

Assessing and Examining the Influence of International Trade on Iraq's Economic Growth Spanning the Period from 1991 to 2021

Ahmed Hachicha¹, Hussein Mahmoud Awad², Amal Ghorbel³, Ahmad a. al-majali⁴

Abstract

The study examines the impact of foreign trade, including exports and imports, on Iraq's GDP from 1991 to 2021. It uses the Nonlinear Autoregressive Distributed Lag (NARDL) model to analyze the individual impacts of total exports, imports, and overall trade on Iraq's GDP. The results show a nonlinear relationship between total trade volume and GDP, suggesting a complex relationship that does not follow a typical linear pattern. Export volume changes also have a nonlinear impact on real GDP, indicating a crucial factor in shaping the local economy. Import volume also shows a significant nonlinear effect at a 5% significance level, attributed to nonlinear changes in the movement of imports and their impact on economic activity.

Keywords: *Nonlinear, NARDL, Exports, Imports, Foreign Trade, real GDP, Economic activity, Iraq.*

1. Introduction

Iraq, despite its oil wealth, has a high-middle-income classification but faces challenges in economic development, healthcare, educational services, and security. Recent conflicts, including the Gulf War and ISIS control, have imposed significant economic and social costs. Per capita GDP in Iraq has declined significantly, with a decline from less than 18% to 21% in 2021 compared to 2013 (World Bank, 2020).. The country also faces deteriorating business conditions, a decline in labor force participation, and a lack of structural reforms to address increasing poverty rates among middle-income countries. These challenges make it difficult for Iraq to achieve sustainable and equitable growth while maintaining a decent standard of living. Enhancing foreign trade is considered a crucial economic policy to support Iraq's economic situation, promoting non-oil production and boosting productivity. This study provides recommendations to enhance Iraq's trade capabilities, support economic growth, and promote economic development. Economic development optimizes the utilization of natural and human resources, shifts production curves upward, provides employment.

The study aims to identify the relationship between foreign trade and Iraq's GDP, a topic that has been overlooked in previous studies. Previous models have used linear models, overlooking nonlinear factors and economic changes in Iraq. The study also highlights the

¹ Laboratory in Economic Development, Faculty of Economics and Management Sfax at University of Sfax, Tunisia

² Laboratory in Economic Development, Faculty of Economics and Management Sfax at University of Sfax, Tunisia

³ Laboratory in Economic Development, Faculty of Economics and Management Sfax at University of Sfax, Tunisia

⁴ Mutah University, College of Business, Economics Business & Finance Department, Jordan, Email: majalia@mutah.edu.jo. ORCID: <https://orcid.org/0000-0003-4204-4995>.

long-term nonlinear impact of imports on economic growth, requiring a deeper understanding of this dynamic. The study also explores the relationship between total exports and overall trade volume, requiring a more detailed exploration of their relationship with economic growth, especially in the Iraqi context. The Nonlinear Autoregressive Distributed Lag (NARDL) model is used to estimate aspects of foreign trade and its impact on the Iraqi economy, a methodology not previously applied at the Iraqi level. The analysis aims to provide policymakers in Iraq with a comprehensive understanding of the impact of economic policies on the Iraqi economy.

2. Literature Review

International trade is a vital aspect of a country's economy, providing employment opportunities, increasing production and government revenues, expanding local companies' customer base, and fostering knowledge and technology exchange. It is conducted through traditional imports and exports, foreign direct investment, and international partnerships. The process relies on trade laws and agreements, requiring compliance with standards related to quality, safety, and the environment. Classical theories of trade, originating from Adam Smith's Absolute Advantage theory, form the theoretical foundations for understanding international trade and the interaction of different economies. These theories assume differences in resources and technology among nations and investigate the importance of international trade for each country. They emphasize the need for countries to engage in international trade to achieve a surplus in the balance of trade.

Smith argued that international trade serves two purposes: disposing of surplus production beyond domestic consumption and overcoming local market limitations. He argued that specialization in production, driven by comparative advantage, leads to increased productivity and market expansion. However, his Absolute Advantage theory faced criticism for its inability to explain certain cases, leading to David Ricardo's introduction of the Comparative Advantage theory (Lang, 2011). Ricardo argued that even if a country is better than another in producing everything, it would still benefit by focusing on producing goods in which it has a comparative advantage, i.e., goods it can produce more efficiently compared to others (Thompson H. , 2021). The theories of Smith and Ricardo, along with the Reciprocal Demand and the terms of trade theory, faced criticism for oversimplifying and excluding elements like production mobility, transportation costs, and constant costs. John Stuart Mill proposed the Reciprocal Demand and the terms of trade theory, which incorporated supply and demand concepts to reconcile these theories. Mill argued that foreign trade rates are determined by reciprocal demand and that trade occurs when relative production costs differ among countries. David Hume introduced the Automatic Equilibrium theory, linking trade with the presence of precious metals, resulting in increased exports, decreased imports, trade surplus, and gold inflow (Gomes, 1990).

Neoclassical economic theory posits that countries engage in international trade based on self-interest and comparative advantage. It suggests that countries have advantages in producing goods, leading them to trade with countries with similar advantages. This theory supports free trade as a means to achieve economic prosperity, arguing that removing trade barriers and regulating markets leads to increased efficiency and better wealth distribution. The Heckscher-Ohlin-Samuelson model, which developed the classical model, assumes differences in factor use and technology used for producing a specific commodity (Marjit & Das, 2022). The Heckscher-Ohlin-Samuelson model suggests that relative abundance in production factors leads to international trade. Countries with an advantage produce and export goods requiring abundant factors, importing goods with scarce factors. Vernon introduced the Product Life Cycle model, which outlines three stages for each product: new product, maturity, and decline.

Research and development are crucial for new products, followed by a maturity stage where production stabilizes and efficiency gains lead to cost reductions. In the decline stage, production may shift to countries with lower costs. Posner's Technological Gap Trade Model suggests that countries with new inventions gain a temporary monopolistic advantage, which diminishes over time (Thompson H. , 2003).

Paul Krugman's 1979 observation of international trade between advanced countries with similar production factors led to product differentiation and economies of scale development (Walther, 2011). This theory suggests that countries can produce similar products widely and trade parts and differentiated products with each other. However, since the early 1970s, global trade has increased faster than overall economic growth. The shift to multinational corporations, transitioning from local to global orientations, has significantly accelerated international trade. International trade is closely linked to economic growth, with increased trade volume fostering job creation, specialization, skill improvement, and innovation. It encourages companies to innovate and develop technology, making them globally competitive. This enhances economic dynamics, contributes to sustainable development, and strengthens a country's economic power. International trade also maximizes the utilization of economic resources, including raw materials and labor, allowing for the maximum use of innovations and machines. This promotes economic development and enables countries to leverage their economic resources, contributing to prosperity and improving the quality of life for citizens.

Research shows varying outcomes regarding the relationship between foreign trade and economic growth. Factors such as trade policies, technological development, political stability, and global demand play crucial roles. Trade policies, such as tariffs and currency fluctuations, can significantly impact foreign trade effectiveness and economic growth. Technologically advanced countries benefit from enhanced products and global competitiveness. Political stability encourages foreign investments and supports a conducive environment for foreign trade. Global demand fluctuations can impact exports and economic growth. Understanding these interactions is essential for guiding economic and trade policies for sustainable and stable growth. This study aims to understand the relationship between foreign trade and economic growth in developing countries like Iraq.

The study (Al-Nuaimi, 2012) aims to review Iraq's trade relations with East Asia using a descriptive approach to analyze variables in the field of trade. The study indicates that Iraq consistently seeks to build strong political and trade relationships with East Asian countries. These countries are observed to recognize Iraq's needs in areas such as construction, reconstruction, strategic, productive, and service sectors, especially those related to oil and its derivatives. In the study (Al-Khanaki & Karim, 2014) it was concluded that the government's actions post-2003 transformed the external sector into a negative component in the composition of the Gross Domestic Product (GDP), with some positive aspects. The study showed adverse effects on capital inflow, and it did not support unplanned foreign trade liberalization. The study (Al-Shammari & Al-Azzawi, 2019) found that trade liberalization leads to technology transfer and restructuring of the infrastructure of developing countries. It also leads to the import of essential goods that cannot be locally produced in developing countries. Trade liberalization in Iraq resulted in excessive spending on low-quality foreign goods and services with low prices. The study recommends that developing countries focus on developing their industries and improving product quality.

(Shweiti, 2015) provided an analysis of the reality of foreign trade in economic development, its evolution, and geographical distribution. It highlighted the impact of Iraq's economic openness policy post-2003 on its foreign trade from 2003 to 2012. The study concluded that foreign trade holds significant importance in Iraq, contributing to the Gross Domestic Product and crucial sectors like agriculture and industry. Despite its growth and development, the oil sector remains paramount in importance, as reflected in

its share of the Gross Domestic Product. The results indicated a deficit in net services in Iraq and a disturbance in foreign trade, reflecting imbalances in agricultural and industrial development, work performance, and fiscal policies. The study by

(Al-Abdali & Heba , 2016) They have used the Auto-Regressive Distributed Lag (ARDL) model to analyze the short-term and long-term relationships. The results showed that the trade imbalance in the previous period could be corrected within four years. The long-term relationship indicated that a one-unit change in GDP leads to a proportional change in the trade balance. The study also revealed a causal relationship between the trade balance to GDP and exchange rates to GDP. (Abugamia, 2016) investigated the impact of foreign trade on economic growth and development in Palestine from 1995 to 2012. The results showed a moderately significant effect of import growth on economic activity in Palestine, suggesting that increasing import volumes moderately contributes to enhancing economic activity. (Al-Fatlawi & Shaker, 2016) A mutual causal relationship was found between foreign trade and economic growth. The study indicated that post-2003 free trade policies had a negative impact on the agricultural and industrial sectors in Iraq. Most imported goods were consumables rather than intermediate or investment goods, contributing to an increase in local production. The study emphasized the need to address these challenges for future economic development. (Jabil, 2018) focused on Iraq's external trade developments with neighboring countries, analyzing both exports and imports. The study highlighted Iraq's increasing dependence on neighboring countries, reflecting imbalanced trade relations that led to structural changes and problems negatively affecting future economic development. (Ahamad, 2018) In Bangladesh, it was demonstrated that international trade significantly positively impacts economic growth, with a tangible positive correlation between international trade and economic growth, as measured by Gross Domestic Product (GDP). The results emphasized the importance of trade policies and business support to enhance economic sustainability. (Abdulla & Ali, 2019) Found a long-term integrated relationship between exports, imports, and Gross Domestic Product in Iraq. The Granger causality results indicated a positive impact of exports on economic growth, while imports also had a positive effect on economic growth. The study suggested that an increase in exports leads to an increase in Gross Domestic Product. (HABIB, 2019) highlighted the significant role of Iraq's foreign trade, constituting over 73% of the country's Gross Domestic Product. The study suggested that the Iraqi economy is open to trade, and it explored the complexities of Iraq's international trade relations. The study investigated the trends of bilateral trade and trade density for the 2007-2017 period with selected countries. It shed light on Iraq's untapped potential to evolve as a major player in international trade, emphasizing the moral impact of trade on the Iraqi economy. (Abdul Hussein, 2020) revealed a significant relationship between the complications of foreign trade and the Iraqi economy. Regression analysis showed a positive relationship between export volume and national income, indicating that an increase in export volume contributes to an increase in national income. Conversely, there was an inverse relationship between import volume and national income, suggesting that an increase in import volume is associated with a decrease in national income. Therefore, the Iraqi government should diversify exports and reduce reliance on unnecessary imports by encouraging local production and investment projects. (Ahmed & Rahman, 2022) demonstrated the crucial role of foreign trade in the Iraqi economy by providing foreign currency to meet the Iraqi society's import needs. The analysis revealed a bidirectional causal relationship between exports and securities. Economic growth (GDP) and exports had a clear positive impact on Gross Domestic Product, with a 1% increase in exports leading to a 1.01% increase in GDP. Imports, on the other hand, negatively affected Gross Domestic Product, leading to a decrease in GDP by 0.19% with a 1% increase in imports. Therefore, the Iraqi government should focus on diversifying exports and reducing dependence on unnecessary imports by encouraging local production and investment projects.

3. Methodology and data

The descriptive and analytical methodology was employed to examine the developments of foreign trade in Iraq and link them to economic growth and other trade-related events over time. Additionally, the standard model for analyzing nonlinear autoregressive distributed lag (NARDL) time-distributed gaps was used to understand the impact of total exports, imports, and overall foreign trade on Iraq's gross domestic product during the period (1991-2021). This model relied on estimating asymmetric effects in the short and long term by analyzing the partial effects of the independent variable. The NARDL model was applied after conducting a unit root test using the augmented Dickey–Fuller test (ADF) and testing data integration using the Bound Test. Furthermore, efforts were made to ensure that the estimates were free from standard problems, including heteroscedasticity, multicollinearity, and serial correlation. In addition, tests were conducted to verify the model's quality, including structural stability tests (CUSUM) and (CUSUMSQ) to ensure that the model represents the data well and accurately reflects the relationships. These methodological steps were fundamental to ensuring the accuracy and reliability of the results obtained in the study.

The Model

The primary study model includes the following equations to analyze the reciprocal effects between foreign trade and economic growth in Iraq:

Equation 1 (Total Trade):

$$RGDP_t = \alpha_0 + \alpha_1 EC_{t-1} + \beta_1^+ TTRED_{t-1}^+ + \beta_2^- TTRED_{t-1}^- + \sum_{t=1}^{\rho} \theta_{1i}^{\pm} \Delta TTRED_{t-1} + INS_POL_t + U_t$$

Equation 2 (Total Exports):

$$RGDP_t = \alpha_0 + \alpha_1 EC_{t-1} + \beta_1^+ TEXPO_{t-1}^+ + \beta_2^- TEXPO_{t-1}^- + \sum_{t=1}^{\rho} \theta_{1i}^{\pm} \Delta TEXPO_{t-1} + INS_POL_t + U_t$$

Equation 3 (Imports):

$$RGDP_t = \alpha_0 + \alpha_1 EC_{t-1} + \beta_1^+ IMPO_{t-1}^+ + \beta_2^- IMPO_{t-1}^- + \sum_{t=1}^{\rho} \theta_{1i}^{\pm} \Delta IMPO_{t-1} + INS_POL_t + U_t$$

Where: Real Gross Domestic Product (RGDP), Total Trade (TTRED), Total Exports (TEXPO), Imports (IMPO), +Indicates positive effects, - Indicates negative effects, INS_POL Political stability index experienced by the Iraqi economy, α β θ : Estimation parameters, EC Error correction, U Random error in the model.

4. The Result

Unit Root Tests:

Unit root tests are statistical procedures used to determine the stationarity of a time series variable. They help identify if a variable exhibits a unit root, indicating a non-stationary time series. Stationarity is crucial in time series analysis and guides the choice of appropriate econometric models. The Real Gross Domestic Product Growth Rate (RGDPG) is stationary at level I(0) with intercept and trend, without a 5% significance

level. However, other variables like foreign trade (TTRED), total exports (TEXPO), imports (IMPO), and the political stability index are non-stationary at level I(0) with both intercept and trend, without a 5% significance level. These results meet the essential conditions for estimating the NARDL methodology.

Table 1. Augmented Dickey–Fuller Test Results (ADF)

At level I (0)		RGDPG	TTRED	TEXPO	IMPO	INS_POL
With Intercept	t value	-3.35	-0.83	-0.94	-0.84	-2.35
	Probability	0.022	0.794	0.761	0.793	0.164
	result	**	n0	n0	n0	n0
With Intercept and Trend	t value	-4.22	-1.48	-1.81	-1.61	-2.29
	Probability	0.012	0.812	0.672	0.763	0.426
	result	**	n0	n0	n0	n0
Without Intercept and Trend	t value	-2.95	0.29	0.06	0.25	-0.86
	Probability	0.005	0.764	0.693	0.753	0.335
	result	***	n0	n0	n0	n0
At the first difference I (1)		d(CORE_INF)	d(GRGP)	d(CBJR)	d(GM2)	d(INS_POL)
With Intercept	t value	-6.9	-4.75	-5.03	-4.45	-4.49
	Probability	0	0.001	0	0.002	0.001
	result	***	***	***	***	***
With Intercept and Trend	t value	-6.75	-4.57	-4.84	-4.39	-4.45
	Probability	0	0.006	0.003	0.008	0.007
	result	***	***	***	***	***
Without Intercept and Trend	t value	-7.02	-4.59	-4.98	-4.32	-4.56
	Probability	0	0	0	0	0
	result	***	***	***	***	***

Where: RGDP: Real GDP, TTRED: External Trade, TEXPO: Total Exports, IMPO: Imports, INS_POL: Index of political turmoil that the Iraqi economy has experienced (*): significant at 10%, (**): significant at 5%, (***): significant over 1%, no: not significant. The probability value is based on Mackinno (1996).

Cointegration Test

The Cointegration Test is a method used to analyze long-term relationships among time-series variables. It aims to determine if the variables move together or have a long-term relationship despite short-term fluctuations. The test is crucial for ensuring the stationarity of time series and analyzing relationships free from spurious regression. It

uses the Bounds test, developed by Pesaran and Shin, within the Autoregressive Distributed Lag (ARDL) methodology. The test relies on the Fisher F-statistic, which indicates the presence of long-term relationships when the F-value exceeds the upper critical bounds. The results of the Bounds test indicate a cointegrating relationship between variables in three selected models, which is the second condition for applying the Nonlinear Autoregressive Distributed Lag (NARDL) model. The first model had an F-value of 5.65, rejecting the null hypothesis and accepting the alternative hypothesis of a cointegrating relationship between variables.

Table 2. Cointegration Test Results – Bounds Test

	F test value	Critical Values			
		bound	Significance Level		
			%10	%5	%1
First model	5.65	Lower Bounds	2.63	3.1	4.13
second model	5.57				
Third model	4.65	Upper Bounds	3.35	3.87	5

Nonlinear Testing in Time Series and the Model:

Nonlinear testing in time series involves using statistical tools to analyze nonlinear relationships between variables in time series. The Brock Dechert Scheinkman-BDS test examines the behavior of time series in terms of symmetric and independent deviations, linear and nonlinear independence, and nonlinear relationships between variables. It detects strong dependence, sudden transitions, or nonlinear dependence, helping to discover nonlinear behavior in time series. The test is applied to the main variable under study to distinguish between linear and nonlinear behavior. The rejection of the null hypothesis indicates a nonlinear path for the variable under investigation.

Table 3. Nonlinear Test (BDS) Results

La g t i m e	RGDP		TTRED		TEXPO		IMPO		INS_POL	
	BDS value	Proba bility	BDS value	Proba bility	BDS value	Proba bility	BDS value	Proba bility	B DS val ue	Proba bility
2	0.05	0.03	0.15	0.000	0.12	0.000	0.16	0.000	0.1	0.000
3	0.12	0.000	0.23	0.000	0.18	0.000	0.27	0.000	0.15	0.000
4	0.17	0.000	0.29	0.000	0.22	0.000	0.33	0.000	0.19	0.000
5	0.2	0.000	0.33	0.000	0.25	0.000	0.36	0.000	0.2	0.000
6	0.21	0.000	0.37	0.000	0.31	0.000	0.38	0.000	0.2	0.000

Estimation of Study Models

The Nonlinear Autoregressive Distributed Lag (NARDL) model estimation results reveal a durable integrative relationship within time series gaps. The error correction term coefficient is noteworthy, exhibiting a negative sign of 0.81, which is both accurate and statistically significant. The speed of correction is determined to be 1.23 time periods

(years). Table 4 illustrates the outcomes of estimating long-term relationships in the NARDL model, uncovering asymmetric effects. A billion-dollar increase in external trade yields a 1% augmentation in real Gross Domestic Product (GDP), underscoring the substantial impact in alignment with established economic theories. This surge in external trade stimulates an overall demand upswing for goods and services, thereby elevating real GDP—a finding consistent with several prior studies, including those by Al-Naimi (2012), Al-Khagani and Karim (2014), Al-Shammari and Al-Azzawi (2014), Shuweti (2015), Al-Abdali and Rasheed (2016), and Al-Janabi.(2017) . Conversely, a 1% reduction in external trade growth correlates with a 0.02% decline in the real GDP rate. This adverse effect remains statistically significant, with a probability of less than 5%, as highlighted in the accompanying table.

Table.4: Long-Term Relationship Estimation Results - First Model

variable	Parameter	Error Value	t-Value	Probability
TTRED_POS	0.000786	0.000155	5.065833	0.0004
TTRED_NEG	-0.000244	0.000079	-3.084023	0.0104
INS_POL	-31.63664	6.894762	-4.588504	0.0008
coefficient of the error	-0.81	0.1100	-7.26	0.0000

Results of estimating the Nonlinear Autoregressive Distributed Lag (NARDL) model for the second specification indicate a long-term cointegrating relationship. The coefficient of the error correction term is negative and less than one, with a value of -0.78, and it is statistically significant. The speed of adjustment is estimated to be 1.3 time periods (years).

The results of the long-term relationship estimation in the NARDL model, as shown in Table 5, indicate asymmetrical effects. An increase in the growth of total exports by one billion dollars leads to a 0.16% increase in real GDP. The results also indicate the significance of this impact, aligning with economic theories in this field, where an increase in exports leads to a rise in overall demand for goods and services, consequently boosting real GDP. This finding is consistent with several previous studies, including studies by Al-Nuaimi (2012), Al-Khagani and Kareem (2014), Al-Shammari and Al-Azzawi (2014), Shuayti (2015), Al-Abdali and Rashid (2016), and Al-Janabi.(2017). Conversely, a decrease in the growth of total exports by one billion dollars results in a 0.027% decrease in the rate of real GDP, and this effect is statistically significant, as indicated in the table below, where the probability was less than 5% .The results of the autoregressive distributed lag (NARDL) model for the third model show a long-term integrative relationship. The coefficient of the error correction term is negative and less than one, reaching 0.97, with statistical significance. The correction speed is 1.03 time periods (years).

Table. 5: Long-Term Relationship Estimation Results - Second Model

variable	Parameter	Error Value	t-Value	Probability
TEXPO_POS	0.0016	0.000401	4.092574	0.001
TEXPO_NEG	-0.0002	4.25E-05	-6.47059	0
INS_POL	-51.056	13.04932	-3.9126	0.0014
Error term coefficient	-0.7782	0.201815	-3.85642	0.0011

The results of the long-term relationship estimation in the NARDL model, as indicated in Table 6 suggest asymmetric effects. An increase in the growth rate of imports by one percentage point leads to a rise in the real gross domestic product (GDP) by 0.4%, as the

results indicate the significance of this impact. This finding aligns with economic theories in this field, where an increase in foreign trade leads to a higher overall demand for goods and services, consequently raising the real GDP. This result is supported by several previous studies, such as the studies by (Al Nuaimi, 2012), (Al-Khagani and Karim, 2014), (Al-Shammari and Al-Azzawi, 2014), (Shawti, 2015), (Al-Abdali and Rashid, 2016), and (Al-Janabi, 2017) .Conversely, a decrease in the growth of imports by one percentage point results in a decrease in the real GDP growth rate by 0.2%. This effect is considered significant, as indicated in the table below, where the probability was less than 5%.

Table. 6: Long-Term Relationship Estimation Results - Third Model

variable	Parameter	Error Value	t-Value	Probability
IMPO_POS	0.003868	0.000981	3.941557	0.0013
IMPO_NEG	-0.0015	0.001154	-1.35931	0.1941
INS_POL	-40.564	16.07234	-2.52384	0.0234
Error term coefficient	-0.9656	0.294313	-3.28096	0.0044

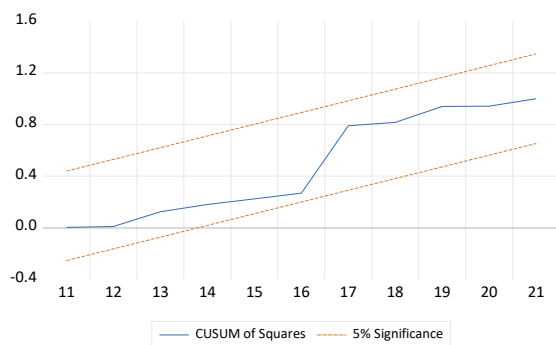
Model Suitability Test

The study employs CUSUM (Cumulative Sum of Residuals) and CUSUMSQ (Cumulative Sum of Squares of Residuals) tests to analyze the structural stability of the model. This is done to ensure the stability of the model parameters over the study period. In this context, the CUSUM test monitors cumulative changes in estimated coefficients. In contrast, the CUSUMSQ test monitors cumulative changes in the squares of the estimated coefficients .Figure (3-1) illustrates the results of the CUSUM and CUSUMSQ tests. Suppose the plotted line falls within the confidence bounds (upper and lower) at a significance level of 5%. In that case, it indicates that the estimated parameters in the model are stable and consistent over the specified study period. This implies that the model possesses a level of structural stability, instilling confidence in the conclusions and forecasts that can be derived from the model based on the available and integrated information .Achieving structural stability in the model is crucial in scientific research, as it can enhance confidence in the results, making them more robust and reliable.

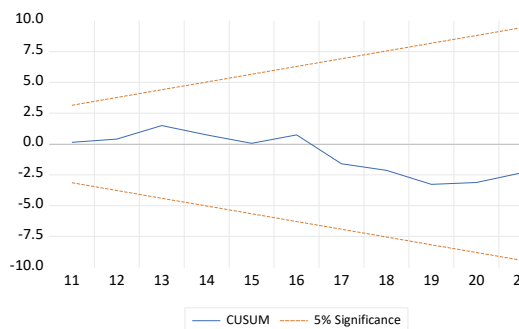
Figure. 1: CUSUM and CUSUMSQ Test Results

First model

CUSUMSQ



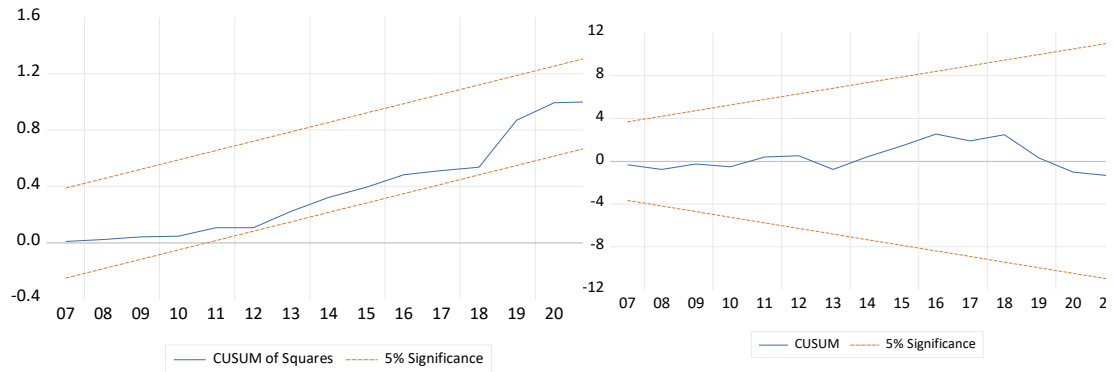
CUSUM



second model

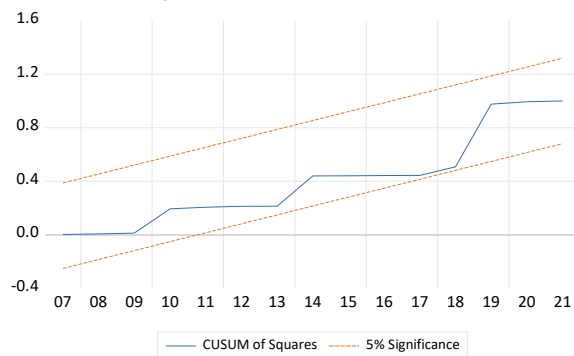
CUSUMSQ

CUSUM

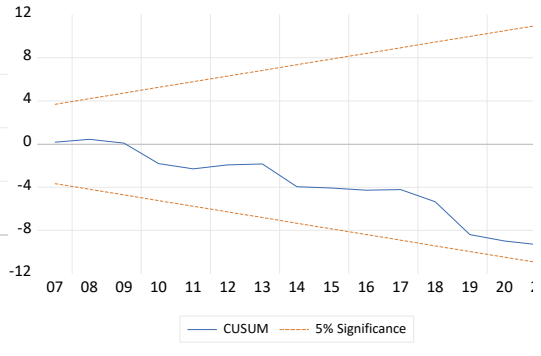


Third model

CUSUMSQ



CUSUM



According to Figure 1, the CUSUMSQ test indicates structural stability for the studied model. When the line of the CUSUMSQ test falls within the confidence bounds (upper and lower) at a significance level of 5%, it suggests structural stability for the model over the study period. This implies that the estimated coefficients are structurally unaffected, and the results and analyses represented by these coefficients can be relied upon within the study context. These results enhance the model's reliability and bolster confidence in the conclusions and forecasts it can produce. They demonstrate that the model does not exhibit any structural biases during the studied time period, strengthening the robustness of the study and the attained results.

The Variance Inflation Factor (VIF) test measures the absence of multicollinearity issues among the independent variables in regression analysis. The VIF value of less than 10 indicates no significant multicollinearity problem among the independent variables. Thus, it can be stated that the variables are not highly correlated with each other. This makes the statistical results and model analyses more reliable and accurate.

The results presented in Table 7 show that the VIF values for the study variables are less than 10, indicating no significant multicollinearity problem among the independent variables in the model. This reinforces the model's validity and makes the statistical conclusions more reliable.

Table. 7: VIF Test Results

First model		
	Variance	VIF
TTRED	4.00E-08	2.317

INS_POL	49.959	2.317
second model		
	Variance	VIF
TEXPO	5.00E+01	2.194
INS_POL	1.00E-07	2.194
Third model		
	Variance	VIF
IMPO	3.00E-07	2.444
INS_POL	52.7	2.444

Heteroskedasticity Test

The Breusch-Pagan-Godfrey test was applied to verify the presence of heteroskedasticity in the estimation errors. To reject the null hypothesis, which assumes no heteroskedasticity issue among the variables, the F probability should be greater than the 5% significance level. According to Table 8, the results indicate the absence of heteroskedasticity issues in the three estimated models. This provides evidence of the efficiency of the estimation and the possibility of generalizing the analysis results.

Table.8 : Heteroskedasticity Test Results

	Statistical value	Probability
First model	0.67346	0.76
second model	0.78721	0.6813
Third model	1.06957	0.4439

Autocorrelation Test (LM Test):

The concept of autocorrelation refers to the relationship between consecutive values of the same variable in a time series or in a series of data linked in some way. In the context of regression models, autocorrelation occurs when there is a statistical relationship between the consecutive values of the model's random disturbance (errors). When autocorrelation occurs, it means that there is one error that repeats over time or across samples in a sequential manner. This can lead to problems in estimating the parameters in the regression model because it violates some of the fundamental assumptions of the regression model, including the assumption of no autocorrelation between errors. The impact of autocorrelation can lead to inflation in the values of regression coefficients, making them inaccurate and unreliable. The results, as shown in Table 9, of the autocorrelation test (Serial Correlation) indicate the acceptance of the null hypothesis of no autocorrelation problem, as the p-value is 0.072, which is greater than the 5% significance level. This suggests the absence of autocorrelation issues between errors .

Table.9 : Autocorrelation Test Results (LM- Test)

	Statistical value chi-sugare	Probability
First model	0.71965	0.5129
second model	2.71141	0.1594

Third model	1.29845	0.3061
-------------	---------	--------

5. Conclusion and Recommendations

The analysis reveals a statistically significant nonlinear effect at a significance level below 5% between total trade and real Gross Domestic Product (GDP) in Iraq. This indicates that changes in total trade volume have a nonlinear impact on real GDP, suggesting a complex relationship that does not follow the typical linear pattern. The results also show a significant nonlinear effect at a significance level below 5% between exports and real GDP in Iraq. This suggests that changes in the volume of exports have a nonlinear impact on real GDP, representing a crucial factor in shaping the local economy. As for imports, the analysis indicates a significant nonlinear effect at a 5% significance level between the volume of imports and real GDP in Iraq. This effect is attributed to nonlinear changes in the movement of imports and their impact on economic activity in the country. It is worth noting that Iraq's import activity has increased significantly after 2003, reflecting efforts for post-war reconstruction and improvement of infrastructure and basic services in Iraq.

The study Recommend the Iraqi government should focus on revenue diversification by developing agricultural, industrial, and service sectors, reducing reliance on oil, and boosting local production capacity. This can be achieved by supporting local companies, providing a suitable working environment, and developing necessary skills. The business environment should be improved by simplifying procedures, reducing bureaucratic intervention, and promoting transparency. Iraq should also promote international trade by signing agreements and enhancing economic cooperation. The tourism sector, with its significant potential, should be developed by providing infrastructure and encouraging investments to boost economic activity and create employment opportunities.

References

- Abdul Hussein, Z. A.-A. (2020). he impact of the foreign trade multiplier on national income in Iraq: An analytical study for the period 2006-2018. *Iraqi University Journal*, 47(2).
- Abdulla, S. M., & Ali, H. K. (2019). An Analysis of Exports and Imports and Their Effect on the Economic Growth in Iraq. *UKH Journal of Social Sciences*, 3(2), 68-76.
- Abugamia, J. (2016). The Impact of Foreign Trade on Economic Growth and Development in Palestine: 1995-2012. *An-Najah University Research Journal (Humanities)*, 30(9), 1847-1876.
- Ahamad, M. H. (2018). Impact of international trade on economic growth in Bangladesh. *International Journal of Science and Research*, 7(11), 1624-1627.
- Ahmed, U. H., & Rahman, D. (2022). Measuring and analyzing the impact of foreign trade on economic growth in Iraq for the period (1990-2020). *Journal of Garmian University*, 9(4), 611-626.
- Al-Abdali, S., & Heba , S. (2016). Analysis of the relationship between Iraq's foreign trade and economic growth (1980-2013). *Journal of Economic and Administrative Sciences*, 22, 336-352.
- Al-Fatlawi, K., & Shaker, A. (2016). The causal relationship between foreign trade and economic growth in Iraq for the period 1980-2013. *Al-Ghari Journal of Economic and Administrative Sciences*, 13.
- Al-Khanaki, N. A., & Karim, N. A. (2014). Liberation of Foreign Trade in Iraq: Reality, Impacts, Prospects. *Al-Gharbi Journal of Economic and Administrative Sciences*(31).

- Al-Nuaimi, H. A. (2012). Iraq's External Orientations towards East Asia: Causes and Implications. Reference Number: 521060. Baghdad: Al-Mustansiriya Center for Arab and International Studies.
- Al-Shammari, H. A., & Al-Azzawi, K. I. (2019). Liberation of Foreign Trade and Its Impact on the Economies of Developing Countries in General and Iraq in Particular. *Journal of the College of Administration and Economics for Administrative and Financial Studies*, 11.
- Gomes, L. (1990). *Neoclassical International Economics*. London: Palgrave Macmillan London. doi:<https://doi.org/10.1057/9780230371552>
- HABIB, D. S. (2019). Iraq's Foreign Trade Performance: A Critical Analysis. *Journal of Applied Economic Sciences*, 14(64), 393-402.
- Jabil, J. A. (2018). Analysis of Iraq's foreign (non-oil) trade with neighboring countries for the period (2003-2015). *Journal of the College of Basic Education for Educational and Human Sciences*(37).
- Lang, N. T. (2011). The Latent Absolute Advantage Of The Comparative Advantage In Theories Of International Trade. *International Business & Economics Research Journal (IBER)*, 5(1).
- Marjit, S., & Das, G. (2022). Finance, Trade, Man and Machines: A New-Ricardian Heckscher-Ohlin-Samuelson Model. *SSRN Electronic Journal*. doi:/10.2139/ssrn.4082577
- Shweiti, B. J. (2015). The role of foreign trade in economic development in Iraq after 2003.
- Thompson, H. (2003). Endogenous Trade in the Factor Proportions Model: The Heckscher-Ohlin-Marshall Model. *SSRN Electronic Journal*. doi:10.2139/ssrn.342400
- Thompson, H. (2021). Relative Prices, Comparative Advantage, and Trade Patterns with Three or More Countries and Goods. *SSRN Electronic Journal*. doi:<https://doi.org/10.2139/ssrn.3786753>
- Walther, O. (2011). Paul Krugman : (presque) un Nobel de géographie. *Articulo – Revue De Sciences Humaines*. doi:10.4000/articulo.791
- World Bank. (2020). *Rising from Fragility: An Economic Memoir on Diversification and Growth in Iraq*. International Development Report under the Microscope.