-Juselius-1990 tests: Are commonly used to determine long-term relationships between economic variables through Cointegration methods. However, establishing such relationships may not always be possible, and the results of these tests are highly dependent on the selection of an optimal delay length, which cannot be conclusively determined. To address these limitations, the ARDL model employs the Bound Test to identify long-term relationships among the economic variables considered in the model (Ghimire et al, 2021).

Bound Test: The Bound Test is employed to test the Cointegration relationship between the dependent and independent variables in the ARDL framework, which utilities the auto-regressive model with distributed or lagged time gaps (Al-Alusi, 2013).

4. RESULTS AND FINDINGS

Standard econometric models are commonly used to quantitatively analyse various economic phenomena, including economic crises, shocks, and cycles. In this study, the description of the economic variables used in the model will be discussed, formulated with mathematical equations, and the estimation of the parameters of the models used in this study through the use of (EVIEWS 12) software based on the ARDL model. The study employed a set of tests based on time series analysis, such as the Augment Dickey-Fuller, Phillips-Perron Tests, the Bound Test, the Cusum Test, and the Arch Test. Accordingly, this chapter was divided into three parts, as follows: the first part is the theoretical framework of the used standard model. The second part is the characteristics of descriptive statistics and time series static. The third part is for estimating the effect of the COVID-19 and the interchange rate on Iraqi foreign trade with Saudi Arabia. The fourth part: the study hypotheses were tested.

4.1. Theoretical Framework of the Standard Model Used

4.1.1. Description of the Standard Model and the Nature of the Relationship Between its Variables

The characterization stage is a crucial step in developing the standard model. This model comprises mathematical equations that represent economic relations and elucidate the mechanics of a specific economy. The equations, known as structural equations, establish the relationship between independent and dependent variables in accordance with economic theory.

The following are the variables that will be addressed and discussed:

$$Y1 = f(X1, X2, X3) \ldots\ldots\ldots\ldots 1$$

$$Y1 = \alpha + \beta_1 y + \beta_2 y + \beta_3 y + ut. \ldots 2$$

The relationship of the COVID-19 pandemic and the interchange rate to Iraqi exports with Saudi Arabia.

$$Y2 = f(X1, X2, X3) \ldots\ldots\ldots\ldots 3$$

The relationship of the COVID-19 pandemic and the interchange rate with Iraqi imports with Saudi Arabia.

$$Y2= \alpha +\beta_1 y+ \beta_2 y+ \beta_3 y+ ut \ldots\ldots 4$$

Table 2: Study Variables

Variable Symbol	Variable Name	Variable Type
Y1	Iraqi Exports	Dependent
Y2	Iraqi Imports	Dependent
X1	Dummy index (COVID 19)	Independent
X2	Stringency Index Ratio	Independent
X3	Interchange Rate	Independent

Source: The Table was prepared by the researcher based on the description of the model

4.1.2. Study Data

Table 3: Indicators of the COVID-19 and the interchange rate in foreign trade with Saudi Arabia

Years	Quarter	Iraqi Exports (1) ($)	Iraqi Imports (2) ($)	Dummy index	Stringency Index ratio (3)	Parallel Interchange Rate (4)
		Y1	Y2	X1	X2	X3
2017	First	2,309,270	191,576,971	0	X2	1273
2017	Second	728,716	238,818,203	0	0	1250
2017	Third	2,870,725	392,565,778	0	0	1255
2017	Fourth	2,038,509	235,406,753	0	0	1254
2018	First	2,030,239	330,055,288	0	0	1231
2018	Second	2,945,242	211,691,539	0	0	1201
2018	Third	2,997,061	333,756,260	0	0	1204
2018	Fourth	3,872,500	260,277,671	0	0	1200
2019	First	1,331,000	196,408,085	0	0	1195
2019	Second	801,665	159,879,490	0	0	1194
2019	Third	1,983,450	216,376,172	0	0	1196
2019	Fourth	2,740,814	213,002,255	0	0	1200

2020	First	2,995,259	163,529,070	1	28.65%	1198
2020	Second	2,340,861	154,186,995	1	90.10%	1232
2020	Third	2,146,398	281,835,002	1	84.53%	1225
2020	Fourth	3,658,560	299,383,610	1	54.31%	1280
2021	First	4,232,557	208,737,836	1	62.54%	1461
2021	Second	2,294,379	227,160,362	1	73.22%	1483
2021	Third	3,936,187	289,368,857	1	75.93%	1473
2021	Fourth	8,030,948	295,976,922	1	71.01%	1479

Source: Prepared by the researcher based on the following sources:

• Column No. 1, 2: General Authority for Statistics - Kingdom of Saudi Arabia .

•Column No. 3: (knoema, 2022). https://public.knoema.com/etibpqe/oxford-covid-19-government-response-tracker?country=1001380-peru

• Column No. 4: The Central Bank of Iraq, Department of Statistics and Research, Annual Bulletins 2017-2021

4.1.3. Tests Stationary or Unit Root

The time series can be classified into two types: static and non-static. A static time series is characterized by a constant average over an extended period, indicating the absence of an upward or downward trend. Conversely, a non-static time series undergoes a continuous change in the average level, indicating the presence of a general trend (Al-Ramli, 2022). Researchers can use various modern tests to determine the presence of stationarity in time series and to examine the characteristic of stationarity among economic variables. The most commonly used tests in recent studies include:

1. Augmented Dickey-Fuller 1981

The Expanded Dickey-Fuller (ADF) test is a widely used statistical tool to determine the presence of stationarity in time series data. It is designed to overcome the issue of autocorrelation in the random error limit. If the time series data lacks stationarity at the level, the ADF test can be applied using first and second differences (Sarker & Khan, 2020) notes that the ADF test has various formulations, including one that assumes no fixed limit or general trend. Also known as the "No Trend and No Intercept" formulation:

Δ **Yt =** ɔ**yt - 1 +** $\sum_r^k$ **= 1ƤiYt-i + ut …….. 1**

Δ Yt : change in the time dependent variable t.

Ƥ , ג : parameters of the independent variables

Yt : The independent variable of t-1 hysteresis.

K: degrees of slowness. Ut: random error limit

- **The existence of a fixed limit and a general trend (Trend and Intercept):**

Δ **Yt= α+βt +** ג y_{t-1}**+** $\sum_r^{k=1}$**ƤiY**$_{t-i}$ **+u**$_t$ 2

βt: The general direction.

- **There is only a static event (Intercept):**

Δ Yt= α + ג **yt-1 +** $\sum$**rk=1ƤiYt-i +ut …….3**

The critical value for these coefficients can be determined through either tables or ready-made programs. This value is then compared to the calculated value to make a decision about whether to accept the alternative hypothesis, indicating that the series is static, or to accept the null hypothesis, indicating that the series is not static. Additionally, the Extended Dickey-Fuller test can be used to determine whether the series used in estimation has a unit root (Al-Ramli, 2020).

- Alternative hypothesis: The availability of stillness in the time series, the absence of a unit root. **H_1: B = 1**.
- Null hypothesis: no stillness in the time series, presence of a unit root **H_0: B = 0**.

The above hypotheses can be accepted or rejected by comparing the probability value (P-value) with predetermined significance levels such as 1%, 5%, or 10%. If the P-value is less than or equal to the significance level, the alternative hypothesis (indicating the presence of stillness) is to be accepted and the null hypothesis (indicating the absence of stillness) is to rejected. Conversely, if the P-value is greater than or equal to the significance level, the alternative hypothesis is to be accepted and the null hypothesis is rejected. If the null hypothesis is rejected, a first different test should be performed and the same procedure repeated.

2. Philips-Perron (PP) 1988:

Although the Dickey-Fuller test is widely used for determining the stability of time series, it has limitations. To overcome these limitations, the Philips-Perron (PP) test is recommended due to its superior accuracy, particularly for small sample sizes. One key difference between the PP test and the extended Dickey-Fuller test is that the former does not consider lagging values of the differences, but instead uses non-parametric correction. When there are inconsistent or inconclusive results from both tests, relying on the results of the PP test is preferable. To estimate the equation for the PP test, the following formula can be used:

$$\Delta Y_t = \alpha + \beta y_{t-1} + u_t \quad \ldots\ldots\ldots\ldots 4$$

It is worth noting that the Philips-Perron (PP) test and the expanded Dickey-Fuller (ADF) test use the same hypotheses (alternative or null) and critical values. Thus, there is no difference between the two tests in this regard (Al-Ramli, 2020).

4.1.4. Autoregressive Distributed Lag Model "ARDL"

That the ARDL (Autoregressive Distributed Lag) model is a modern econometric method used for estimating time series models. The model, developed by Pesaran and Shin in 1999 and later by Pesaran et al. in 2001, aims to study the relationship between economic variables. It consists of two parts, the autoregressive (AR) part, which explains the dependent variable based on its past values, and the distributed lag (DL) part, which interprets the dependent variable based on past values of independent variables. As a linear parametric model, the ARDL model has proven useful in econometric analysis (Al-Abdali, 2018).

The Johansen-1992 and Johansen-Juselius-1990 tests are commonly used to determine long-term relationships between economic variables through Cointegration methods. However, establishing such relationships may not always be possible, and the results of these tests are highly dependent on the selection of an optimal delay length, which cannot be conclusively determined. To address these limitations, the ARDL model employs the Bound Test to identify long-term relationships among the

economic variables considered in the model. The ARDL model is distinct from prior tests due to its unique characteristics, which are detailed by Ghimire et al. (2021):

- The (Autoregressive Distributed Lag) (ARDL) model is a viable alternative to Cointegration. Unlike Cointegration, the ARDL model does not require that data be stillness at the same degree. Instead, it can accommodate data that is either stillness at the level I or stillness at the first difference I. However, the ARDL test cannot be performed if the data is stillness at the second difference I.
- The ARDL model necessitates that the dependent variable is stillness at the first difference I.
- The ARDL model can distinguish between the dependent and explanatory variables. The model also automatically takes a sufficient number of degrees of lag into account.
- The model addresses the issues related to variable deletion and autocorrelation.
- Additionally, the ARDL model can be estimated with relatively small sample sizes (Al-Alusi, 2013).
- The use of the ARDL model allows for the simultaneous estimation of short-term and long-term components in a single equation, eliminating the need for separate equations.

In the ARDL framework, which makes use of the auto-regressive model with dispersed or delayed time gaps, the Bound assess is utilized to assess the Cointegration connection that exists between the dependent and independent variables. When testing the alternative hypothesis of Cointegration among the variables in the Unrestricted Error Correction Model (UECM), Narayan (2004) determined upper and lower critical values for the F statistic. These values serve as upper and lower limits for the critical range. The maximum value is based on the assumption that all of the variables are integrated to degree I, suggesting the existence of a Cointegration relationship between the variables. On the other hand, the lower limit makes the opposite assumption, which is that all variables are integrated to degree I, signalling that there is no Cointegration between the variables being considered. If the value of the F statistic is more than the upper limit, then there is evidence of Cointegration, which suggests a long-term equilibrium connection between the variables, and the alternative hypothesis is accepted. If the value of the F statistic is less than the top limit, then there is no evidence of Cointegration. In contrast, if the value of the F statistic is less than the

lower limit, then there is no Cointegration. This indicates that there is no long-term equilibrium relationship between the variables, and the null hypothesis is accepted. This means that the relationship between the variables is not linear. According to Al-Alusi (2013), a result is considered inconclusive when the value of the F statistic is located anywhere between the upper and lower boundaries. It is possible to construct a chart that demonstrates the several processes that are a part of the ARDL model testing:

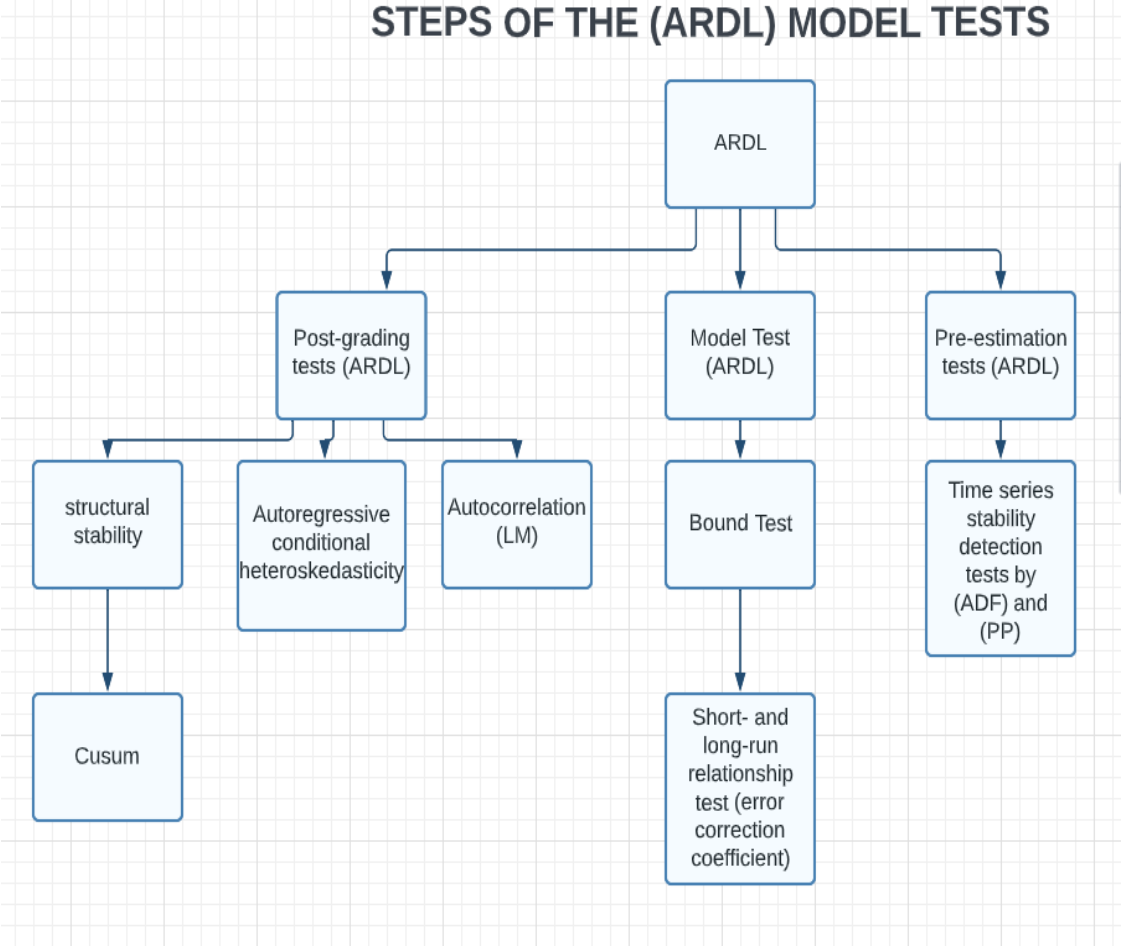

Figure 2: Steps of the (ARDL) model tests

Source: Prepared by the researcher based on the description of the standard model.

4.2. Characteristics of Descriptive Statistics and Static Time Series

4.2.1. The Characteristics of the Descriptive Statistics of the Study Data

To begin, this study conducts statistical tests on the time series data to understand its nature and characteristics. These tests include computing the arithmetic mean, median, maximum, minimum, standard deviation, Skewness, and Kurtosis for quarterly time series data. Table 4 displays the descriptive statistics of the independent variables (dummy index X1, militancy index proportion X2, and interchange rate X3) and the dependent variables (Iraqi exports Y1 and Iraqi imports Y2) used in this study. The data covers the period 2017-2021 based on quarterly observations, with 20 observations for each variable.

Table 4: Characteristics of Descriptive Statistics for the Study Variables

	Y1	Y2	X1	X2	X3
Mean	2814217.00	245000000.00	0.40	0.27	1274.20
Median	2540838.00	231000000.00	0.00	0.00	1231.50
Maximum	8030948.00	393000000.00	1.00	0.90	1483.00
Minimum	728716.00	154000000.00	0.00	0.00	1194.00
Std. Dev.	1557849.00	64098634.00	0.50	0.36	105.97
Skewness	1.79	0.54	0.41	0.66	1.28
Kurtosis	7.43	2.60	1.17	1.64	2.95
Jarque-Bera	27.03	1.11	3.36	3.01	5.49
Probability	0.00	0.57	0.19	0.22	0.06
Sum	56284340.00	4900000000.00	8.00	5.40	25484.00
Observations	20.00	20.00	20.00	20.00	20.00

Source: The Table was prepared by the researcher using the EVIEWS 12 program

4.2.2. Testing the Stillness of the Time Series of the Studied

4.2.2.1. Variables

4.2.2.1.a. Time Series Graph

To begin any analysis on time series data, it is important to first visualize it graphically over time to understand its type and nature. The graphical representation of a time series provides an initial indication of its potential nature. For instance, if the curve of the time series exhibits an overall trend (upward or downward), this suggests that the time series is non-stationary, meaning its average varies over time.

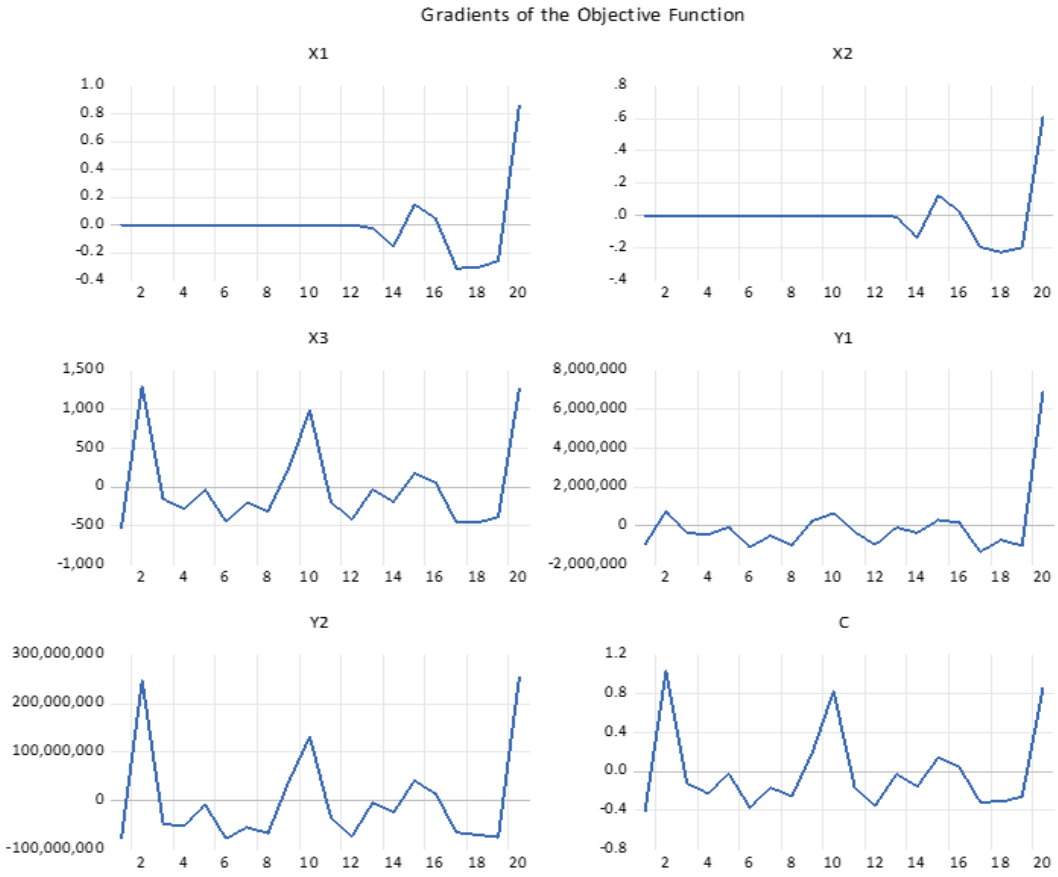

Figure 3: Time Series Stillness Graph

Source: Figures were prepared by the researcher using the EVIEWS 12 program.

4.2.2.2. Augmented Dickey-Fuller test

According to the findings of the Augmented Dickey-Fuller (ADF) test, if the variables show evidence of having a unit root, the null hypothesis, which states that ($H_0 = 0$), is accepted while the alternative hypothesis is rejected. On the other hand, if the variables do not show any evidence of a unit root, then the alternate hypothesis ($H_1 = 1$) is accepted, and the null hypothesis is rejected. The results of the Augmented Dickey-Fuller (ADF) test are presented in Table 5. These results show that the study variables did not stabilize at the same level, but rather at the level corresponding to the first difference I.

Table 5: The expanded Dickey-Fuller (ADF) Test for Study Variables.

Stability Tests						
Variables	**Level**			**1st Difference**		
	FAD	**Sig.**	**Status**	**ADF**	**Sig.**	**Status**
Y1	0.204271	0.9643	Intercept	-3.829867	0.0112	Intercept
Y2	-3.690457	0.0134	Intercept	-0.817579	0.7823	Intercept
X1	-0.754571	0.8091	Intercept	-4.242641	0.0046	Intercept
X2	0.330940-	0.9009	Intercept	4.471688-	0.0032	Intercept
X3	0.174031	0.9630	Intercept	2.913836-	0.0061	None

Source: The table was prepared by the researcher using the EVIEWS 12 program.

4.2.2.3. Measuring The Correlation Between The COVID-19, The Interchange Rate, and Iraqi Foreign Trade with Saudi Arabia

Table 6: Correlation between Study Variables

Covariance Analysis: Ordinary	
Date: 12/25/22 / Time: 23:24	
Sample: 1 20	

Included observations: 20			
Covariance			
Probability	**X1**	**X2**	**X3**
Y1	356070.7	229107.4	91981895
	0.0327	0.0578	0.0066
Y2	-1990930.	-517113.5	1.08E+09
	0.7853	0.9212	0.4813

Source: The Table was prepared by the researcher using the EVIEWS 12 program.

The results presented in Table 6 reveal two key findings:

Firstly, a significant direct correlation exists between the independent variables (X1, X2, X3) and the dependent variable, Iraqi exports (Y1), as evidenced by the correlation coefficients of (356070.7), (229107.4), and (91981895), respectively. Additionally, the p-values associated with these correlations (0.0327, 0.0578, and 0.0066) are all below the established significance level of (0.05), further supporting the statistical significance of these correlations. Secondly, there appears to be no significant relationship between the independent variables (X1, X2, X3) and the dependent variable, Iraqi imports (Y2), as the p-values exceed the 5% threshold.

4.3. Estimating the Effect of the COVID-19 and the Interchange Rate on Iraqi Foreign Trade with Saudi Arabia

4.3.1. Estimating The Effect of The COVID-19 and The Interchange Rate on Iraqi Exports:

Based on the analysis this far, the study variables demonstrate stability within the first difference and do not exceed the second difference threshold. Consequently, the variables satisfy the Cointegration conditions as per the (ARDL) methodology, allowing for the application of the ARDL model test. The AKAIKE Information Criteria (top 20 models) were employed to select from 20 possible slowing periods for ARDL models, and to determine the optimal number of lag periods needed to detect

the relationship between the independent variables (X3, X2, X1) and the dependent variable (Y1).

4.3.1.1. Akaki Test Results

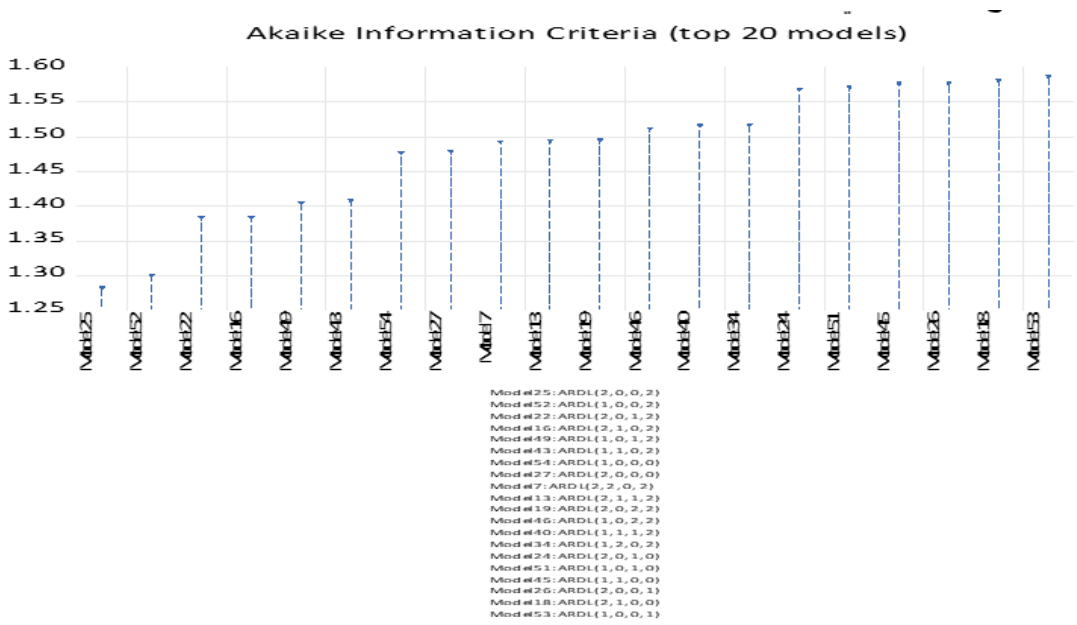

Figure 4: Test the number of time lags according to AKAIKE's criterion

Source: The figure was prepared by the researcher using the EVIEWS 12 program

Table 7: Test the Number of Time Lags According to AKAIKE's Criterion

Model Selection Criteria Table
Dependent Variable: LOGY1
Date: 12/26/22 Time: 00:14

Sample: 1 20						
Included Observations: 18						
Model	**LogL**	**AIC***	**BIC**	**HQ**	**Adj. R-sq**	**Specification**
25	-3.541235	1.282359	1.678080	1.33692	0.353886	ARDL (2, 0, 0, 2)

Table 7 and Figure 3 provide valuable insights, indicating the following findings:

Firstly, the ideal model for studying the long-term relationship between the COVID-19 and the interchange rate variables and their effect on the dependent variable (exports) is the ARDL model (2, 0, 0, 2). This was determined based on the results of the AKAIKE Information Criteria, which showed that the optimal model had the lowest value for this criterion (1.282359). Furthermore, this model considers delays based on the ARDL (2, 0, 0, 2) values for both the dependent and explanatory variables. Secondly, the corrected coefficient of determination reveals that (0.353886%) of the changes observed in the dependent variable are caused by the explanatory variables with their lagged effects, as indicated in the table 10.

4.3.1.2. The Results of the Initial Estimation of the ARDL Model

Table 8: Initial estimation results for the ARDL model

Dependent Variable: LOGY1
Method: ARDL
Date: 12/26/22 / Time: 00:29
Sample (adjusted): 3 20
Included observations: 18 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: AKAIKE Info Criterion (AIC)
Dynamic regressors (2 lags, automatic): X1 X2 X3
Fixed regressors: C

Number of models evaluated: 54				
Selected Model: ARDL (2, 0, 0, 2)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
LOGY1(-1)	0.147314	0.222739	0.661374	0.5233
LOGY1(-2)	-0.266100	0.226425	-1.175223	0.2671
X1	0.566520	0.576439	0.982794	0.3489
X2	-0.429830	0.814701	-0.527592	0.6093
X3	0.002452	0.002498	0.981552	0.3495
X3(-1)	-0.004943	0.003671	-1.346601	0.2078
X3(-2)	0.005851	0.002616	2.236172	0.0493
C	12.18902	4.799116	2.539847	0.0294
R-squared	0.619933	Mean dependent var		14.78772
Adjusted R-squared	0.353886	S.D. dependent var		0.491683
S.E. of regression	0.395221	Akaike info criterion		1.282359
Sum squared resid	1.561997	Schwarz criterion		1.678080
Log likelihood	-3.541235	Hannan-Quinn criter.		1.336924
F-statistic	2.330164	Durbin-Watson stat		1.968530
Prob(F-statistic)	0.108962			
***Note: p-values and any subsequent tests do not account for model selection.**				

Source: The Table was prepared by the researcher using the EVIEWS12 program.

The data displayed in the aforementioned table presents the outcomes of the preliminary estimation of the ARDL model, which reveals the association between the independent variables (X1, X2, X3) and the dependent variable (Y1). The model's explanatory power is indicated by the value of R2 (0.619933) while its lack of correlation is reflected in the D-W value (1.968530). The F-statistic value, which is greater than 5%, reveals the insignificance of the model as a whole, thereby requiring further steps to be taken. To verify the existence of the long-term equilibrium relationship between the study variables, the Bound Test according to the ARDL model was performed.

4.3.1.3. Bound Test

Table 9: Bound Test Results

F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
		Asymptotic: n=1000		
F-statistic	4.170532	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Source: The Table was prepared by the researcher using the EVIEWS 12 program.

Table 9 displays the outcomes of the Bound Test to determine cointegration among the study variables. The computed F-statistic of (4.170532) exceeded the maximum tabular value of (3.67) at a significant level of (5%). Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted, signifying the existence of a cointegration relationship among certain variables, implying a long-term equilibrium relationship.

4.3.1.4. The Short- and Long-Term Relationship

The presence of Cointegration between the variables in the model was confirmed by the results of the bounds test. Based on this, estimates of short-term and long-term parameters were calculated, and the findings are presented in tables (10) and (11).

Table 10: Displays the short-term estimates of the COVID-19 and interchange rate variables on Iraqi exports

ARDL Long Run Form and Bounds Test				
Dependent Variable: D(LOGY1)				
Selected Model: ARDL (2, 0, 0, 2)				
Case 2: Restricted Constant and No Trend				
Date: 12/26/22 / Time: 00:34				
Sample: 1 20				
Included observations: 18				
Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	12.18902	4.799116	2.539847	0.0294
LOGY1(-1)*	-1.118786	0.323458	-3.458834	0.0061
X1**	0.566520	0.576439	0.982794	0.3489
X2**	-0.429830	0.814701	-0.527592	0.6093
X3(-1)	0.003359	0.001304	2.576537	0.0276
D(LOGY1(-1))	0.266100	0.226425	1.175223	0.2671
D(X3)	0.002452	0.002498	0.981552	0.3495
D(X3(-1))	-0.005851	0.002616	-2.236172	0.0493

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Source: The Table was prepared by the researcher using the EVIEWS12 program.

The table above displays the outcomes of a brief-term estimation where the Iraqi exports index (Y1) did not exhibit a significant effect from the independent variables of COVID-19 indicators (X1, X2), because of the potential for surpassing the 5% threshold. While the interchange rate index (X3) had a significant and exponential effect on the Iraqi exports index (Y1). Specifically, the researcher discovered that a 100% increase in the dollar interchange rate corresponded to a 0.003359 increase in exports, with a probability level of 0.0276. This finding aligns with the actual state of affairs.

Table 11: Long-term estimates of the variables of the COVID-19 and the interchange rate on Iraqi exports.

Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
X1	0.506370	0.528107	0.958841	0.3602
X2	-0.384193	0.750442	-0.511956	0.6198
X3	0.003003	0.001384	2.169599	0.0552
C	10.89486	1.680785	6.482006	0.0001
EC = LOGY1 - (0.5064*X1 -0.3842*X2 + 0.0030*X3 + 10.8949)				

Source: The table was prepared by the researcher using the EVIEWS12 program.

The table presented above reveals the outcome of a long-term estimation. The study found that the COVID-19 indicators (X1, X2) did not have a significant effect on the Iraqi exports index (Y1), potentially because the results exceeded the 5% threshold. However, the interchange rate index (X3) exhibited a direct and significant effect on the Iraqi exports index (Y1). The study discovered that a 100% increase in the dollar interchange rate led to a 0.003003 increase in exports, with a probability level of 0.0552.

To validate the accuracy and reliability of the previous findings, the researcher conducted essential diagnostic tests. To test whether the estimated model exhibited normal distribution or not, the researcher employed the Jarque-Bera test. Figure 4 presents the results of this test. The probability of normal distribution, Prob=0.589652, surpassed the 5% threshold, which indicates the acceptance of the hypothesis that the residuals exhibit a normal distribution.

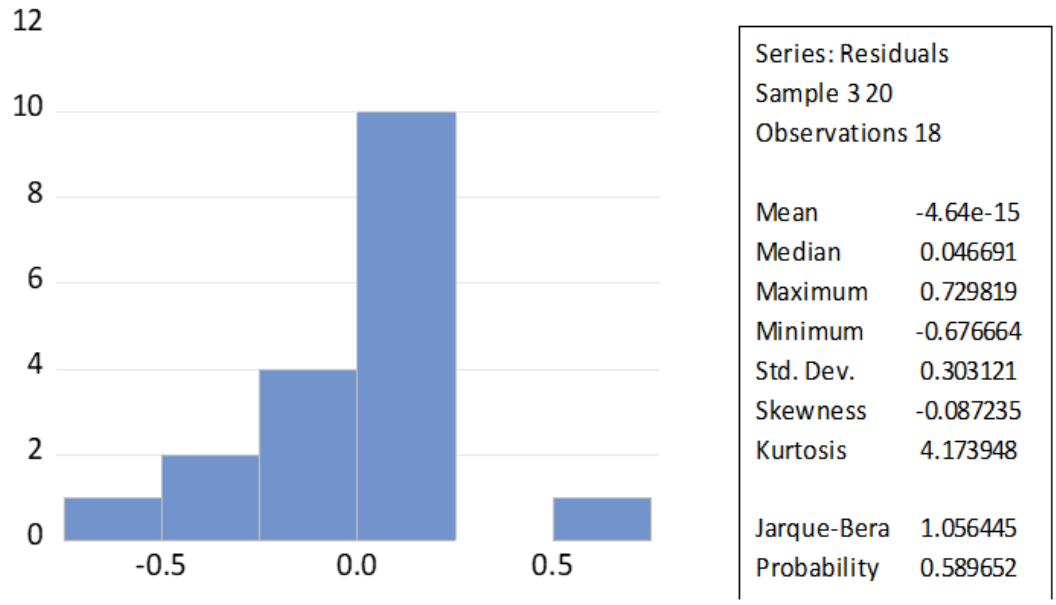

Figure 5: Test results for the normal distribution problem.

Source: The Figure was prepared by the researcher using the EVIEWS12 program

The researcher aimed to determine whether the estimated model exhibited the autocorrelation problem of the residuals. To do so, the Serial Correlation LM Test LM test was conducted, and the results were presented in Table 12. The findings confirmed that the model was free from the autocorrelation problem if the probability exceeded the 0.05 threshold. As follow:

Table 12: Serial Correlation LM Test LM Autocorrelation

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	1.850225	**Prob. F(2,8)**	0.2185
Obs*R-squared	5.692781	**Prob. Chi-Square(2)**	0.0581

Source: The table was prepared by the researcher using the EVIEWS12 program.

Moreover, the study sought to determine whether the estimated model was free from the error limit variance problem. To accomplish this, the researcher conducted the ARCH test, and the results were presented in Table 13. The findings confirmed that the model was free from the problem of random error limit variance, as the probability surpassed the 0.05 threshold.

Table 13: ARCH stability hypothesis test

Heteroskedasticity Test: ARCH			
F-statistic	0.207150	**Prob. F(1,15)**	0.6555
Obs*R-squared	0.231572	**Prob. Chi-Square(1)**	0.6304

Source: The table was prepared by the researcher using the EVIEWS12 program.

In order to assess the stability of the data utilized in this study, the cumulative sum of residuals (CUSUM) test was employed. The results of this test are presented in Figure 5 and demonstrate that the estimated parameters of the model remained stable over the course of the study period. Specifically, the graph reached critical limits at a significance level of 0.05, indicating that the data did not experience any significant structural changes.

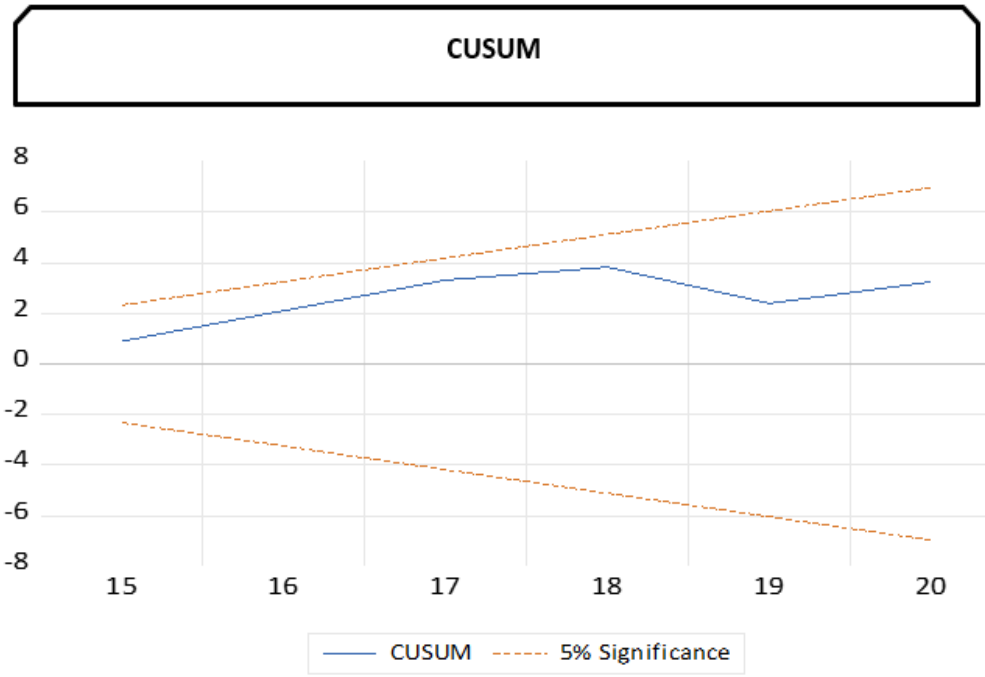

Figure 6: Results of the model stability test

Source: The Figure was prepared by the researcher using the EVIEWS12 program

4.3.2. Estimating the Effect of the COVID-19 and the Interchange Rate on Iraqi Imports

Based on the stability of the time series of the study variables, as evidenced by their meeting the requirements for Cointegration under the first difference and second difference thresholds, the researcher applied the autoregressive time gaps (ARDL) methodology to test for relationships between the independent variables (X3, X2, X1) and the dependent variable (Y2). Specifically, utilized the AKAIKE Information Criteria (AIC) to identify the top 20 ARDL models with slowing periods. This enabled us to determine the optimal number of lag periods necessary to detect any significant relationships between the variables.

Akaike Test Results:

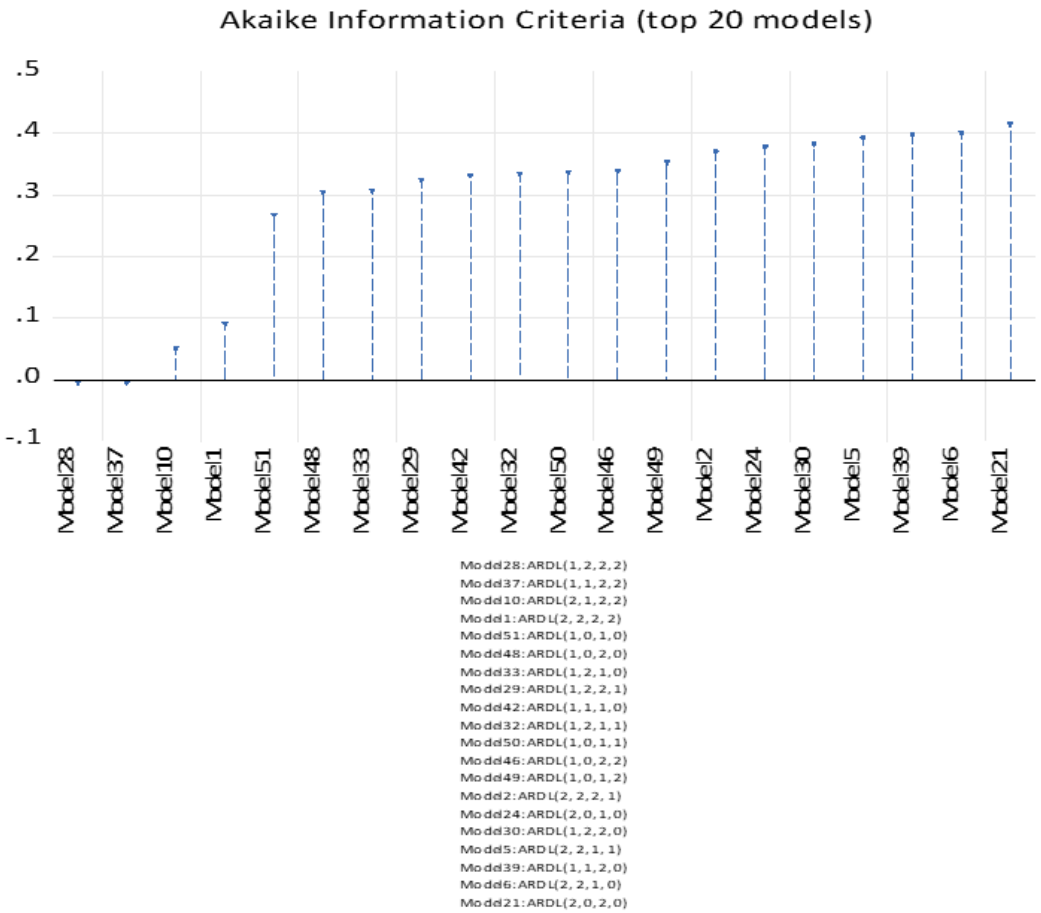

Figure 7: the number of time lags according to the AKAIKE criterion

Source: The Figure was prepared by the researcher using the EVIEWS12 program.

Table 14: Test the number of time lags according to the AKAIKE criterion

Model Selection Criteria Table						
Dependent Variable: LOGY2						
Date: 12/26/22 Time: 19:30						
Sample: 1 20						
Included observations: 18						
Model	**LogL**	**AIC***	**BIC**	**HQ**	**Adj. R-sq.**	**Specification**
28	11.04582	-0.005091	0.53902	0.06993	0.38734	ARDL(1, 2, 2, 2)

The findings presented in Table 14 and Figure 6 provide the following insights:

- The ARDL (1, 2, 2, 2) model is the most appropriate for examining the long-term relationship between COVID-19 and interchange rates in relation to the dependent variable (imports). This conclusion was based on the results of the AKAIKE Information Criteria, which identified this model as having the lowest value (-0.005091).
- The adjusted coefficient of determination indicates that the explained variables with their slowing down account for 0.38734% of the changes in the dependent variable. The initial model was estimated, and its results are detailed in Table 15.

4.3.2.1. The Results of the Initial Estimation of the ARDL Model

Table 15: The results of the initial estimation of the ARDL model.

Dependent Variable: LOGY2				
Method: ARDL				
Date: 12/26/22 Time: 19:27				
Sample (adjusted): 3 20				
Included observations: 18 after adjustments				
Maximum dependent lags: 2 (Automatic selection)				
Model selection method: AKAIKE Info Criterion (AIC)				
Dynamic regressors (2 lags, automatic): X1 X2 X3				
Fixed regressors: C				
Number of models evalulated: 54				
Selected Model: ARDL(1, 2, 2, 2)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
LOGY2(-1)	-0.148340	0.263817	-0.562283	0.5915
X1	4.860280	2.325472	2.090019	0.0750
X1(-1)	10.33202	5.428491	1.903296	0.0987
X1(-2)	2.449824	2.697492	0.908186	0.3940
X2	-17.72177	7.842170	-2.259805	0.0583

X2(-1)	0.544813	3.527999	0.154425	0.8816
X2(-2)	-9.718966	4.240003	-2.292207	0.0556
X3	0.007296	0.005333	1.367936	0.2136
X3(-1)	-0.009422	0.004002	-2.354456	0.0508
X3(-2)	0.009245	0.004703	1.965630	0.0901
C	13.48326	5.310039	2.539201	0.0387
R-squared	0.747729	Mean dependent var		19.29642
Adjusted R-squared	0.387343	S.D. dependent var		0.268370
S.E. of regression	0.210059	Akaike info criterion		-0.005091
Sum squared resid	0.308875	Schwarz criterion		0.539025
Log likelihood	11.04582	Hannan-Quinn criter.		0.069935
F-statistic	2.074798	Durbin-Watson stat		2.343067
Prob(F-statistic)	0.172477			
***Note: p-values and any subsequent tests do not account for model selection.**				

Source: The table was prepared by the researcher using the EVIEWS12 program.

The table above presents the results of the initial estimation of the ARDL model, which explores the relationship between the independent variables (X1, X2, X3) and the dependent variable (Y2). The model's explanatory ability is indicated by an R2 value of 0.747729, while the absence of correlation is reflected by a D-W statistic of 2.343067. However, the F-statistic indicates the overall insignificance of the model, as its value exceeds the 5% threshold. Consequently, further steps are required. Specifically, a Bound Test is conducted to verify the existence of a long-term equilibrium relationship between the study variables using the ARDL model.

4.3.2.2. The Bound Test

Table 16: Bound Test Results

F-Bounds Test	**Null Hypothesis: No levels relationship**

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	4.554696	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Source: The table was prepared by the researcher using the EVIEWS12 program.

The results of the Bound Test of Cointegration between the study variables are shown in Table 16. The calculated F-statistic value of 4.554696 exceeds the maximum tabular value of 3.67 at a significant level of 5%. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted, indicating the presence of a Cointegration relationship between some variables. This suggests the existence of a long-term equilibrium relationship.

4.3.2.3. The Short- and Long-Term Relationship

Tables 17 and 18 present the results of the estimation of short-term and long-term parameters, respectively. The estimation based on the Cointegration between the variables of the model, as indicated by the results of the Bound Test .

Table 17: Short-term estimates of the variables of the COVID-19 and the interchange rate on Iraqi imports

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LOGY2)
Selected Model: ARDL(1, 2, 2, 2)
Case 2: Restricted Constant and No Trend
Date: 12/26/22 Time: 19:46
Sample: 1 20
Included observations: 18
Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.48326	5.310039	2.539201	0.0387
LOGY2(-1)*	-1.148340	0.263817	-4.352791	0.0033
X1(-1)	17.64213	10.03416	1.758208	0.1221
X2(-1)	-26.89593	14.21045	-1.892687	0.1003
X3(-1)	0.007119	0.002635	2.702081	0.0305
D(X1)	4.860280	2.325472	2.090019	0.0750
D(X1(-1))	-2.449824	2.697492	-0.908186	0.3940
D(X2)	-17.72177	7.842170	-2.259805	0.0583
D(X2(-1))	9.718966	4.240003	2.292207	0.0556
D(X3)	0.007296	0.005333	1.367936	0.2136
D(X3(-1))	-0.009245	0.004703	-1.965630	0.0901
*** p-value incompatible with t-Bounds distribution.**				

Source: The table was prepared by the researcher using the EVIEWS12 program.

The table above depicts the outcomes of the short-term estimation. The COVID-19 index (X1) as an independent variable has a significant and direct effect on Iraqi imports (Y2), where an increase of one unit in the dummy index leads to a rise of 4.860280 units in imports at a probability level of 0.0750. Furthermore, the percentage of Stringency index (X2) has a significant and negative effect on the Iraqi imports index (Y2), wherein an increase of one unit in the Stringency index ratio results in a decrease of 17.72177 units in imports at a probability level of 0.0583. The interchange rate index (X3) has a significant and direct effect on the Iraqi imports index (Y2). Specifically, a one-unit increase in the dollar interchange rate leads to a 0.007119 unit increase in imports, with a probability level of 0.0305.

Table 18: Long-term estimates of the variables of the COVID-19 and the interchange rate on Iraqi imports

Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**

X1	15.36316	9.102925	1.687717	0.1353
X2	-23.42157	12.94470	-1.809356	0.1133
X3	0.006199	0.002385	2.599592	0.0354
C	11.74152	2.899397	4.049644	0.0049
EC = LOGY2 - (15.3632*X1 -23.4216*X2 + 0.0062*X3 + 11.7415)				

Source: The table was prepared by the researcher using the EVIEWS12 program.

The long-term estimation results presented in the table above indicate that the indicators of the COVID-19 (X1, X2) as independent variables did not demonstrate a significant effect on the Iraqi imports index (Y2), as the probability level exceeded the 5% threshold. In contrast, the interchange rate index (X3) had a significant and direct effect on the Iraqi imports index (Y2). Specifically, an increase of one unit in the dollar interchange rate led to a rise of 0.006199 units in imports, with a probability level of 0.0354.

To validate the accuracy of the previous results, the researcher conducted several diagnostic tests. The Jarque-Bera test was employed to verify the normal distribution of the estimated model. The results are presented in Figure 7. indicating that the probability of 0.790630 exceeded the 5% threshold, thus supporting the hypothesis that the residuals are normally distributed.

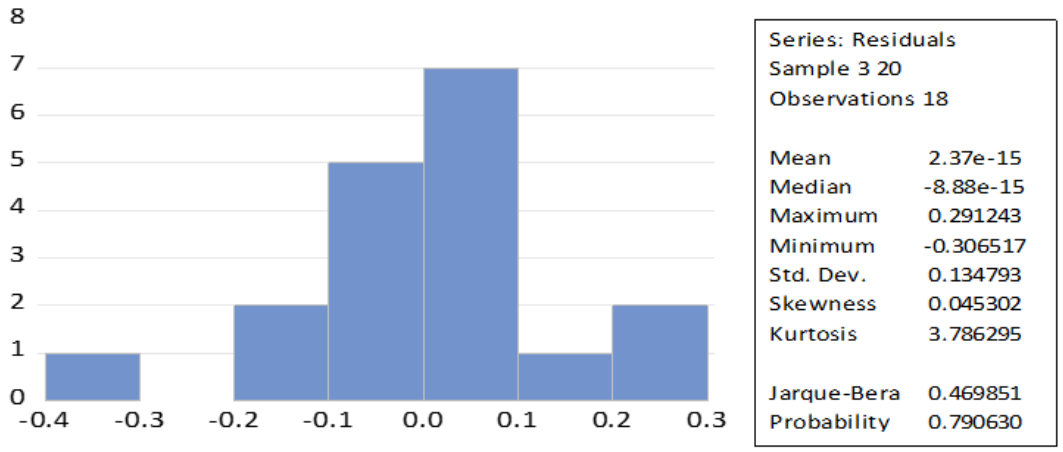

Figure 8: Test results for the normal distribution problem

Source: The Figure was prepared by the researcher using the EVIEWS12 program.

Meanwhile, a Serial Correlation LM Test is conducted to determine whether the estimated model suffers from any autocorrelation problem of the residuals. The findings, which were presented in Table 19, indicated that the model is free from autocorrelation issues if the probability exceeds the 0.05 threshold.

Table 19: Serial correlation LM test

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	0.482122	**Prob. F (2,5)**	0.6435
Obs*R-squared	2.910074	**Prob. Chi-Square (2)**	0.2334

Source: The table was prepared by the researcher using the EVIEWS 12 program.

In order to test whether the estimated model is free from the problem of error limit variance, the ARCH test was conducted and the results were presented in Table 20. The probability value exceeding the 0.05 threshold indicates that the model is free from the issue of random error limit variance. The results are summarized in the following table, confirms the absence of the error limit variance issue in the model:

Table 20: ARCH Stability Hypothesis Test

Heteroskedasticity Test: ARCH			
F-statistic	0.207150	**Prob. F(1,15)**	0.6555
Obs*R-squared	0.231572	**Prob. Chi-Square(1)**	0.6304

Source: The table was prepared by the researcher using the EVIEWS12 program.

Additionally, in order to verify the absence of structural changes in the data utilised for the study, the Cumulative Sum of Residuals (CUSUM) test was employed. The outcomes of the test are presented in Figure 8, which demonstrates that the model's estimated parameters remain stable over the course of the study period. This is evidenced by the graph remaining within the critical limits at a significance level of 0.05. The results are as follows:

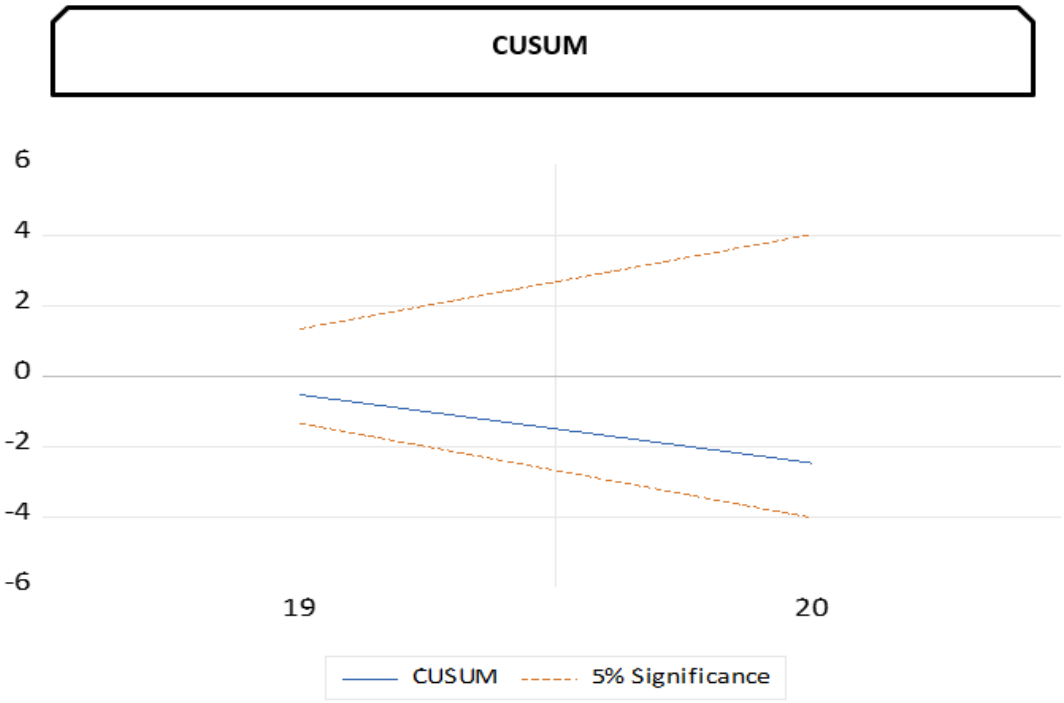

Figure 9: Results of the model stability test

Source: The Figure was prepared by the researcher using the EVIEWS12 program

4.4. Hypothesis Testing

In this section, which is considered the final section of the statistical analysis of the data, the study tested the four hypotheses that were formulated by the study based on the results of the study, to confirm whether or not these hypotheses are supported. The results of this analysis, which were mentioned in the previous section of this chapter, were collected and summarized.

The first hypothesis suggested an influence, negative of COVID-19 on Iraqi exports to Saudi Arabia. The result did not find statistically significant effect of COVID-19, represented by (X1, X2), on Iraqi exports (Y1) in the long term as well as the short term, as the probability exceeded the 5% threshold. So, the validity of the first hypothesis has not been proven.

The second hypothesis suggested an influence, negative of COVID-19 on Iraqi imports from Saudi Arabia. The result did not find statistically significant effect of COVID-19, represented by (X1, X2), on Iraqi imports (Y2) in the long term, as the

probability exceeded the 5% threshold. In the short term, however, there has been a positive impact of the COVID-19 index (X1) on Iraq's imports from Saudi Arabia, units with a probability level of 0.0750. On the contrary, there was a negative impact of the COVID-19 index (X2) and in the short term as well, units with a probability level of 0.0583. Therefore, the validity of the second hypothesis has not been established.

The while the Third hypothesis suggested an influence the positive, of the US dollar interchange rate on Iraqi exports to Saudi Arabia. The result was that there is a significant and positive effect of the interchange rate of the US dollar, represented by (X3), on Iraqi exports (Y1) in the long and short term, at a probability level of 0.0276 in the short term, and at a probability level of 0.0552, in the long term. The third hypothesis was proven correct.

The fourth hypothesis suggested an influence, negative of the US dollar interchange rate on Iraqi imports from Saudi Arabia. The result showed that there is existence a significant and positive effect of the interchange rate of the US dollar, represented by (X3), on Iraqi imports (Y2) in the short and long term. When the interchange rate of the US dollar, Iraqi imports increase. units at a probability level of 0.0305 in the short term. In the long term, at a probability level of 0.0354. So, the validity of the fourth hypothesis has not been proven.

Table 21: Summary of Hypotheses

The Hypotheses	Statements	Supported and not Supporting the Hypotheses
H1	There is a negative effect of the COVID-19 on the volume of Iraqi exports to Saudi Arabia.	not Supported
H2	There is a negative effect of the COVID-19 on the volume of Iraqi imports from Saudi Arabia.	not Supported
H3	There is a positive relationship between the rise in the interchange rate of the dollar (the depreciation of the Iraqi dinar) and Iraqi exports to Saudi Arabia.	Supported
H4	There is an inverse relationship between the rise in the interchange rate of the dollar (the depreciation of the Iraqi dinar) and Iraqi imports from Saudi Arabia	not Supported

In sum, only the third hypothesis H3 was supported, while the first H1 , second H2 , and fourth H4 hypotheses, were not supported .

5. CONCLUSIONS AND DISCUSSIONS

This chapter, which is the fifth and final chapter of the study, presents a detailed presentation on the discussions on the results of the statistical analysis obtained by the present study, especially the four hypotheses formulated by this study. This chapter is divided into several sections, starting with discussions on the impact of the COVID-19 on Iraq's non-oil trade with Saudi Arabia, as well as discussions on the results of the impact of interchange rates on Iraq's non-oil trade with Saudi Arabia. Several recommendations were also included. The chapter concludes with the study's conclusion.

5.1. The Impact of the COVID-19 on Iraqi Exports to Saudi Arabia

The results showed no statistically significant impact of the COVID-19, including the dummy index and the lockdown index, on Iraqi exports to Saudi Arabia in the long and short term. These results are consistent with Rohmi et al. (2021), but differ from Purohit et al. (2022) and Ali (2021), who asserted that the COVID-19 had a significant impact on foreign trade, especially exports.

The findings of the present study deviate from most prior research outcomes. This discrepancy can be attributed to the reopening of the “Arar” border crossing connecting Iraq and Saudi Arabia in November 2020, during the initial stages of the pandemic's dissemination. Both the Iraqi and Saudi Arabian governments were steadfast in ensuring the success of this commercial conduit to enhance trade between the two nations. These governments collaborated to streamline procedures and eliminate any impediments that could hinder trade interchange (Hassan, 2021; Al-Sarhan, 2020). Throughout 2020, several meetings were convened between the two countries, including the third session of the Iraqi-Saudi Coordination Council in July 2020, which aimed to activate and implement economic agreements. Saudi Arabia, capitalising on the opportunity presented by the closure of the Iraqi border with Iran due to the, exhibited significant interest in expanding economic cooperation with both Iraq and Iran, thereby fostering a resurgence of their political ties through an economic gateway (Odeh, 2022). Another contributing factor is the devaluation of the Iraqi dinar against the US dollar by the Central Bank of Iraq towards the conclusion of 2020,

which had a positive impact on augmenting the volume of Iraqi non-oil exports (Al-Taweel & Rashid, 2021).

5.2. The Impact of the COVID-19 on Iraqi Imports from Saudi Arabia

For the impact of the COVID-19, including the dummy index and the lockdown index, on Iraqi imports from Saudi Arabia, the short-term results demonstrated a positive relationship between the first index of the pandemic and Iraqi imports from Saudi Arabia, and a negative relationship with the second index of the pandemic, which is related to the lockdown and severity measures. As for the long-term results, they showed no statistically significant impact of the pandemic on Iraqi imports from Saudi Arabia. These result are consistent with Rohmi et al (2021).

This empirical finding presents a different from established economic theories, and such incongruity can be attributed to several factors. One notable factor is Iraq's reliance on imported foreign goods and products, particularly indispensable commodities such as food (Alsaadi & Hameed, 2023). Despite the preventive measures implemented in Iraq, the authorities permitted the transportation of essential foodstuffs, basic commodities, and healthcare products across the country's governorates to ensure their availability to the population (Government of Iraq, 2020). Another influential factor is the reopening of the “Arar” border crossing connecting Iraq and Saudi Arabia in November 2020, coinciding with the initial year of the pandemic's global spread. The Iraqi and Saudi Arabian governments exhibited a strong commitment to the success of this commercial outlet, aiming to expand bilateral trade and fostering collaborative efforts to streamline processes and eliminate trade barriers (Al-Sarhan, 2020).

5.3. The Impact of the Interchange Rate on Iraqi Exports to Saudi Arabia

The results of the current study on the impact of the interchange rate on Iraqi exports to Saudi Arabia demonstrated a significant positive impact, indicating that an increase in the interchange rate of the US dollar (a decrease in the value of the Iraqi dinar) increases the volume of Iraqi exports to Saudi Arabia during the current study

period. This finding was based on the fact that the results of the previous study on the impact of the interchange rate on Iraqi exports to Saudi Arabia. This conclusion is compatible with economic theories, and it is also confirmed by prior investigations such as the ones conducted by Nyamrunda and Mbogela (2014) and by Jadoon and Guang (2019). All have emphasized the significance of the interchange rate and the role it plays in encouraging exports, and a great number of nations all over the world are actively seeking to lower the value of their national currency in order to boost their exports and reduce their imports.

5.4. The Impact of the Interchange Rate on Iraqi Imports from Saudi Arabia

A strong positive impact was found when the influence of the interchange rate was investigated on Iraq's imports from Saudi Arabia. This indicates that a rise in the interchange rate of the US dollar (a drop in the value of the Iraqi dinar) resulted in an increase in Iraq's imports from Saudi Arabia. The failure of the Iraqi production system to fulfil the local demand for goods and services, as well as Iraq's strong reliance on imported consumer and food commodities, which cannot be abandoned, are the reasons why these outcomes defy economic theories (Dadoosh, 2021). The Iraqi production system is weak because it cannot meet the local demand for goods and services. These findings are in contrast to those obtained by Bentabet and Souiah (2017), who found that a decline in the value of a nation's currency leads to a reduction in the quantity of goods the country imports into its territory.

5.5. Recommendations

Iraq and Saudi Arabia should establish trust and foster political and economic relations, while avoiding interference in each other's internal affairs. Iraq should invest in its economic and health infrastructure, develop an advanced electronic base, foster an electronic culture in society, and form specialized teams to face emergency situations such as war, epidemics, or natural disasters. This study recommends implementing a comprehensive economic reform program in Iraq, including building a sound economic structure for the country using the significant financial revenues from

oil exports, paying attention to small and medium enterprises, rebuilding factories and production facilities, and encouraging the national product to gradually reduce imports and lessen dependence on oil exports. Additionally, the Iraqi government should exploit its fertile agricultural land, develop modern agricultural methods and livestock projects to achieve self-sufficiency, and continue supporting the private sector, particularly companies operating in the production, industrial and agricultural fields. The Iraqi monetary authorities should not be affected by internal and external political pressures represented by international organizations, the first of which is (the International Monetary Fund). These authorities have to reduce the value of the Iraqi dinar as opposed to the dollar, but in a gradual and deliberate manner and without exaggeration in order to reduce imports and rely on national products and enter them into market competition. Iraq should reduce the deficit in its trade balance in its trade with Saudi Arabia.

5.6. Conclusion

The main aim of this study was to determine the extent of the impact of COVID-19 and the interchange rate on Iraqi non-oil trade with Saudi Arabia from the first quarter of 2017 to the fourth quarter of 2021. After identifying the study problem, four hypotheses were developed. The first hypothesis was the negative impact of COVID-19 on Iraqi exports to Saudi Arabia, and the second hypothesis was the negative impact of COVID-19 on Iraqi imports from Saudi Arabia. The third hypothesis was the positive impact of the US dollar interchange rate on Iraqi exports to Saudi Arabia, while the fourth hypothesis was the opposite impact of the US dollar interchange rate on Iraqi imports from Saudi Arabia. After conducting theoretical and descriptive analysis, this study used quantitative analysis by obtaining secondary data from the Central Statistical Organization, the Central Bank of Iraq, and the Knoema economic website. The statistical software EVIEWS 12 was used to analyzed the data and extract the results, relying on the Auto-Regressive Distributed Lag (ARDL) model with time gaps. The current study found several results, including the absence of a significant impact of COVID-19 on Iraqi exports in the short and long term. There was also no significant impact of COVID-19 on Iraqi imports in the long term, while in the short term, there was a significant negative relationship between the COVID-19

dummy index and Iraqi imports, and an inverse relationship with the lockdown index on Iraqi imports. Regarding the interchange rate, the results showed a significant positive impact of the US dollar interchange rate on Iraqi exports and imports in the short and long term. Finally, only the third hypothesis was supported, while the first, second, and fourth hypotheses were not supported due to the probability exceeding 5%. In conclusion, several recommendations were developed based on the study's findings.

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LIST OF TABLES

LIST OF FIGURES

APPENDİX A

OUTPUT OF EVİEWS

1- Augmented Dickey-Fuller test statistic

Null Hypothesis: X1 has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.754571	0.8091
Test critical values:	1% level	-3.831511	
	5% level	-3.029970	
	10% level	-2.655194	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 19

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(X1)
Method: Least Squares
Date: 12/25/22 Time: 22:32
Sample (adjusted): 2 20
Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1(-1)	-0.083333	0.110438	-0.754571	0.4608
C	0.083333	0.067033	1.243163	0.2307

R-squared	0.032407	Mean dependent var	0.052632
Adjusted R-squared	-0.024510	S.D. dependent var	0.229416
S.E. of regression	0.232210	Akaike info criterion	0.016953
Sum squared resid	0.916667	Schwarz criterion	0.116368
Log likelihood	1.838946	Hannan-Quinn criter.	0.033778
F-statistic	0.569378	Durbin-Watson stat	2.007576
Prob(F-statistic)	0.460832		

Null Hypothesis: D(X1) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.242641	0.0046
Test critical values:	1% level	-3.857386	
	5% level	-3.040391	
	10% level	-2.660551	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(X1,2)
Method: Least Squares
Date: 12/25/22 Time: 22:38
Sample (adjusted): 3 20
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(X1(-1))	-1.058824	0.249567	-4.242641	0.0006
C	0.058824	0.058824	1.000000	0.3322

R-squared	0.529412	Mean dependent var	0.000000
Adjusted R-squared	0.500000	S.D. dependent var	0.342997
S.E. of regression	0.242536	Akaike info criterion	0.109103
Sum squared resid	0.941176	Schwarz criterion	0.208033
Log likelihood	1.018074	Hannan-Quinn criter.	0.122744
F-statistic	18.00000	Durbin-Watson stat	2.007353
Prob(F-statistic)	0.000621		

Null Hypothesis: X2 has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.330940	0.9009
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20

observations
and may not be accurate for a sample size of 17

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(X2)
Method: Least Squares
Date: 12/25/22 Time: 22:46
Sample (adjusted): 4 20
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X2(-1)	-0.044049	0.133104	-0.330940	0.7460
D(X2(-1))	0.350436	0.238390	1.470013	0.1653
D(X2(-2))	-0.535778	0.252717	-2.120066	0.0538
C	0.061354	0.050882	1.205814	0.2494

R-squared	0.358011	Mean dependent var	0.041771
Adjusted R-squared	0.209859	S.D. dependent var	0.184695
S.E. of regression	0.164175	Akaike info criterion	-0.573447
Sum squared resid	0.350393	Schwarz criterion	-0.377397
Log likelihood	8.874299	Hannan-Quinn criter.	-0.553959
F-statistic	2.416520	Durbin-Watson stat	1.753020
Prob(F-statistic)	0.113177		

Null Hypothesis: D(X2) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.471688	0.0032
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 17

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(X2,2)
Method: Least Squares
Date: 12/25/22 Time: 22:46
Sample (adjusted): 4 20
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(X2(-1))	-1.243548	0.278094	-4.471688	0.0005
D(X2(-1),2)	0.571650	0.220911	2.587697	0.0215
C	0.051737	0.040417	1.280080	0.2213

R-squared	0.589166	Mean dependent var	-0.002894
Adjusted R-squared	0.530475	S.D. dependent var	0.231850
S.E. of regression	0.158868	Akaike info criterion	-0.682705
Sum squared resid	0.353345	Schwarz criterion	-0.535667
Log likelihood	8.802989	Hannan-Quinn criter.	-0.668089
F-statistic	10.03851	Durbin-Watson stat	1.766321
Prob(F-statistic)	0.001975		

Null Hypothesis: X3 has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.174031	0.9630
Test critical values:	1% level	-3.831511	
	5% level	-3.029970	
	10% level	-2.655194	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 19

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(X3)
Method: Least Squares
Date: 12/25/22 Time: 22:47
Sample (adjusted): 2 20
Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X3(-1)	0.019837	0.113984	0.174031	0.8639
C	-14.22000	144.4108	-0.098469	0.9227

R-squared	0.001778	Mean dependent var	10.84211
Adjusted R-squared	-0.056941	S.D. dependent var	45.60490
S.E. of regression	46.88531	Akaike info criterion	10.63259
Sum squared resid	37369.95	Schwarz criterion	10.73200
Log likelihood	-99.00957	Hannan-Quinn criter.	10.64941
F-statistic	0.030287	Durbin-Watson stat	1.414725
Prob(F-statistic)	0.863897		

Null Hypothesis: D(X3) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.913836	0.0061
Test critical values:	1% level	-2.699769	
	5% level	-1.961409	
	10% level	-1.606610	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(X3,2)
Method: Least Squares
Date: 12/25/22 Time: 23:00
Sample (adjusted): 3 20
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(X3(-1))	-0.659888	0.226467	-2.913836	0.0097

R-squared	0.332481	Mean dependent var	1.611111
Adjusted R-squared	0.332481	S.D. dependent var	55.18327
S.E. of regression	45.08573	Akaike info criterion	10.50896
Sum squared resid	34556.29	Schwarz criterion	10.55843
Log likelihood	-93.58065	Hannan-Quinn criter.	10.51578
Durbin-Watson stat	1.889789		

Null Hypothesis: Y1 has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.204271	0.9643
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 17

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(Y1)
Method: Least Squares
Date: 12/25/22 Time: 23:01
Sample (adjusted): 4 20
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Y1(-1)	0.121621	0.595391	0.204271	0.8413
D(Y1(-1))	-0.322374	0.474848	-0.678900	0.5091
D(Y1(-2))	-0.692292	0.373399	-1.854030	0.0866
C	40281.15	1556456.	0.025880	0.9797

R-squared	0.255802	Mean dependent var	303542.5
Adjusted R-squared	0.084065	S.D. dependent var	1496001.
S.E. of regression	1431740.	Akaike info criterion	31.38900
Sum squared resid	2.66E+13	Schwarz criterion	31.58505
Log likelihood	-262.8065	Hannan-Quinn criter.	31.40849
F-statistic	1.489493	Durbin-Watson stat	1.636667
Prob(F-statistic)	0.263591		

Null Hypothesis: D(Y1) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.829867	0.0112
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 17

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(Y1,2)
Method: Least Squares
Date: 12/25/22 Time: 23:01
Sample (adjusted): 4 20
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

D(Y1(-1))	-1.898474	0.495702	-3.829867	0.0018
D(Y1(-1),2)	0.649364	0.297895	2.179844	0.0468
C	349974.4	339894.2	1.029657	0.3206

R-squared	0.559109	Mean dependent var	114867.8
Adjusted R-squared	0.496125	S.D. dependent var	1946733.
S.E. of regression	1381872.	Akaike info criterion	31.27456
Sum squared resid	2.67E+13	Schwarz criterion	31.42160
Log likelihood	-262.8338	Hannan-Quinn criter.	31.28918
F-statistic	8.876955	Durbin-Watson stat	1.564978
Prob(F-statistic)	0.003238		

Null Hypothesis: Y2 has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.690457	0.0134
Test critical values:	1% level	-3.831511	
	5% level	-3.029970	
	10% level	-2.655194	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 19

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(Y2)
Method: Least Squares
Date: 12/25/22 Time: 23:10
Sample (adjusted): 2 20
Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Y2(-1)	-0.887808	0.240569	-3.690457	0.0018
C	2.21E+08	60229667	3.663069	0.0019

R-squared	0.444798	Mean dependent var	5494734.
Adjusted R-squared	0.412139	S.D. dependent var	86115539
S.E. of regression	66026602	Akaike info criterion	38.94831
Sum squared resid	7.41E+16	Schwarz criterion	39.04773
Log likelihood	-368.0090	Hannan-Quinn criter.	38.96514
F-statistic	13.61947	Durbin-Watson stat	1.988187
Prob(F-statistic)	0.001815		

Null Hypothesis: D(Y2) has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.817579	0.7823
Test critical values:	1% level	-4.004425	
	5% level	-3.098896	
	10% level	-2.690439	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 14

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(Y2,2)
Method: Least Squares
Date: 12/25/22 Time: 23:10
Sample (adjusted): 7 20
Included observations: 14 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(Y2(-1))	-0.733602	0.897286	-0.817579	0.4373
D(Y2(-1),2)	-0.499917	0.760780	-0.657111	0.5296
D(Y2(-2),2)	-0.840540	0.576797	-1.457254	0.1832
D(Y2(-3),2)	-0.847042	0.363777	-2.328463	0.0483
D(Y2(-4),2)	-0.246002	0.183289	-1.342151	0.2164
C	869591.3	12814973	0.067857	0.9476

R-squared	0.899760	Mean dependent var	8926558.
Adjusted R-squared	0.837110	S.D. dependent var	1.15E+08
S.E. of regression	46321029	Akaike info criterion	38.43762
Sum squared resid	1.72E+16	Schwarz criterion	38.71150
Log likelihood	-263.0633	Hannan-Quinn criter.	38.41226
F-statistic	14.36168	Durbin-Watson stat	1.176922
Prob(F-statistic)	0.000804		

Outpot of Export

Dependent Variable: LOGY1
Method: ARDL
Date: 12/26/22 Time: 00:05
Sample (adjusted): 3 20
Included observations: 18 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): X1 X2 X3
Fixed regressors: C
Number of models evalulated: 54
Selected Model: ARDL(2, 0, 0, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOGY1(-1)	0.147314	0.222739	0.661374	0.5233
LOGY1(-2)	-0.266100	0.226425	-1.175223	0.2671
X1	0.566520	0.576439	0.982794	0.3489
X2	-0.429830	0.814701	-0.527592	0.6093
X3	0.002452	0.002498	0.981552	0.3495
X3(-1)	-0.004943	0.003671	-1.346601	0.2078
X3(-2)	0.005851	0.002616	2.236172	0.0493
C	12.18902	4.799116	2.539847	0.0294

R-squared	0.619933	Mean dependent var	14.78772
Adjusted R-squared	0.353886	S.D. dependent var	0.491683
S.E. of regression	0.395221	Akaike info criterion	1.282359
Sum squared resid	1.561997	Schwarz criterion	1.678080
Log likelihood	-3.541235	Hannan-Quinn criter.	1.336924
F-statistic	2.330164	Durbin-Watson stat	1.968530
Prob(F-statistic)	0.108962		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LOGY1)
Selected Model: ARDL(2, 0, 0, 2)
Case 2: Restricted Constant and No Trend
Date: 12/26/22 Time: 00:06
Sample: 1 20
Included observations: 18

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.18902	4.799116	2.539847	0.0294
LOGY1(-1)*	-1.118786	0.323458	-3.458834	0.0061
X1**	0.566520	0.576439	0.982794	0.3489
X2**	-0.429830	0.814701	-0.527592	0.6093

X3(-1)	0.003359	0.001304	2.576537	0.0276
D(LOGY1(-1))	0.266100	0.226425	1.175223	0.2671
D(X3)	0.002452	0.002498	0.981552	0.3495
D(X3(-1))	-0.005851	0.002616	-2.236172	0.0493

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	0.506370	0.528107	0.958841	0.3602
X2	-0.384193	0.750442	-0.511956	0.6198
X3	0.003003	0.001384	2.169599	0.0552
C	10.89486	1.680785	6.482006	0.0001

EC = LOGY1 - (0.5064*X1 -0.3842*X2 + 0.0030*X3 + 10.8949)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	4.170532	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66
			Finite Sample:	
Actual Sample Size	18		n=35	
		10%	2.618	3.532
		5%	3.164	4.194
		1%	4.428	5.816
			Finite Sample:	
			n=30	
		10%	2.676	3.586
		5%	3.272	4.306
		1%	4.614	5.966

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	1.850225	Prob. F(2,8)	0.2185
Obs*R-squared	5.692781	Prob. Chi-Square(2)	0.0581

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 12/26/22 Time: 00:07
Sample: 3 20

Included observations: 18
Presample missing value lagged residuals set
to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGY1(-1)	0.186266	0.287958	0.646849	0.5358
LOGY1(-2)	0.412151	0.299614	1.375608	0.2062
X1	0.015518	0.533194	0.029103	0.9775
X2	-0.296847	0.775251	-0.382904	0.7118
X3	0.001038	0.002372	0.437421	0.6734
X3(-1)	-0.001816	0.003559	-0.510113	0.6237
X3(-2)	0.000651	0.002467	0.263714	0.7987
C	-8.517457	6.757758	-1.260397	0.2430
RESID(-1)	-0.185291	0.401218	-0.461819	0.6565
RESID(-2)	-0.833555	0.433362	-1.923462	0.0906

R-squared	0.316266	Mean dependent var	-4.64E-15
Adjusted R-squared	-0.452936	S.D. dependent var	0.303121
S.E. of regression	0.365375	Akaike info criterion	1.124396
Sum squared resid	1.067991	Schwarz criterion	1.619047
Log likelihood	-0.119564	Hannan-Quinn criter.	1.192602
F-statistic	0.411161	Durbin-Watson stat	2.078796
Prob(F-statistic)	0.896291		

Heteroskedasticity Test: ARCH

F-statistic	0.207150	Prob. F(1,15)	0.6555
Obs*R-squared	0.231572	Prob. Chi-Square(1)	0.6304

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 12/26/22 Time: 00:07
Sample (adjusted): 4 20
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.077596	0.047103	1.647362	0.1203
RESID^2(-1)	0.117522	0.258212	0.455137	0.6555

R-squared	0.013622	Mean dependent var	0.088341
Adjusted R-squared	-0.052137	S.D. dependent var	0.163835
S.E. of regression	0.168051	Akaike info criterion	-0.618963
Sum squared resid	0.423619	Schwarz criterion	-0.520938
Log likelihood	7.261187	Hannan-Quinn criter.	-0.609219
F-statistic	0.207150	Durbin-Watson stat	2.033694

Prob(F-statistic)	0.655529

Outpot of Imports

Dependent Variable: LOGY2
Method: ARDL
Date: 12/27/22 Time: 22:54
Sample (adjusted): 3 20
Included observations: 18 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): X1 X2 X3
Fixed regressors: C
Number of models evalulated: 54
Selected Model: ARDL(1, 2, 2, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOGY2(-1)	-0.148340	0.263817	-0.562283	0.5915
X1	4.860280	2.325472	2.090019	0.0750
X1(-1)	10.33202	5.428491	1.903296	0.0987
X1(-2)	2.449824	2.697492	0.908186	0.3940
X2	-17.72177	7.842170	-2.259805	0.0583
X2(-1)	0.544813	3.527999	0.154425	0.8816
X2(-2)	-9.718966	4.240003	-2.292207	0.0556
X3	0.007296	0.005333	1.367936	0.2136
X3(-1)	-0.009422	0.004002	-2.354456	0.0508
X3(-2)	0.009245	0.004703	1.965630	0.0901
C	13.48326	5.310039	2.539201	0.0387

R-squared	0.747729	Mean dependent var	19.29642
Adjusted R-squared	0.387343	S.D. dependent var	0.268370
S.E. of regression	0.210059	Akaike info criterion	-0.005091
Sum squared resid	0.308875	Schwarz criterion	0.539025
Log likelihood	11.04582	Hannan-Quinn criter.	0.069935
F-statistic	2.074798	Durbin-Watson stat	2.343067
Prob(F-statistic)	0.172477		

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LOGY2)
Selected Model: ARDL(1, 2, 2, 2)
Case 2: Restricted Constant and No Trend
Date: 12/27/22 Time: 22:55
Sample: 1 20
Included observations: 18

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	13.48326	5.310039	2.539201	0.0387
LOGY2(-1)*	-1.148340	0.263817	-4.352791	0.0033
X1(-1)	17.64213	10.03416	1.758208	0.1221
X2(-1)	-26.89593	14.21045	-1.892687	0.1003
X3(-1)	0.007119	0.002635	2.702081	0.0305
D(X1)	4.860280	2.325472	2.090019	0.0750
D(X1(-1))	-2.449824	2.697492	-0.908186	0.3940
D(X2)	-17.72177	7.842170	-2.259805	0.0583
D(X2(-1))	9.718966	4.240003	2.292207	0.0556
D(X3)	0.007296	0.005333	1.367936	0.2136
D(X3(-1))	-0.009245	0.004703	-1.965630	0.0901

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	15.36316	9.102925	1.687717	0.1353
X2	-23.42157	12.94470	-1.809356	0.1133
X3	0.006199	0.002385	2.599592	0.0354
C	11.74152	2.899397	4.049644	0.0049

EC = LOGY2 - (15.3632*X1 -23.4216*X2 + 0.0062*X3 + 11.7415)

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	4.554696	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66
			Finite Sample: n=35	
Actual Sample Size	18			
		10%	2.618	3.532
		5%	3.164	4.194
		1%	4.428	5.816
			Finite Sample: n=30	
		10%	2.676	3.586
		5%	3.272	4.306
		1%	4.614	5.966

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.482122	Prob. F(2,5)	0.6435
Obs*R-squared	2.910074	Prob. Chi-Square(2)	0.2334

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 12/27/22 Time: 22:55
Sample: 3 20
Included observations: 18
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGY2(-1)	0.139641	0.451677	0.309161	0.7697
X1	0.264356	2.603173	0.101551	0.9231
X1(-1)	0.908827	6.041651	0.150427	0.8863
X1(-2)	0.790929	3.035746	0.260538	0.8048
X2	-0.813748	8.816144	-0.092302	0.9300
X2(-1)	-1.110231	4.031429	-0.275394	0.7940
X2(-2)	-0.553350	4.731266	-0.116956	0.9114
X3	-0.001617	0.006430	-0.251532	0.8114
X3(-1)	0.000121	0.004642	0.026006	0.9803
X3(-2)	0.000950	0.005247	0.181079	0.8634
C	-2.050002	7.559599	-0.271179	0.7971
RESID(-1)	-0.407257	0.648698	-0.627807	0.5577
RESID(-2)	-0.313717	0.448860	-0.698919	0.5158

R-squared	0.161671	Mean dependent var	2.37E-15
Adjusted R-squared	-1.850319	S.D. dependent var	0.134793
S.E. of regression	0.227569	Akaike info criterion	0.040787
Sum squared resid	0.258939	Schwarz criterion	0.683833
Log likelihood	12.63292	Hannan-Quinn criter.	0.129454
F-statistic	0.080354	Durbin-Watson stat	2.276401
Prob(F-statistic)	0.999791		

Heteroskedasticity Test: ARCH

F-statistic	0.012961	Prob. F(1,15)	0.9109
Obs*R-squared	0.014676	Prob. Chi-Square(1)	0.9036

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 12/27/22 Time: 22:55
Sample (adjusted): 4 20

Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.018672	0.008827	2.115426	0.0515
RESID^2(-1)	-0.029260	0.257015	-0.113846	0.9109

R-squared	0.000863	Mean dependent var	0.018148
Adjusted R-squared	-0.065746	S.D. dependent var	0.030072
S.E. of regression	0.031045	Akaike info criterion	-3.996638
Sum squared resid	0.014457	Schwarz criterion	-3.898613
Log likelihood	35.97142	Hannan-Quinn criter.	-3.986894
F-statistic	0.012961	Durbin-Watson stat	1.948025
Prob(F-statistic)	0.910870		

RESUME

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