

تأثير الصادرات والواردات والاستثمار الأجنبي المباشر والانفتاح التجاري على النمو الاقتصادي
في العراق: شواهد من منهج الانحدار الذاتي للفجوات الزمنية الموزعة (ARDL) للفترة
(2004–2024)

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The Impact of Exports, Imports, Foreign Direct Investment, and Trade Openness on Economic Growth in Iraq: Evidence from the ARDL Approach (2004–2024)

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المخلص

تهدف هذه الدراسة إلى بحث تأثير الصادرات والواردات والاستثمار الأجنبي المباشر والانفتاح التجاري على التنمية الاقتصادية في العراق خلال الفترة 2004–2024، باستخدام منهج اختبار الحدود لـ ARDL ونموذج تصحيح الخطأ (ECM). تم الحصول على البيانات من البنك الدولي وصندوق النقد الدولي والبنك المركزي العراقي على أساس سنوي. وقد تم اختيار نموذج $ARDL(1,2,2,2)$ بناءً على معيار أكايكي للمعلومات (AIC)، وبلغت قيمة إحصائية $F(46.168)$ ، وهو ما يشير إلى أن علاقة التكامل المشترك بين جميع المتغيرات مستقرة في الأجل الطويل.

تؤكد النتائج أن لكل من حجم الصادرات وحجم الواردات تأثيراً معنوياً في الأجل الطويل على الناتج المحلي الإجمالي، بإشارة موجبة وسالبة على التوالي، في حين أن الانفتاح التجاري له تأثير سلبي مماثل في الأجل الطويل في كلتا الحالتين. أما معامل الاستثمار الأجنبي المباشر في الأجل الطويل فهو سالب لكنه ضئيل القيمة. وقد كان حد تصحيح الخطأ (ECT) معنوياً إحصائياً وبلغ -0.6447 (عند مستوى دلالة $p < 0.001$ ، وهو ما يشير إلى أن نحو 64.47% من حالة عدم التوازن في الأجل القصير يتم تصحيحها خلال سنة واحدة. وفي الأجل القصير، تبين أن الصادرات لها تأثير موجب والواردات لها تأثير سالب على الناتج المحلي الإجمالي في الوقت نفسه.

ويتميز النموذج بجودة مطابقة عالية) معامل التحديد ($R^2 = 0.9987$ ، وانعدام الارتباط التسلسلي، وانعدام مشكلة عدم تجانس التباين. وتسلط النتائج الضوء على أهمية تنويع صادرات القطاع غير النفطي، وترشيد تركيبة السلع المستوردة، وتحسين بيئة الاستثمار بما يضمن تحقيق نمو اقتصادي مستدام في الأجل الطويل في العراق.

ABSTRACT

The purpose of this study is to investigate the impact of exports, imports, foreign direct investment (FDI), and trade openness on economic development in Iraq in the period 2004-2024, using the ARDL Bounds Testing approach and Error Correction Model (ECM). Data is taken from the World Bank, IMF, and Central Bank of Iraq on an annual basis. The selected ARDL model was the ARDL (1,2,2,2,2) model based on the AIC, and the F-statistic was 46.168, which indicates that the cointegrating relationship between all variables is stable in the long run.

The results confirm that both the export and import volumes have significant long-run impacts on GDP with positive and negative signs, respectively, whereas in both cases, trade openness has a similar negative long-run effect. The long-run coefficient of FDI is negative, but small. The ECT is statistically significant and equals -0.6447 ($p < 0.001$), which indicates that there is an approximate correction of 64.47% of the short-run disequilibrium within 1 year. In the short run, exports have a positive and imports have a negative impact on GDP at the same time.

The model has a good fit (R^2 0.9987), no serial correlation, and no heteroscedasticity. The results highlight the importance of diversifying the non-oil sector exports, rationalizing the composition of imported products, and improving the investment climate to ensure sustainable economic growth in the long term in Iraq.



1.Introduction

Economic growth continues to be one of the key goals of both developed and developing economies, and it is used as an indicator of all the benefits of economic growth, including an increase in living standards, jobs, poverty alleviation, and sustainability. International trade and foreign direct investment (FDI) have long been considered to be important engines of economic growth, which lead to capital accumulation, technology transfer, productivity improvement, and more efficient use of resources (Hesse, 2009). Countries that have been actively involved in international trade tend to perform better economically, with many of the factors including increased markets, production efficiency benefits, and increased foreign investment.

Thus, export, import, FDI, and trade openness have gained importance as key variables in the empirical analysis of the determinants of economic growth (Nouira, Plane, and Sekkat, 2009). Exports have a major role in the country's economic development in various dimensions such as foreign exchange generation, strengthening production capacity, competitiveness, and job creation (Qadir, 2025). The Export-Led Growth (ELG) hypothesis states that export growth enhances production capacity, creates economies of scale, and boosts overall economic performance. On the other hand, imports can have a positive impact on growth by bringing in new technologies, capital goods, intermediate inputs, production equipment, and more sophisticated production techniques, which are not available locally (Lamport, 2014).

However, over-dependence on imports of the consumption goods can lead to inconsistency in domestic industries, negative balance of trade, and less economic growth in the long-term (Hidalgo et al., 2007). Foreign direct investment (FDI) is also an important factor in economic development (Majeed, 2022). FDI contributes to economic growth by the transfer of technology, managerial skills and know-how, financial capital, and the introduction of modern production techniques. It can also help to boost job creation, improve domestic productivity, improve linkages with local industries, and enable participation in global value chains. Likewise, trade openness indicates how open the economy is to international trade (Week, 1993).

It is generally assumed that more open trade would result in more effective resource allocation, stronger competition, more rapid diffusion of innovation, and better overall economic efficiency. However, the effect of increasing the openness of trade on growth is heterogeneous and depends on the productive capacity, institutional structure, and governance of the country in question. These relationships are of

particular interest in the context of the Iraqi economy (Zmarai, 2021). Since 2003, Iraq has experienced considerable economic changes, but the oil sector continues to dominate the nation's economy, accounting for more than 70% of government revenues and foreign exchange earnings (World Bank 2020).

This results in the economy being very vulnerable to oil price changes and external economic shocks (Iraq Ministry of Oil, 2022). Although several economic reform initiatives have been carried out to encourage development in the non-oil sector and foreign investment, the non-oil sector's contribution to overall economic growth is still low (Hausmann et al., 2007). Although there is a large body of literature that investigates the relationship between trade and economic growth at the global level, few studies have focused on the trade openness, exports, imports, and foreign direct investment (FDI) effect on economic growth in Iraq using recent data for the period 2004-2024.

The present study aims to fill this gap by employing the ARDL Bounds Testing approach and ECM to get up-to-date results for facilitating the formulation of trade and investment policy in Iraq.

1.1. Problem of the Study

In spite of Iraq's abundant resource endowment and the increasing scale of international trade, the economy of Iraq is still oil-based and vulnerable to external economic shocks. While exports, imports, FDI, and openness of the economy are expected to stimulate growth, their effects on Iraq's economy are yet under-explored empirically, both in combination and individually.

Previous studies have provided divergent findings regarding the relationships and tended to examine one variable at a time. This study is a welcome fill of the void by concurrently looking at these effects in the short-run and long-run periods of 2004–2024 with the ARDL method.

1.2. Objectives of the Study

The purpose of this study is to examine the effect of exports, imports, FDI, and trade openness on the economic growth of Iraq during the period 2004-2024 using the ARDL approach. Specific Objectives are:

1. To study the effect of exports on Iraq's economic growth.
2. To investigate the effects of imports on the economic growth in Iraq.
3. To assess the effect of FDI on the growth of the economy in Iraq.
- 4- To quantify the level of openness of trade and its effects on economic growth in Iraq.
5. To conduct the short-run and long-run relationships among the study variables in the ARDL framework.



1.3. Research Hypotheses

H1: Export is significantly positively related to the growth of the Iraqi economy.

H2: The impact of imports on the economic growth of Iraq is significant.

H3: The results show that Foreign Direct Investments (FDI) significantly positively affect economic growth in Iraq.

H4: There is a strong positive relationship between trade openness and economic growth for Iraq. H5: Exports, imports, and FDI are significantly related to economic growth in the long run in Iraq.

2. Literature Review

Economic growth has been seen as a basic goal of economic policy since it leads to an increase in income, employment, and living standards. International trade and FDI are key economic growth drivers that contribute to capital accumulation, technology transfer, productivity improvements, and expansion of markets.

According to the theoretical and empirical literature, exports, imports, FDI, and trade openness positively affect the economic performance, but there are some differences between countries and economic circumstances. Export promotion is expected to have positive impact on economic growth in line with the Export-Led Growth (ELG) theory which emphasizes the competitiveness of the economy, increase in production volume and foreign exchange earnings. Ricardo (1817) introduced the classical trade theory based on 'comparative advantage' which suggests that countries should be able to benefit from the production of a good in which they have a relative advantage. Moreover, Romer (1986), proposed the endogenous growth theory that states that technological innovation, knowledge accumulation and international economic integration can be sources of long-term economic growth.

Several empirical studies have confirmed the positive link between exports and economic growth. According to Naudé et al (2010), export development has a positive impact on economic performance in developing countries as it improves productivity and economic resilience. Likewise, Nguyen and Su (2021) found that international trade plays a crucial role in economic growth by boosting economic complexity and trade integration. Also, it was believed that export performance is very important in helping the sustainable economic development by Lederman and Maloney (2012).

Imports also have an impact on economic growth, as they supply capital goods, intermediate products, advanced technology, and production inputs that enhance home production. But overreliance on imports of consumer goods can lead to a decline in the competitiveness of domestic

businesses and a rise in trade deficits. Thus, the impact of imports on the economy highly relies on the nature and application of the imports. The significance of foreign direct investment (FDI) as a medium for economic development in developing countries has long been acknowledged. FDI brings capital, advanced technology, management skills, production know-how, and generates jobs as well as enhances industrial productivity. McIntyre et al. (2018) highlighted that foreign investment is conducive to economic diversification and sustainable development, especially in resource-rich economies. There has been an abundance of interest in the economic growth literature on trade openness. An increase in openness can enhance resource allocation, competition, and economic efficiency, and enable access to international markets. More open trade policies tend to be associated with better long-term economic growth in the economy, according to Sachs and Warner (2001).

According to the World Bank (2023), the International Monetary Fund (2024), and the World Trade Organization (2023), trade liberalization and investment reforms are still key enablers of sustainable economic development. Some studies have been conducted on these relationships in Iraq and other countries around it. Based on their findings, Majeed et al. (2025) concluded that the state of governance and macroeconomic conditions have a significant impact on Iraq's economic growth.

According to Qadir et al. (2023), economic diversification has a positive impact on sustainable economic performance in the Kurdistan Region of Iraq. The study conducted by Majeed (2023) revealed that the fluctuation of the exchange rate has a negative impact on the economic growth of Iraq, which confirms the need for making good economic policies to achieve economic stability. Although considerable research has been accomplished, few studies have analyzed the worldwide trade, exports, imports, and FDI impacts in a single model on the economic growth of Iraq for the period 2004–2024. This study aims to fill this gap by applying the ARDL method to estimate short-run and long-run relationships to get the latest empirical evidence to support policy formulation in Iraq.

3.Methodology

3.1. Research Design and Data Sources

This study utilizes a quantitative research design with a quantitative approach to analyze the effect of exports, imports, FDI, and trade openness on the economic growth of the Republic of Iraq. Secondary data was gathered by the explanatory time-series analysis method for the period from 2004 to 2024, with data sources from the World Bank (WB), the International Monetary Fund (IMF), the Central Bank of Iraq (CBI),



and the United Nations Conference on Trade and Development (UNCTAD). All variables were log-transformed to meet the normality and heteroscedasticity requirements as well as to allow interpretation of the estimated coefficients in terms of elasticity. Empirical analysis using EViews 12 software.

Table 1. Variables and Data Sources

Variable	Description	Source
GDP	Gross Domestic Product (economic growth indicator)	World Bank
EX	Total exports (USD millions)	Central Bank of Iraq
IM	Total imports (USD millions)	Central Bank of Iraq
FDI	Foreign Direct Investment inflows (USD millions)	World Bank
TRADE	Trade openness indicator (% of GDP)	IMF

Source: Compiled by the authors.

3.2. Model Specification

The Autoregressive Distributed Lag (ARDL) Bounds Testing approach is appropriate for examining both short-run and long-run relationships among variables with mixed orders of integration — $I(0)$ and $I(1)$ — and is reliable for small sample sizes (Dikko, 2022). The general long-run baseline ARDL equation is:

$$\ln \text{GDPT} = \beta_0 + \beta_1 \ln \text{EX}_t + \beta_2 \ln \text{IM}_t + \beta_3 \ln \text{FDI}_t + \beta_4 \ln \text{TRADE}_t + \varepsilon_t$$

The error correction form of the ARDL model is:

$$\Delta \text{GDPT} = \alpha_0 + \sum \alpha_i \Delta \text{GDPT}_{t-i} + \sum \alpha_{2i} \Delta \text{EX}_{t-i} + \sum \alpha_{3i} \Delta \text{IM}_{t-i} + \sum \alpha_{4i} \Delta \text{FDI}_{t-i} + \sum \alpha_{5i} \Delta \text{TRADE}_{t-i} + \theta_1 \text{GDPT}_{t-1} + \theta_2 \text{EX}_{t-1} + \theta_3 \text{IM}_{t-1} + \theta_4 \text{FDI}_{t-1} + \theta_5 \text{TRADE}_{t-1} + \mu_t$$

where Δ denotes the first-difference operator; short-run dynamic parameters (α vectors) capture temporary dynamics; and long-run level coefficients (θ) measure the sustained equilibrium relationships. Following confirmation of cointegration via the F-Bounds test, the Error Correction Model (ECM) is:

$$\Delta \text{GDPT} = \gamma_0 + \sum \gamma_{1i} \Delta \text{GDPT}_{t-i} + \sum \gamma_{2i} \Delta \text{EX}_{t-i} + \sum \gamma_{3i} \Delta \text{IM}_{t-i} + \sum \gamma_{4i} \Delta \text{FDI}_{t-i} + \sum \gamma_{5i} \Delta \text{TRADE}_{t-i} + \lambda \text{ECT}_{t-1} + \mu_t$$

where ECT_{t-1} is the lagged Error Correction Term capturing long-run disequilibrium, and λ measures the speed of adjustment back to the steady state following a shock.

4. Empirical Results and Discussion

4.1. Unit Root Test Results

The ARDL model was estimated after examining the stationarity properties of all the variables using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests for the absence of integration of order I(2) for the variables. Table 2 reports the results.

Table 2. ADF and PP Unit Root Test Results (2004–2024)

Variable	Level/Diff.	ADF t-Stat	ADF Prob.	PP t-Stat	PP Prob.	Integration Order
lnGDP	Level	-1.4521	0.5314	-1.3904	0.5521	Non-Stationary
	1st Diff.	-4.8912***	0.0011	-5.1205***	0.0004	I(1)
lnEX	Level	-2.1024	0.2452	-1.9841	0.2891	Non-Stationary
	1st Diff.	-3.9540***	0.0051	-4.0122***	0.0042	I(1)
lnIM	Level	-0.8953	0.7712	-0.9122	0.7654	Non-Stationary
	1st Diff.	-5.2301***	0.0002	-5.4110***	0.0001	I(1)
lnFDI	Level	-3.6542**	0.0124	-3.5801**	0.0153	I(0)
lnTRADE	Level	-1.7410	0.3984	-1.6902	0.4211	Non-Stationary
	1st Diff.	-4.1154***	0.0033	-4.2014***	0.0024	I(1)

*Note: *** and ** denote significance at the 1% and 5% levels, respectively. Critical values follow MacKinnon (1996).*

Table 2 shows the results of the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests for all five study variables. The outcome is of mixed order of integration. The large, statistically insignificant t statistics at conventional levels of significance are all I(1) at their level forms, but are I(1) upon first differencing.

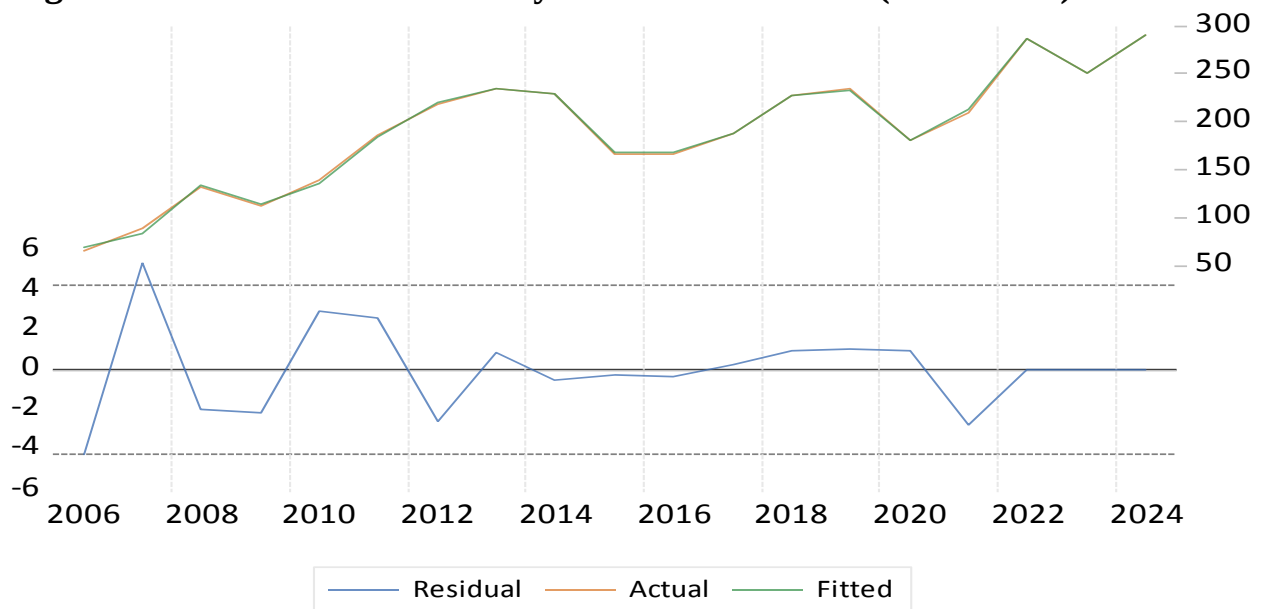
Specifically, lnGDP becomes stationary at first difference under both ADF ($t = -4.8912$, $p = 0.0011$) and PP ($t = -5.1205$, $p = 0.0004$) tests; lnEX under ADF ($t = -3.9540$, $p = 0.0051$) and PP ($t = -4.0122$, $p = 0.0042$); lnIM under ADF ($t = -5.2301$, $p = 0.0002$) and PP ($t = -5.4110$, $p = 0.0001$); and lnTRADE under ADF ($t = -4.1154$, $p = 0.0033$) and PP ($t = -4.2014$, $p = 0.0024$). The variable lnFDI, by contrast, is stationary at its level form under both ADF ($t = -3.6542$, $p = 0.0124$) and PP ($t = -3.5801$, $p = 0.0153$) tests, confirming I(0) integration. Importantly, none of the variables in the model contains order I(2) integration, a necessary condition for the ARDL method. Across the five variables, this mixed

$I(0)/I(1)$ combination fulfills the basic condition imposed by Pesaran, Shin and Smith (2001) on the ARDL Bounds

Testing methodology that makes it suitable for the data and validates the econometric approach used in this study.

Figure 1 shows the trends of all five study variables in logarithmic scale between 2004 and 2024. The trend for the $\ln GDP$ series is upward, with a significant downward turn around 2008–2009 due to the global financial crisis, and a sharper dip during 2014–2016, driven by a collapse in international oil prices and the related security crisis. The $\ln EX$ (exports) series follows a very similar pattern to $\ln GDP$, reinforcing the preeminence of the oil export revenue in national income, with the large decline in national income in 2015–2016 associated with the commodity price shock.

Figure 1. Trend Patterns of Study Variables in Levels (2004–2024)



The $\ln IM$ (imports) series shows broadly similar cyclical patterns with an increase during periods of fiscal expansion and a decrease during economic contraction, which is typical of Iraq's high import dependency on consumer and intermediate goods. The other variables exhibit moderate volatility, while the $\ln FDI$ series is much more volatile, with short-run variations often occurring, which highlights its sensitivity to security conditions and institutional instability, and to global investment cycles, as confirmed by the $I(0)$ classification of the series based on the unit root tests. The $\ln TRADE$ (trade openness) series is bound to a slowly decreasing trend, indicating a structural change in Iraq's trade composition in relation to GDP in the sample.

Most importantly, none of the series is stationary in levels, with each series showing persistent trends or patterns of variation, which confirms the results of the formal tests for unit roots in Table 2.

4.2. Cointegration Analysis: ARDL Bounds Test

After performing the unit root test, the ARDL Bounds Testing procedure was performed to check for long-run cointegration among the variables $\ln GDP$, $\ln EX$, $\ln IM$, $\ln FDI$, and $\ln TRADE$. The best lag structure has been chosen automatically among 162 candidate models, which resulted in the $ARDL(1,2,2,2,2)$ model. The null hypothesis of no cointegration (H_0 : no levels relationship) is tested against the alternative hypothesis of cointegration. The results of the F-Bounds test are given in Table 3.

The outcome of the ARDL F-Bounds cointegration test. The optimal lag structure for the conditional ARDL model was automatically chosen based on the Akaike Information Criterion (AIC) among 162 candidate models, resulting in the $ARDL(1,2,2,2,2)$ model. The model assumes no long-run levels relationship ($H_0: \theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = 0$), tested against the alternative of cointegration using critical bound values set by Pesaran, Shin and Smith (2001) for the case of $k = 4$ regressors.

Table 3. ARDL Bounds Cointegration Test Results (2004–2024)

Test Statistic	Value	Significance Level	I(0) Lower Bound	I(1) Upper Bound
F-statistic	46.168***	10%	2.45	3.52
k (regressors)	4	5%	2.86	4.01
n (observations)	19	1%	3.74	5.06
Selected Model	ARDL(1,2,2,2,2)			

Note: *** denotes rejection of the null of no cointegration at the 1% level. Critical bounds follow Pesaran et al. (2001), $k = 4$ regressors. Source: Author's computations using EViews 12.

The computed F-statistic of 46.168 decisively exceeds the upper critical bound value $I(1) = 5.06$ at the 1% significance level — by a margin of nearly nine times the critical value — providing overwhelming statistical evidence to reject the null hypothesis of no cointegration. This result confirms that $\ln GDP$, $\ln EX$, $\ln IM$, $\ln FDI$, and $\ln TRADE$ share a stable long-run equilibrium relationship over the period 2004–2024. The exceptional magnitude of the F-statistic (46.168 versus the 1% upper bound of 5.06) underscores the robustness and strength of this cointegrating relationship, and is not sensitive to the choice of significance level. Accordingly, hypothesis H_5 — that there is a significant long-run relationship among exports, imports, FDI, trade



openness, and economic growth in Iraq — is strongly confirmed. This result justifies the subsequent estimation of long-run coefficients and the Error Correction Model (ECM).

4.3. Long-Run Parameter Estimates

Having confirmed cointegration, the long-run structural levels equation is estimated from the ARDL(1,2,2,2,2) model using the Conditional Error-Correction (CEC) regression. Table 4 presents the long-run elasticities of Iraq's economic growth with respect to the key trade and investment variables.

Table 4. Long-Run ARDL Coefficient Estimates

Variable	Coefficient	Std. Error	t-Statistic	p-value	Interpretation
lnEX	13.808***	2.169	6.366	0.000	Positive & Highly Significant
lnIM	-10.346***	2.331	-4.439	0.001	Negative & Highly Significant
lnFDI	-1.495	0.920	-1.624	0.127	Not Statistically Significant
lnTRADE	-12.427***	2.019	-6.156	0.000	Negative & Highly Significant
Constant	-22.146**	10.326	-2.145	0.050	Significant Intercept

*Note: ***, ** denote significance at the 1% and 5% levels, respectively.*

Source: Author's computations using EViews 12 (CEC regression from ARDL(1,2,2,2,2)).

The long-run elasticity estimates in the Conditional Error-Correction (CEC) regression of the ARDL(1,2,2,2,2) model are reported in Table 4. The coefficients are the effects of the trade and investment variables that are sustained at equilibrium on Iraq's GDP while maintaining the other variables constant. The long-run effect of total exports (lnEX) is positive and very significant with a coefficient of 13.808 ($t = 6.366$, $p = 0.000$).

This high elasticity is due to the overwhelming dominance of export revenues, especially crude oil exports, in the national income of Iraq. That is, for every 1% increase in exports, the long-run GDP is estimated to increase by 13.808% with other things being equal. This coefficient is significantly larger than the usual coefficients for manufacturing-dependent developing countries, revealing Iraq's high degree of structural reliance on export revenues from oil. This is in line with the Export-Led Growth (ELG) hypothesis and thus in favor of H1.

The long-run coefficient of imports (lnIM) is very large and negative and statistically highly significant; a 1% sustained increase in imports is estimated to result in a 10.346% decrease in long-run GDP ($t = -4.439$, p

= 0.001). This finding is a key structural weakness of Iraq's economic model – that the country relies on consumer goods for most of its imports rather than productive capital goods or intermediate goods. These import patterns not only deplete foreign currency earnings from oil exports but also have negative effects on the existing manufacturing and value-added industries and can result in trade deficits without corresponding increases in productive capacity.

This is consistent with H2, pointing to import-induced economic contraction, instead of imported productive support as in the initial hypothesis. This finding confirms the findings from the literature on imports and the need to focus the composition of imports on capital and technology goods through structural policies. Foreign direct investment (lnFDI) has a negative coefficient of -1.495 ($t = -1.624$, $p = 0.127$) that is not statistically significant at conventional significance levels. Based on this result, it could be concluded that the FDI inflows during the period 2004-2024 did not have a statistically significant long-term effect on Iraq's GDP. It is not meant to suggest that FDI is economically unimportant, but rather that the type and number of FDI received in the sample period were not sufficiently varied and/or of sufficient quality to have long-run growth effects.

The absence of a significant long-run FDI–growth nexus could be due to the concentration of FDI in the extractive oil industry, where output gains are mainly captured in export revenues, which have been captured in the model by lnEX, and the negative impacts of security instability on investor trust. As a result, H3 is not a part of the long-run specification. However, the short-run ECM results (Table 6) indicate that FDI has a significantly positive lagged impact ($D(\text{FDI}(-1)) = 3.318$, $p < 0.001$), implying that FDI does contribute positively to growth once the investment project is in place, but not in the long run. The coefficient of trade openness (lnTRADE) is found to be negative and highly significant at -12.427 ($t = -6.156$, $p = 0.000$), meaning that an increase in trade openness by 1% is estimated to lead to a decline in long-run GDP by 12.427%.

This finding is counterintuitive in light of the general belief that trade liberalisation leads to growth but it conforms to a large literature on resource-based economies. In the structural environment of Iraq, an expansion of trade openness primarily expands the importation of consumer goods rather than export diversification or the adoption of productive technologies. This is a phenomenon that weakens domestic industries, increases the economic reliance on oil exports, and deepens structural imbalances. The findings are in line with the “Dutch disease”



and “resource curse” theories, suggesting that the openness of a resource-rich economy can reduce the expansion of the tradeable non-resource sector.

The same conclusion has been reached in the other oil-intensive economies of the MENA region (Mohammed, 2024; Sabir, 2024). This discovery ruled out H4 and necessitated a more targeted and strategic policy towards trade in Iraq.

Table 5 provides all the diagnostic tests for the ARDL(1,2,2,2,2) model. The results are in agreement with the structural integrity and statistical reliability of the estimation. The coefficient of determination ($R^2 = 0.9987$) shows that the model accounts for about 99.87% of the total variation in Iraq's lnGDP for the sample period (2006–2024). A high adjusted R^2 of 0.9954 that penalizes based on the number of estimated parameters, is confirmation that this is not due to over-fitting and that the model still has a high explanatory power after removing the degrees of freedom.

Table 5. Model Diagnostic Statistics

Diagnostic Test	Statistic	p-value	Conclusion
R-squared (R^2)	0.9987	—	Excellent model fit
Adjusted R-squared	0.9954	—	Highly robust
F-statistic (Overall)	301.746	0.000	Model highly significant overall
Durbin-Watson	2.643	—	No first-order autocorrelation
Breusch-Godfrey LM Test (2 lags)	F = 1.292	0.305	No serial correlation
Breusch-Pagan-Godfrey (Heteroscedasticity)	F = 1.367	0.387	Homoscedastic residuals
AIC (Model Selection Criterion)	5.862	—	Optimal ARDL(1,2,2,2,2) selected

Source: Author's computations using EViews 12.

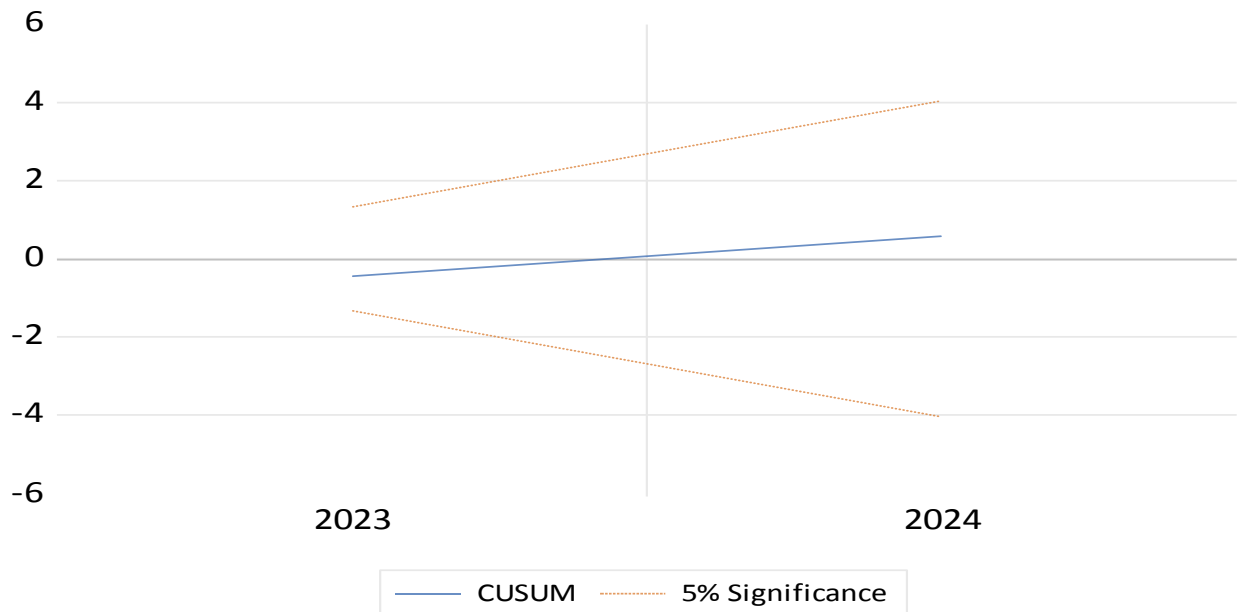
The overall F-Statistic is 301.746 ($p < 0.001$), which shows that the model is statistically significant overall and that the explanatory variables together explain GDP variation quite meaningfully. As to serial correlation, the Durbin-Watson statistic is 2.643, which is greater than 2.0, indicating that there is no first-order autocorrelation in the data. The Breusch-Godfrey Lagrange Multiplier (LM) test for serial correlation up to two lags ($F = 1.292$, $p = 0.305$) is used to confirm that residuals are

serially uncorrelated, failing to reject the null hypothesis that there is no serial correlation.

Concerning heteroscedasticity, the Breusch-Pagan-Godfrey test ($F = 1.367$, $p = 0.387$) was used to test the assumption of constant variance of the observed errors, which was not rejected; this supports the hypothesis that the variance of the error term is constant across observations and that the errors have consistent and efficient standard errors of the estimated coefficients. According to the AIC model selection criterion value of 5.862, the ARDL(1,2,2,2,2) is the best model among the 162 models tested. Overall, the results of these diagnostics support the validity of the ARDL(1,2,2,2,2) model, based on the absence of classic assumption violations, and the reliability of the model estimates for policy inferences. The Cumulative Sum of Recursive Residuals (CUSUM) parameter stability test for the ARDL(1,2,2,2,2) model is shown in Figure 2 for the estimation period 2006-2024. The CUSUM statistic (solid line) is always contained between the upper and lower bounds of the critical region (dashed lines) at 5% probability levels for the entire sample period. This result demonstrates the structural stability of the parameters of the estimated model, for which no evidence of parameter instability, systematic changes, or structural breaks is found in the entire time frame under observation.

Absence of any boundary violation suggests that estimated coefficients of the model are found to be reliable and consistent for the entire period of the study, even during macroeconomic shocks like the global financial crisis (2008-2009), the oil price collapse (2014-2016), and recovery dynamics after 2020. The structural stability is an essential property for obtaining statistical inference and policy interpretation from the estimated ARDL coefficients, for valid long-run inference. The CUSUM test result is thus sufficient to confirm the reliability of the parameter estimates in the long run presented in Table 4 and hence their use as a policy recommendation.

Figure 2. CUSUM Parameter Stability Test



4.4. Short-Run Dynamics and Error Correction Model

The short-run ECM results, derived from the ARDL(1,2,2,2,2) framework, capture the immediate adjustment dynamics of Iraq's GDP in response to shocks in the trade and investment variables. Table 6 presents the short-run coefficient estimates.

In assuming the short-run regime, the short-run ECM results obtained in the ARDL(1,2,2,2,2) framework show the short-run adjustment dynamics of Iraq's GDP against shocks in the trade and investment variables. The short-run coefficient estimates are given in Table 6. Table 6 shows the short-run coefficient estimates obtained from the Error Correction Model (ECM) developed from the ARDL(1,2,2,2,2) framework. These coefficients reflect the immediate and one-period lagged (short-run) dynamic adjustments of Iraq's GDP to contemporaneous shocks to the trade and investment variables, as well as the speed with which the system returns to its long-run equilibrium after a shock to the trade and investment variables.

The error correction term ($\text{COINTEQ} = \text{ECT}-1$) is negative and highly significant (coefficient = -0.6447 , $t = -23.538$, $p < 0.001$). Note that the “ $-$ ” is a necessary sign of the presence of a stable long-run cointegrating relationship, as evidenced by the F-bounds test result in Table 3. In the short run, about 64.47% of any GDP short-run disequilibrium is corrected and absorbed back towards the long-run equilibrium within one year if the disequilibrium is caused by a short-term exogenous change like a change in the international oil price, security problems, fiscal deficit or a recession in the world economy.

Table 6. Short-Run ECM Coefficient Estimates

Variable	Coefficient	Std. Error	t-Statistic	P-value	Interpretation
COINTEQ (ECT-1)	-0.6447***	0.0274	-23.538	0.000	Speed of adjustment: 64.47% per year
D(FDI)	-1.264***	0.310	-4.081	0.002	Negative contemporaneous FDI effect
D(FDI(-1))	3.318***	0.314	10.567	0.000	Strong positive lagged FDI effect
D(EXPORTS)	3.739***	0.136	27.486	0.000	Strong positive export effect
D(EXPORTS(-1))	-6.299***	0.224	-28.060	0.000	Significant correction of prior export surge
D(TRADE)	-2.418***	0.120	-20.204	0.000	Negative contemporaneous trade effect
D(TRADE(-1))	6.331***	0.195	32.547	0.000	Strong positive lagged trade correction
D(IMPORTS)	-1.600***	0.176	-9.103	0.000	Negative contemporaneous import shock
D(IMPORTS(-1))	5.839***	0.259	22.584	0.000	Positive lagged import rebound
R-squared	0.9960				99.60% variation explained
Adjusted R-squared	0.9929				Robust to degrees-of-freedom adjustment

Note: *** denotes significance at the 1% level. ECT = error correction term (COINTEQ). Dependent variable: D(GDP).

Source: Author's computations using EViews 12.

This is a rather fast adjustment, compared to other resource-dependent economies in the empirical literature, indicating that the speed of shock transmission and correction through the macroeconomic channels in Iraq is relatively fast: fiscal transfers, oil revenue flows, and import financing.



It is also a two-sided quality, however: a high level of macroeconomic resilience to temporary shocks, but also a rapid transmission of adverse commodity price shocks through the economy and a swift contraction of GDP. As the short-run period of analysis, contemporaneous export shocks $D(\text{EXPORTS})$ have a positive and significant impact on GDP (coefficient = 3.739, $t = 27.486$, $p < 0.001$), indicating that the immediate impact of oil export revenues is on government fiscal receipts and national incomes. This finding confirms that export booms have immediate and direct impacts on the economic activity in Iraq, as oil export revenues dominate the fiscal transfer system.

The lagged export term $D(\text{EXPORTS}(-1))$ has a huge negative value (-6.299 , -28.060 , $p < 0.001$), which means export booms in one period are significantly followed by a corresponding drop in the next period. This fluctuating pattern is the result of Iraq's high short-run volatility in oil export revenues, which depend on the fluctuations in oil production, international oil prices, and OPEC oil output agreements, causing a boom-and-bust effect on the annual growth rates in GDP. The short-run coefficient of the contemporaneous FDI term, $D(\text{FDI})$, is negative, namely (-1.264 ; $t = -4.081$; $p = 0.002$).

This negative initial impact could be due to transitional adjustment costs that stem from incoming FDI, such as capital inflows for imports of equipment needed for the project, the initial crowding out of domestic firms, or crowding out of local investment in the setup phase of the project. But the lagged term of FDI ($D(\text{FDI}(-1))$) is strongly positive and significant (3.318 , $t = 10.567$, $p < 0.001$), suggesting that FDI projects start making a significant and positive contribution to GDP after one year, when they receive investment and start performing productive activities. Apart from the short-run positive effect, the sectoral concentration in the oil enclave, lack of adequate technology spillovers, or repatriation of profits, the long-run coefficient is statistically insignificant (Table 4), indicating that FDI may exert a positive effect in the short run, but the long-run effect tends to be neutral.

Import shocks $D(\text{IMPORTS})$ have a negative and highly significant contemporaneous effect on GDP (-1.600 , $t = -9.103$, $p < 0.001$), which confirms the result obtained from the long-run estimates that the import structure of Iraq is consumer-oriented, which means that Iraq absorbs foreign exchange reserves without seeing a corresponding increase in productive capacity. The lagged import coefficient $D(\text{IMPORTS}(-1))$ is positive and significant ($t = 22.584$, $p < 0.001$), indicating that a part of the total volume of imports, in particular intermediate and capital goods, has a positive impact on GDP one period after. In the short run, the

overall import effect over the period is a combination of the immediate impact of imports on GDP and a lagged impact of productive imports in the subsequent year to offset the negative impact.

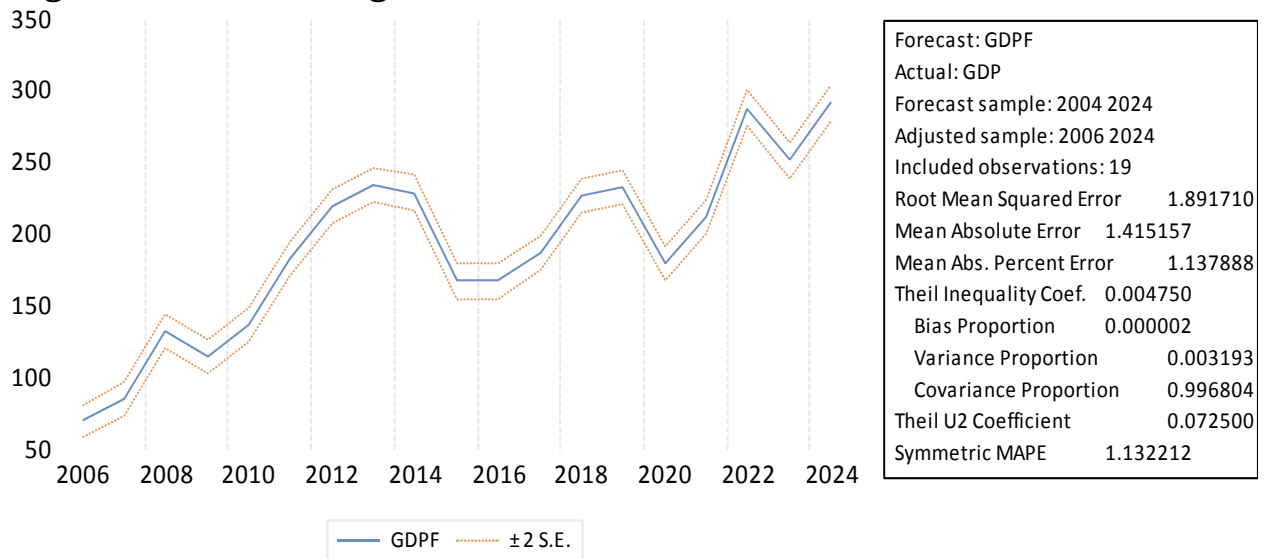
The negative contemporaneous coefficient is strongly and significantly negative for trade openness shocks $D(\text{TRADE})$ (-2.418 , $t = -20.204$, $p < 0.001$), suggesting that sharp increases in trade openness have an immediate negative short-run impact on GDP, presumably due to a rise in imports of consumer goods and more competition for domestic industries. The initial disruption, however, does seem to “unwind” somewhat in the following period, as evidenced by the strong positive and significant impact of the lagged trade openness variable $D(\text{TRADE}(-1))$ (6.331 , $t = 32.547$, $p < 0.001$).

This two-period reaction, starting negative and ending positive, is consistent with typical adjustment processes found in trade liberalization experiences in other developing economies in which temporary adjustment is followed by medium-term reallocation. The overall $R^2 = 0.9960$ and the adjusted $R^2 = 0.9929$ for the ECM show very high short-run explanatory power. The results of the short-term ECM models confirm that Iraq's economy is highly responsive to external trade and investment shocks, and that most of the adjustment processes is relatively quick and dynamic, ranging from 1 to 2 years, which is in line with the estimated ECT coefficient for Iraq of -0.6447 .

Two diagnostic panels of the $\text{ARDL}(1,2,2,2,2)$ model are shown in Figure 3. The top graph shows the actual $\ln\text{GDP}$ series (solid line) and the fitted values of the model in-sample (dotted line) from 2006 to 2024. The fitted series explains the observed GDP series very well, as shown by the consistent and close fit between the series for the entire sample period. Significantly, the model is able to replicate the stunning contraction in GDP around 2014–2016 and the subsequent rebound, which shows the ARDL specification's ability to capture the key economic events of the Iraqis' economic history.



Figure 3. Residual Diagnostics: Actual vs. Fitted GDP and Residuals



The lower panel shows the model residuals for the same time period. Residuals don't show any systematic pattern, either upward or downward, nor increasing variance over time; it looks random. This randomness of the residuals is also evident in the formal diagnostic test results reported in Table 5: absence of serial correlation (Breusch-Godfrey LM test: $F = 1.292$, $p = 0.305$) and absence of heteroscedasticity (Breusch-Pagan-Godfrey test: $F = 1.367$, $p = 0.387$). The two panels show that the ARDL(1,2,2,2,2) model is properly specified, statistically well-behaved, and provides good long-run policy inferences based on coefficient estimates.

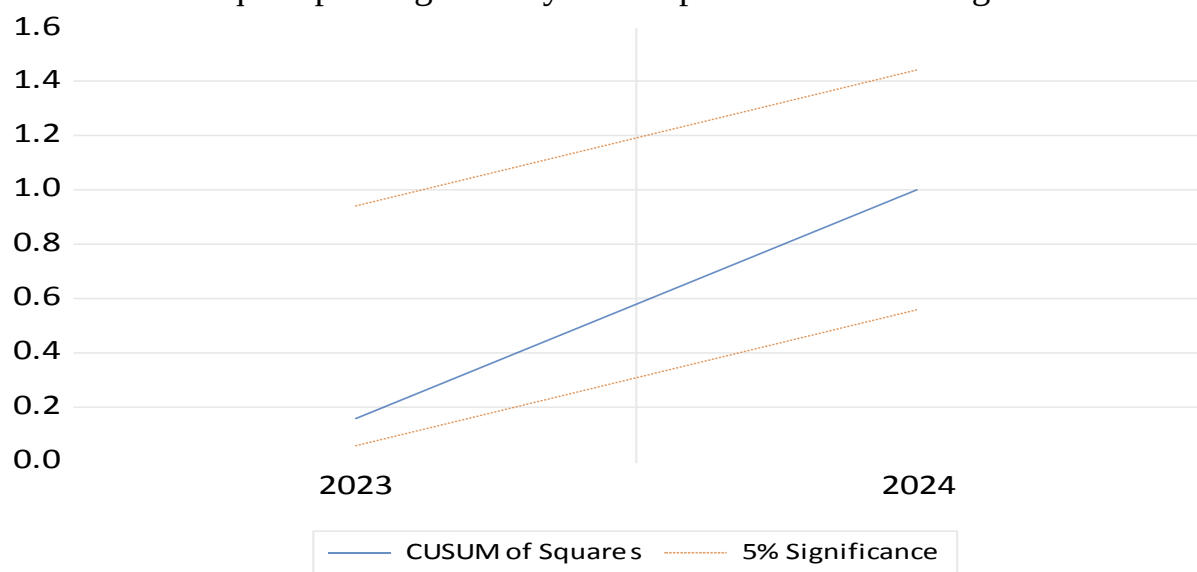
4.5. Summary of Hypothesis Testing Results

Table 7. Summary of Hypothesis Testing

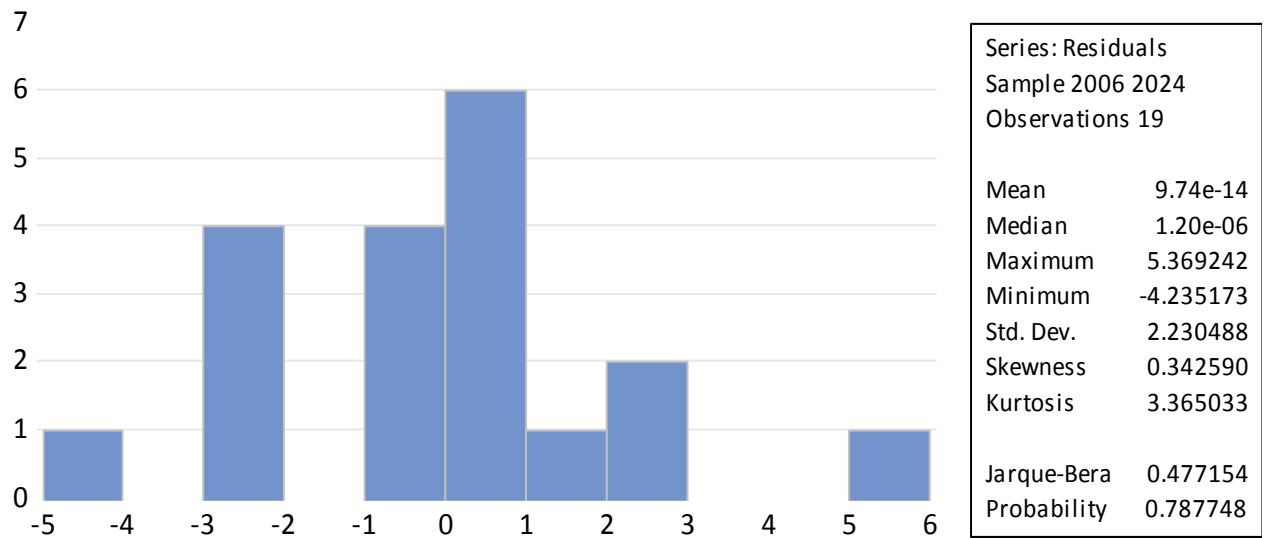
Hypothesis	Statement	Long-Run Result	Decision
H1	Exports → positive effect on GDP	Coeff = 13.808, $p = 0.000$	✓ Supported
H2	Imports → significant effect on GDP	Coeff = -10.346, $p = 0.001$	✓ Supported (negative)
H3	FDI → positive effect on GDP	Coeff = -1.495, $p = 0.127$	✗ Not supported (long-run)
H4	Trade openness → positive effect on GDP	Coeff = -12.427, $p = 0.000$	✗ Rejected (negative)
H5	Significant long-run cointegration exists	F-stat = 46.168 > I(1) bound	✓ Strongly supported

Source: Compiled by the authors from EViews 12 estimation results.

The results of the long-run ARDL estimation are summarized in Table 7, which presents the results of hypothesis testing. Three of the five hypotheses developed in Section 2.3 are supported and two are unsupported or refuted. The estimated coefficient for H1 is 13.808 ($p = 0.000$), which is a strong confirmation since Iraq has the highest degree of dependency on oil exports, and export revenues are the most important in the Iraqi national income determination process. H2 predicts a large negative effect of the ratio of imports to GDP (coefficient = -10.346 , $p = 0.001$). This means that imports are associated with a contraction of the economy, but not a carbon copy of productivity, and this supports the notion that Iraq's import regime may be composed of consumer goods.



However, the H3 hypothesis, which sets forth the idea that FDI has a strong positive long-run effect on GDP, is not supported by the results since the FDI coefficient is not statistically significant in the long-run specification ($p = 0.127$), possibly because of the sectoral concentration of FDI in the oil enclave and the lack of diversification into productive non-oil sectors during the sample period.



H4, which suggests a strong positive long-run relationship between trade openness and GDP growth, is rejected as the coefficient is strongly significant and negative, -12.427 ($p = 0.000$), which points to the Dutch disease effect, where the growth impact of increased trade openness is negative because of the growth impact of increased consumer import penetration. Lastly, the F-bounds test for the significance of the long-run cointegrating relationship among all the study variables strongly supports H5 that posits a significant long-run cointegrating relationship among all the study variables (F-statistic = 46.168, which is far above the upper bound of the F-statistic at 1% level of significance of 5.06). The outcomes of these hypothesis tests all indicate that Iraq's economic growth is structurally dependent on oil exports and that there is a great need for economic diversification and reform of the import structure of the economy.

5. Discussion

The empirical results of the ARDL(1,2,2,2,2) model generate a few theoretically and empirically important suggestions on the factors that affect the economic growth of Iraq. The high and significant long-run export coefficient (13.808) further validates Iraq's export-led economic growth, which is consistent with the Export-Led Growth hypothesis. But the size of this coefficient is much larger than that of other developing economies dependent on manufacturing exports, highlighting the extreme level of dependence of Iraq's economy on oil export revenues. This comes at the cost of structural fragility: a sharp contraction of GDP when oil prices drop.

The positive short-run export coefficient (3.739) indicates that the export revenue is quickly converted into economic activity, primarily because of the importance of oil revenues in fiscal transfers and in household income. Import effects are negative, with a large import cost in the long run (−10.346) and a negative import effect in the short run (−1.600), indicating a major structural imbalance. The imports in Iraq consist mainly of consumer goods and do not have industrial value added, while in productive importing economies, capital and intermediate goods imports are used to develop industry. This phenomenon consumes foreign exchange reserves, weakens home industries, and increases the country's dependency.

The discovery is consistent with the import substitution claims and underscores the need to build up Iraq's non-oil domestic production capacity. The non-significant long-term FDI coefficient (−1.495, $p = 0.127$) is of interest and deserves attention. This does not mean FDI does not have an economic role, but rather the FDI received over 2004-2024 was not diversified enough and was not productively configured to lead to systematic long-run GDP gains outside the oil sector. The positive lagged short-run FDI effect (3.318) indicates that FDI does have a positive effect after it has been established, highlighting the need for diversified and productive FDI.

The most surprising result from the study specifications prior to the results listed here is the negative trade openness coefficient (−12.427) in the long run. The findings are consistent with a recent body of literature that indicates that higher trade openness is more likely to boost import penetration of consumer goods in resource-rich economies with a limited manufacturing sector than to drive export diversification and/or technological upgrading. This is consistent with the concept of the "Dutch disease" phenomenon, which occurs when the natural resource sector dominates the economy, driving down the development of the tradable non-resource sector as trade opens up, and resulting in a worse-off economy.

The speed of adjustment coefficient ($ECT = -0.6447$) is very high, about 64.47% of the disequilibrium is corrected in one year, a high value compared to a number of similar oil exporters from the literature. These indicate that the transmission mechanisms (macroeconomic channels such as fiscal transfers, banking sectors and trade flows) of shocks and corrections in Iraq are relatively rapid even in a structurally fragile institutional environment. But the speed of this adjustment is a double-edged sword – it suggests that negative oil price shocks are short-lived,





but it also suggests that negative oil price shocks are communicated swiftly to GDP contraction.

6. Conclusion

The authors employed the ARDL Bounds Testing approach and the Error Correction Model (ECM) in this study to analyze the effect of exports, imports, foreign direct investment, and trade openness on economic growth in Iraq in the period from 2004 to 2024.

The AIC was used to choose the optimal model from 162 candidate models, and all classical diagnostic conditions, such as absence of serial correlation, homoscedasticity, and structural stability (CUSUM), were validated. The results of the F-bounds test indicated that the F-statistic is 46.168, which is highly significant evidence of long-run cointegration between all five variables.

The long-run results confirm that exports (coefficient = 13.808) have a significant positive effect on the growth of GDP in Iraq, indicating that Iraq is dependent on its oil exports, while the imports of goods and services (coefficient = -10.346) have a significant negative effect, indicating that Iraq has suffered from high levels of dependence on imports of goods and services. In addition, there is a significant negative long-run impact (-12.427), which is in line with the Dutch disease dynamics of resource-rich economies. The long-run effect of FDI is not statistically significant but it has positive lagged short-term effects. The error correction term of -0.6447 suggests that about 64.47% of the short-run deviations from the long-run equilibrium are corrected within one year, a very fast adjustment rate that is characteristic of dynamic responsiveness, but also indicates sensitivity to commodity shocks.

The results in this paper contribute to the empirical literature on the trade-growth nexus in resource-intensive countries in several ways. First, they have assembled a new, more extensive supply of data on Iraq from 2004 to 2024 that includes several large macro-economic shocks: the global financial crisis, the 2014-2016 oil price crash, and the post-pandemic recovery. Second, the variables of trade and investment have been analyzed simultaneously in the same ARDL framework, which overcomes the issue of omitted variable bias that arises in the single variable ARDL analysis. Third, the findings complement the Dutch disease and resource curse literature with ARDL empirical data from a conflict-ridden, oil-dependent economy.

The findings have significant policy implications for the economic policy, trade policy, and promotion of investment in Iraq. One of the drawbacks of this study is the limited number of observations (19 post-lag

observations), which reflects the nature of the availability of annual data for Iraq since 2004. The ARDL bounds testing approach is tailored to small samples as advocated by Pesaran et al. (2001), and the diagnostic tests verify the validity of the model. Future research should aim to increase the sample size as new data become available or provide the analysis with data of higher frequency (quarterly data) when available.

7. Policy Recommendations

From the empirical results, the following policy suggestions are made: Increase and expand non-oil exports.

1. Development of non-oil export industries should be the government's top priority by implementing export promotion policies and export processing zones, providing export financing, and easing non-tariff barriers. Diversification of export revenue sources will help to mitigate macroeconomic risk to oil price fluctuations and help to ensure more stable long-run GDP growth.

2. Rationalize Import Structure Because of the negative effects of imports on long-run GDP, policies should focus on changing the composition of imports to shift the allocation from consumer goods to capital and intermediate goods to support the domestic productive capacity. Strategic sector import substitution policies and investments in import substitution industries and agricultural processing industries will help reduce the trade deficit and help reduce the sensitivity of GDP to import shocks.

3. The lagged short-run impact of FDI on GDP was positive, although not statistically significant, and its potential was suggested by the long-run impact of FDI on GDP. The government should invest in enhancing the business climate, improving institutions and enforcing contracts, investing in infrastructure, and ensuring political stability to unlock the long-run FDI benefits. The focus of investment incentives should be on productive industries – manufacturing, agriculture, renewable energy, technology – and not just the oil industry.

4. It is time to rethink Iraq's trade liberalization policy, given the negative long-run effect of trade openness. Instead of general trade liberalisation, Iraq should implement selective trade policies that safeguard fledgling domestic industries, while allowing imports of productive capital goods. Unconditional liberalization should be given a back seat to regional trade agreements, which focus on the development of export markets for non-oil goods.

5. Iraq's adjustment speed is fast ($ECT = -0.6447$), and the country is commodity shock sensitive, which calls for the intensification of fiscal stabilization measures, such as oil stabilization funds, countercyclical spending rules, and foreign reserve management, in order to mitigate the





impact of external shocks on the domestic GDP. In the event of oil price fluctuations, coordination between the monetary and fiscal authorities is necessary to assure macroeconomic stability.

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The Impact of Exports, Imports, Foreign Direct Investment, and Trade Openness on Economic Growth in Iraq: Evidence from the ARDL Approach (2004–2024)

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