

AN ECONOMIC ANALYSIS OF THE RELATIONSHIP BETWEEN AGRICULTURAL TRADE OPENNESS AND AGRICULTURAL GROWTH IN IRAQ FOR THE PERIOD (1990-2021).

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ABSTRACT

The research was conducted to evaluate the link between agricultural trade openness and Iraqi agricultural development through the use of annual time series data from (1990–2021). This research that focuses on the Iraqi case study, as a developing country that opens up to the Global industry, and aims to identify the position of openness in facilitating agricultural development. The Research question centers around the effects of agricultural trade openness to agricultural growth or vice versa. The analysis is based on the examination of the secondary data utilizing statistics such as ARDL (Auto Regressive Distributed Lag) and co-integration analysis. The relevance of the findings results in understanding the complex causal relationship between agricultural trade openness and agricultural growth. The research conclusions indicate that the high agricultural trade openness index means that the Iraqi economy is highly dependent on the outside world, which weakens the economic and political ability to confront fluctuations in economic activity. The impact of the agricultural trade openness policy in Iraq depends on the performance of the economy in general and the quality of imported goods in particular. The co-integration test of the ARDL model shows the existence of a long-term balanced relationship between the dependent variable. The research recommends the need to enhancement the competitiveness of major agricultural products and adopts encouraging policies to enhance export. It also highlights the importance of developing effective agricultural policies that provide the necessary support to farmers, to adapt to the changes resulting from trade openness.

Key words: agricultural exports, agricultural imports, economic growth, comparative advantages, ARDL.

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INTRODUCTION

To a widening food gap caused by increasing internal demand surpassing local food production. This Foreign trade in agricultural products is vital for developing countries like Iraq, as it facilitates access to regional and international markets to meet consumer demands that domestic production cannot fulfill, particularly in the short term (Abdel Aziz, A. 2010). Commodities and foodstuffs are essential in global trade, meet increasing demands for food security and safety (Jamal, 2018). Increasing local demand for imports is a key issue in both economics of internal and foreign, as it exceeds individuals' needs, boosting consumption levels beyond necessary

levels (Al-Shammari,& Fadhel, 2009). Iraq heavily relies on imports due s gap is filled by imports, especially from neighboring countries. Import growth is influenced by fluctuating economic policies, particularly trade policies, and a lack of harmonization and implementation of key economic laws, negatively affecting local industries and the overall economy (Salman, & Kadhem. 2016). Import Control causes harmful economic effects, which resulted in negative effects on national economic sectors, thereby contributing to a decrease in income and job opportunities (Kadhim, 2017). The relationship between foreign trade and economic growth is contentious. Some claim

that trade While liberalization is an impetus for growth, others believe that it will result indefinite. Some people argue that there ought to be more economic growth, then encouraging exports and reducing imports. Export promotion policies are thought to contain will make significant contributions to the economy's growth, because rise in import without accompanying export growth can negatively affect GDP. An increase The interest in international economic relations drives the motivations of increased local institutional integration into the global economy. All this leads to increased international trade in goods and services, controlled by customs administrations to guarantee orderly import/export activities (Al-Sabaawi, and Abtan. 2013) Trade openness is an essential component in the economics of perfect competition models as it promotes factor distribution and efficiency. Trade openness in the agricultural sector could encourage developing countries to undertake agricultural trade liberalization. Agricultural trade openness requires the reduction of trade impediments such as tariffs in order to promote the flow of agricultural products across international boundaries, thus enhancing international economic cooperation. Agricultural trade openness promotes efficiency in economics and the agricultural sector in particular. It enables countries to take advantage of specialization in the agricultural sector. The benefits and drawbacks of agricultural trade openness include the impact of price changes on farmers. Agricultural trade openness enables the transfer of technology and experience sharing between countries. The conflict between the economics of growth and the need for global food and environmental security is essential in the success of agricultural trade openness. Different studies reveal that trade openness can contribute to enhancing production capacity and the marketing of agricultural commodities. The role of foreign trade in relation to enhancing marketing capacity and well-being can be seen from the aspect of competitiveness in the international market. :

1. Marketing capacity extension results in the creation of markets. It relates nations' goods to

markets through: "Exp2. The expansion of the consumption and investment sectors can increase the well-being of the country.

3. Economic factors such as the country's productivity, exports, imports, and trade balance are reflective of its competitiveness within the world economy (Jubair, and Al-Hayali, 2018)

4. The links among foreign trade, economic growth, trade volume, and structure of national income are also important.

5. Economic development raises the level of national income. and a robustness of foreign trade, This study highlights It is well recognized that one of the most important roles of agricultural trade openness in promoting growth, especially in developing countries like Iraq, whereas challenges are there due to uncertain relationship with growth, the research aims to make this dynamic clearer. It puts forward policies to Enhancing export competitiveness and playing a vital role in role of agricultural trade openness for driving Iraq's economic growth in the agricultural sector, using econometric analysis for comprehensive understanding. It is Complemented to previous research in this field.

Data sources and methods of analysis

The study used secondary data that was gathered from the year 1990 - 2021. Sources: Governmental and international international actors, such as those in the Ministry of Agriculture, Ministry of Planning/Central Bureau of Statistics, FAO, WTO, and international information These were the network sites. It used econometric ARDL Modeling & Co-Integration Analysis, incorporating Y. Johansson, C. W. J tests. Data analysis was performed using Eviews12. software, With the growth rate of agricultural products denoted as dependent variable, total agricultural exports: value, total agricultural import value, and agricultural trade openness rate as independent variables.

MATERIALS AND METHODS

Firstly, trade openness refers to the elimination of barriers to international trade such as tariffs, quotas, and administrative barriers. The goal of promoting trade openness is to remove obstacles to the flow of goods, services, and

investment across borders with a view to achieving economic integration and growth. Trade openness policies are hailed as initiatives that put equal emphasis on import and exports, lower tariffs, and convert quantitative restrictions to tariffs. Trade openness policies cover diverse approaches to import and export policy, exchange rate, and macroeconomic management with a view to encouraging trading with other countries. Regarding combating global poverty and promoting economical growth, applying trade openness policy approaches is imperative. It has been learned from experience and concepts of political economy that any elimination of barriers to trades such as tariffs and other non-tariff barriers effectively brings about advancements in wealth and growth. The more prosperous and growing economically are nations embracing free trade. Otherwise, nations supporting trade barriers might end up generating gains but at the expense of growth, hence a lack of funds to utilize to meet particular social needs. (Abdel Aziz, 2010). Importing agricultural goods is necessary to augment domestic output, keep up with the growing demand, and fill the gap between demand and supply in relation to the growing population and rising incomes. Secondly, importing agricultural goods plays an imperative role in procuring agricultural raw materials for the purpose of production from abroad (Al-Attabi & Al Badawi. 2019). Studies have shown that there is an increase in agricultural trade as a result of the growing economy and economy openness. Obtaining an advantage in the agricultural products line helps to improve investments and agricultural product output in other countries. Importing agricultural goods fills the gap in the agricultural products needed in the short run. International trade rules were set to ensure the facilitation of trade transactions, as there is an increasing importance of international economic ties, as the foreign trade sector greatly contributes to the GDP of the economy (Al-Attabi, Al-Badri, & Al-Badawi, (2020)). Trade liberalization makes it easy to specialize and divide the labor force globally. This helps the economy by increasing economic indicators. Some of the economic benefits

cited by economists include its ability to improve economic growth; eventually, the levels of happiness or good life increases (Dharrar, & Matlak, 2019). I

Indicators of measuring openness to trade:

Trade openness indicators are used to measure the extent to which an economy is open. of engagement in foreign trade activities. These Indicators include many measures, including:

1. Imports to GDP ratio index: It is obtained by dividing total imports by GDP. then multiplying the result by 100.

2. Terms of Trade Index: Computed by dividing the unit price of exports by unit price of imports, then multiplying the result by 100 to obtain the relative number

3. A rising standard of living spawns the need for some countries to find markets for exports.

4. Non-developed countries aspire to adopt modern technologies as part of technological and industrial advancement.

5. Industrialized countries, driven by a pressing need for natural resources, engage in trade with resource-rich nations.

Types of trade openness

Countries do not universally implement a singular form of trade liberalization. Instead, various types exist, encompassing liberalization concerning goods and services, both for exports and imports, alongside other forms. (Nora, 2019):

Trade liberalization takes different forms across countries, rather than being universally uniform. These include full liberalization, where trade flows freely without any barriers, partial liberalization with relaxed restrictions often seen in bilateral agreements, multilateral liberalization under organizations such as the World Trade Organization that facilitate free trade between member states, liberalization with first- and second-order preferences, With the aim of achieving free flow of goods while maintaining some restrictions for strategic purposes

Second: Economic growth

Economic growth is a primary objective for governments worldwide, categorizing countries based on growth rates into advanced, developing, and underdeveloped categories.

Economic growth concept: Economic growth, an important area of concern for

economists across the world, is pursued by both developing and developed countries in order to meet the challenges of advancements and increase social welfare. According to the World Bank, it is "the value of goods and services produced domestically minus the value of goods and services employed in production, plus taxes, less certain subsidies" (Al-Shehri, & Mustafa. 2014). It can also be explained as the increase in GDP and GDP per capita (Al-Badri, and Mohammed, 2016). Economic growth is often explained as the increase in the gross domestic product in real terms over a period of time, eventually leading to better improvements in the sectors of development, including literacy rate, life expectancy, and poverty levels. It is often termed identical to economic development, indicating a "constant and rapid expansion in real national income, making way for an increase in the shares of individuals in it over a given period of time, generally one year" (Murad, 2013). While economic growth emphasizes the increase in the GDP and optimization of production, economic development emphasizes changes in the economy, along with social regulations to increase productivity and optimize the production process (Al-Fatlawi, & Shaker, 2016). Economic growth can hinder development if it is limited to specific sectors of the economy without positively affecting the whole economy, which could eventually cause the drain or concentration of income in other countries (Sulaiman, 2021). This growth could be limited to the enhancement of real income, the expansion of the net National Product, or the improvement of some aspects of the economy (Marouf, 2005). Variables like the enhancement of human knowledge, the buildup of the country's capitals, or the growth of the country's population could eventually contribute to the growth of society (Salman, & Kadhem, 2016) Countries like the developing nations, which possess an ample amount of unexploited resources in their economies, hold the prospect of fast growth in their National Income . Agricultural exports are important in agricultural output as they enhance the economy through foreign exchange. The exporters are able to re-invest the foreign

exchange into increased agricultural output. The level of agricultural exports signifies excess output and the concept of comparative advantage. The total Iraq export levels are declining, except for oil, gas, and metal exports. Agricultural exports appear marginal in total exports, thus the importance of focusing on the core agricultural products like dates, leather, wool, meat, dairy products, eggs, grains, sugar, and some processed items based on international trade categories (Ben Yakhlef, & Shuaib, 2010). The concept of economic growth is difficult to understand owing to differences in interpretation among economists like F. Perrous, W. A. Lewis, S. Kuznets, among others. Most interpret growth in the country's income, while others interpret it as an expansion in output of goods and services; thereby taking different approaches in their schools of thought (Nora, 2019). Economic growth has reference to the improvement of the ability of an economy to provide goods and services in a specific short-term period that may be domestic or foreign or the combination of both (Jamal, 2018). An economic growth definition by Pigou refers to the expansion in the quantity of goods and services produced, provided to the people at lower costs and greater qualities compared to the former period (Dharrar, & Matlak, 2019). Economic growth indicates the quantitative improvement of the efficiency of productivity. Higher productivity rates indicate faster growth of the domestic product and may face challenges in sustaining the growth rate when the maximum productivity rate has got limits. There are two indicators that may be used to conclude economic growth (Dharrar, & Matlak, 2019):

1. Evaluation of growth of average real per-capita income.
2. Estimating the rate of growth of real GDP or real net output

Economic growth is one of the main targets pursued by all countries with the aim of improving their economies and increasing their standard of living. Regardless of its causes, it is imperative for choices on growth alternatives to become specific. Whether resulting from technological change, more physical capital, or human capital, the

crossroads decision for society is one of current benefits versus the pursuit of economic growth rates. There are costs of forgone current consumption, with substantial resources being channeled toward developing such sources of growth, especially during the early stages of development (Al-Lahham, 2021). There are various facts that help identify the process of economic growth and these are:(Al-Wadi, Al-Assaf, & Safi, 2013).

1. Production per capita increases steadily without a decrease in the rate of growth
2. Physical capital per worker grows steadily
3. The rate of return on capital is broadly constant
4. The ratio of physical capital to output is approximately constant
5. The proportions related to the labor, human capital, and physical capital components in the national income remain relatively stable.

Essentially, economic growth is regarded as a quantitative change that can be recognized in the real GDP, as well as the growth in its distribution per capita. The different growth rates in economies can be categorized into three different models (Sara, & Mohammed, 2019):

1. Stability in the growth rate: Remains steady without fluctuation
2. Growth rate acceleration: Increments at a steady rate with time
3. Growth rate decline: Characterized by decline, especially in the event of a crisis.

Third: Reality of agricultural trade openness in Iraq for the period 1990-2021

Iraq's trade openness is hampered by its heavy reliance on oil exports, leaving it vulnerable to global oil price fluctuations. Efforts to improve through agreements and investment climate enhancements are hindered by corruption, security issues, and political instability. Export growth is vital for economic stability and reducing unemployment, while imports meet essential needs for food and investment, albeit secondary in importance (Kadhim, 2017) The rate of trade openness is a crucial indicator of agricultural foreign trade growth. Table (1) illustrates fluctuations in agricultural trade openness from 1990 to 2021. In 1990, the percentage stood at about 11.71%, and it decreased to 0.88% in the following year due to the imposition of economic sanctions. The lowest percentage recorded in 1997, which was about 0.002%. The percentage increased in 2007 to 9.22% due to the increase in agricultural imports. The highest percentage was recorded in 2018, it was 226.68% due to Iraq's dependence on oil exports and the lack of agricultural diversity. At the end of the study, the percentage of agricultural trade openness reached 1.36%, and the average was about 24.50%, with an annual growth rate of 27.20%. Table no. (1) shows the percentages of agricultural trade openness in Iraq.

Table 1. Agricultural exports, agricultural imports, agricultural output at current prices, and the agricultural trade openness index in Iraq for the period (1990-2021).

Years	Agricultural exports (Million I.D.)	Agricultural imports (Million I.D.)	Agricultural product in current prices (Million I.D.)	Agricultural trade (%) openness index
1990	30.98	509.10	4613.30	11.71
1991	16.01	42.10	6629.10	0.88
1992	4.77	55.40	22872.70	0.26
1993	3.47	285.15	49864.00	0.58
1994	0.68	174.89	333524.20	0.05
1995	4.27	192.15	1378274.30	0.01
1996	16.78	135.42	1208982.30	0.01
1997	17.84	12.00	1276367.10	0.002
1998	39.66	24.49	1868379.80	0.003
1999	58.56	40.79	2482616.50	0.004
2000	35.36	46.23	2327277.20	0.004
2001	57.26	39.26	2863495.00	0.003
2002	42.52	41.56	3512658.60	0.002
2003	41.04	157.34	2486865.50	0.008
2004	27.26	227.00	3693768.00	0.01
2005	10.08	161.69	5064158.00	0.003
2006	26.92	3411.70	5568985.70	0.06
2007	19663.64	487287.20	5494212.40	9.22
2008	17025.64	85402.40	6042017.70	1.69
2009	14188.03	572689.60	6832552.10	8.58
2010	14706.10	327785.00	8366232.40	4.09
2011	38459.38	1439130.00	9918316.80	14.89
2012	51852.01	5299120.00	10484949.30	51.03
2013	16.17	3068480.00	13045856.40	23.52
2014	16.24	1914330.00	13128622.60	14.58
2015	16.94	657809.00	8160769.90	8.06
2016	12732.99	2883430.00	7832046.90	36.97
2017	187837.93	11928101.85	6598384.80	183.62
2018	146672.26	14186133.99	6322747.20	226.68
2019	507376.73	12842470.48	8766710.80	152.27
2020	14589.90	1016143.00	11056874.00	9.32
2021	66405.50	47647.70	8395649.30	1.36
Less value	0.68	12.00	4613.30	0.002
Higher value	507376.73	14186133.99	13128622.60	226.68
Average	34124.78	1773797.39	5143602.31	24.50
Annual growth (%) rate	32.30	46.00	18.20	27.2

Source: Ministry of Planning / Central Organization of Statistics - Trade Statistics - Years of Study –Baghdad Researchers calculated the average, annual growth rate and percentage of agricultural trade openness.*Agricultural trade openness ratio = (agricultural exports + agricultural imports) / agricultural domestic product at current prices x 100

RESULTS AND DISCUSSION

Several formulas applied to describe the model, and the semi-log formula showed the best results in measuring the effect of

agricultural trade openness on agricultural growth. After passing econometric and statistical tests, the model results were as follows:

$$AP = \beta_0 + \sum_{i=1}^k \beta_1 \log T_{t-1} + \sum_{i=1}^k \beta_2 \log EX_{t-1} + \sum_{i=1}^k \beta_3 \log MI_{t-1} + \varphi_1 T_{t-1} + \varphi_2 Ex_{t-1} + \varphi_3 MI_{t-1} + \varepsilon_i$$

Whereas:

AP= Agricultural output (million dinars).

Log T = The natural logarithm of the agricultural trade openness index.

Log EX =The natural logarithm of agricultural exports

Log MI= The natural logarithm of agricultural imports

k=number of decelerations

β =short-run parameters

Φ=Long-run parameters

ε_i=random erroe.

The research depends on the use of descriptive and quantitative methods, and some standards adopted to calculate and know the extent of impact of agricultural trade openness on agricultural growth. ARDL model was used, which is a statistical tool used to analyze the relationships between variables in the economy. The model estimates the effect of independent variables on the dependent variable, with the possibility of immediate and lagged effects. It allows researchers to analyze the ongoing effect in the long and short term, which makes it effective in economic studies

using Eviews12 statistical program via using time series data during 1990-2021. The stability of the time series for the study variables analyzed using the stationary PP (Philip Peron) test, and it found that all the variables were unstable at the original level, and after converting them to semi-logarithms and taking the first difference, the tests showed that all of them became stable. Based on the results, the alternative hypothesis was rejected and the null hypothesis was accepted, as the tests indicated the presence of the unit root at the level I(0), and after taking the first difference I(1), the stability hypothesis was

confirmed and showed the stability of the variables. This is consistent with standard results that indicate that most economic variables become stable after taking the first difference. Thus, it can be said that using PP test with semi logarithmic value analysis and taking the first difference showed that the economic variables studied were initially unstable but became stable after adjustment. This conclusion highlights the importance of examining and analyzing the stability of time series to ensure an accurate understanding of various economic developments. Table (2) shows the test results for the variables.

Table 2. Results of the stability test of variables using the PP test

UNIT ROOT TEST RESULTS TABLE (PP)					
<u>At Level</u>					
		AP	LNT	LNEX	LNMI
With Constant	t-Statistic	-1.3062	-0.9634	-1.4999	-1.0069
	Prob.	0.6140	0.7536	0.5204	0.7383
With Constant & Trend	t-Statistic	n0	n0	n0	n0
	Prob.	0.4839	0.1459	0.3254	0.6706
Without Constant & Trend	t-Statistic	n0	n0	n0	n0
	Prob.	0.0567	-0.9999	0.0633	-0.0856
		0.6934	0.2778	0.6955	0.6462
		n0	n0	n0	n0
<u>At First Difference</u>					
		d(AP)	d(LNT)	d(LNEX)	d(LNMI)
With Constant	t-Statistic	-4.3472	-5.3565	-6.8987	-4.6298
	Prob.	0.0018	0.0001	0.0000	0.0009
		***	***	***	***
With Constant & Trend	t-Statistic	-4.2157	-5.5091	-6.8004	-4.5257
	Prob.	0.0121	0.0005	0.0000	0.0058
		**	***	***	***
Without Constant & Trend	t-Statistic	-4.3987	-5.4302	-5.5450	-4.6349
	Prob.	0.0001	0.0000	0.0000	0.0000
		***	***	***	***

Significant at the 10% level, **Significant at the 5% level, ***Significant at the 1% level, no not significant

Source: Eviews12 output

Table 3. Analysis of the impact of indicators of agricultural trade openness on agricultural growth through ARDL model

Dependent Variable: AP				
Method: ARDL				
Date: 02/07/24 Time: 17:20				
Sample (adjusted): 1994 2021				
Included observations: 28 after adjustments				
Maximum dependent lags: 4 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (4 lags, automatic): LNT LNEX LNMI				
Fixed regressors: C				
Number of models evaluated: 500				
Selected Model: ARDL(4, 3, 4, 3)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
AP(-1)	0.097960	0.196565	0.498358	0.6290
AP(-2)	-0.557402	0.183933	-3.030468	0.0127
AP(-3)	0.423803	0.147311	2.876927	0.0165
AP(-4)	-0.427790	0.104130	-4.108215	0.0021
LNT	-315165.6	227233.4	-1.386969	0.1956
LNT(-1)	-247739.0	365697.3	-0.677443	0.5135
LNT(-2)	-112877.0	437504.1	-0.258002	0.8016
LNT(-3)	-619772.6	344045.0	-1.801429	0.1018
LNEX	-313655.0	94834.13	-3.307406	0.0079
LNEX(-1)	-50390.43	87215.53	-0.577769	0.5762
LNEX(-2)	360082.4	85646.85	4.204269	0.0018
LNEX(-3)	-103672.3	103954.3	-0.997287	0.3421
LNEX(-4)	338414.2	86799.93	3.898784	0.0030
LNMI	634809.4	146280.9	4.339659	0.0015
LNMI(-1)	552417.8	381945.6	1.446326	0.1787
LNMI(-2)	-147233.4	451362.0	-0.326198	0.7510
LNMI(-3)	835398.1	358829.6	2.328119	0.0422
C	-11318168	1880194.	-6.019681	0.0001
R-squared	0.992611		Mean dependent var.	5875403.
Adjusted R-squared	0.980050		S.D. dependent var	3681343.
S.E. of regression	519966.0		Akaike info criterion	29.41701
Sum squared residue	2.70E+12		Schwarz criterion	30.27343
Log likelihood	-393.8381		Hannan-Quinn criter.	29.67882
F-statistic	79.02359		Durbin-Watson stat	2.353313
Prob(F-statistic)	0.000000			

Source: Prepared by the researchers through the outputs of Eviews12 program

Using ARDL analysis to estimate the autoregressive distributed lag model, Table(3)shows that the estimated model has a strong interpretation, as the value of the coefficient of determination R^2 was 0.99, which indicates that 99% of the changes in agricultural growth are due to the influence of the independent variables (agricultural trade openness index, agricultural imports, agricultural exports), and the remaining percentage 1% is due to unmeasured factors, as its effect absorbed by the random variable, and with regard to the independent variables, the effect of the agricultural trade openness index on agricultural growth appears negative with a value of 315165.6 and is not significant. This is consistent with economic logic because increasing agricultural trade openness may be an obstacle to agricultural growth due to the abundance of cheap imports in the local market that do not encourages farmers to increase agricultural openness, while the agricultural exports parameter appears significant

at 5% with inverse relationship with agricultural growth at -313655 which is consistent with economic logic and the reason is due to that increasing trade openness will increase agricultural imports to the point of dumping sometimes as long as the state of openness remains complete, which will lead to a decline in domestic product production and thus a decrease in export quantities, and this is also due to some economic policies that do not encourage the development of the agricultural export sector, which reduces the opportunities for growth in this sector. As for the agricultural import's parameter, it appears with a value of 634809.4 and it is significant at 1%, with a direct relationship with agricultural growth. It is consistent with economic logic if agricultural imports are modern agricultural technologies and agricultural production requirements that increase agricultural productivity. Overall, the F test shows a significant value of 79.02 with 0.0000 prob., that indicating the significance of the model as a whole.

These results enhance our understanding of impact of independent variables on agricultural growth, as the agricultural trade openness index contributes a large and inverse effect, while agricultural exports have an inverse effect, and agricultural imports show a positive effect. These results reinforce the importance of understanding cause and effect relationships in the context of agriculture, and provide valuable guidance for future economic and agricultural decision-making. The results indicate that all independent variables show a time lag, and this is consistent with economic logic, as agricultural trade openness has the opposite effect, it affects competition with foreign agricultural commodities, which leads to challenges with the local agricultural sector and this may affect the rate of agricultural growth. As for agricultural exports, they have an inverse and negative impact on agricultural growth. If agricultural exports are negative, this means that the country imports more agricultural products than it exports, and therefore this can have a negative impact on agricultural growth because the increasing dependence on agricultural imports can weaken the ability to

develop the local agricultural sector and increase local production. Consequently, this situation can lead to reduced investment in local agriculture and reduced ability to achieve sustainable agricultural growth. As for agricultural imports, they had a significant and positive impact due to the direct relationship between agricultural imports and agricultural growth, as importing some agricultural products can lead to saving resources and costs, which contributes to improving efficiency and increasing production.

Error correction model and F-Bounds Test

The model shows that the error correction coefficient was -1.463 and has a statistical significance of 0.00, which is identical to the correction limit conditions. This negative and significant value reflects that imbalance in the short period corrected in the long period, indicating the existence of a co-integration relationship (Al-Isa, Q. N., & Suleiman, S. 2006) as shown in Table(4). The error will be corrected in less than a year.

Table 4. ECM error correction model

ARDL Error Correction Regression				
Dependent Variable: D(AP)				
Selected Model: ARDL(4, 3, 4, 3)				
Case 2: Restricted Constant and No Trend				
Date: 02/07/24 Time: 23:47				
Sample: 1990 2021				
Included observations: 28				
ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AP(-1))	0.561388	0.113082	4.964431	0.0006
D(AP(-2))	0.003987	0.092799	0.042962	0.9666
D(AP(-3))	0.427790	0.079929	5.352148	0.0003
D(LNT)	-315165.6	132228.4	-2.383493	0.0384
D(LNT(-1))	732649.6	252511.7	2.901448	0.0158
D(LNT(-2))	619772.6	198440.9	3.123210	0.0108
D(LNEX)	-313655.0	56851.51	-5.517091	0.0003
D(LNEX(-1))	-594824.3	82181.37	-7.237946	0.0000
D(LNEX(-2))	-234741.9	90671.16	-2.588937	0.0270
D(LNEX(-3))	-338414.2	68134.09	-4.966885	0.0006
D(LNMI)	634809.4	101076.9	6.280463	0.0001
D(LNMI(-1))	-688164.7	257169.3	-2.675921	0.0233
D(LNMI(-2))	-835398.1	214344.5	-3.897456	0.0030
CointEq(-1)*	-1.463429	0.155303	-9.423077	0.0000
R-squared	0.956451		Mean dependent var.	298063.8
Adjusted R-squared	0.916014		S.D. dependent var.	1516373.
S.E. of regression	439451.5		Akaike info criterion	29.13129
Sum squared residue	2.70E+12		Schwarz criterion	29.79740
Log likelihood	-393.8381		Hannan-Quinn criter.	29.33493
Durbin-Watson stat	2.353313			

Source: From the work of researchers based on the outputs of E-Views 12 program.

The co-integration test is conducted between the independent variables and the dependent variable in the autoregressive model for distributed lag periods (ARDL) using the

bounds test. This done by comparing the value of the F statistic with the lower and upper bounds, distributed over four statistically significant levels, as shown in Table (5).

Table 5. Bounds test for co-integration according to the Bounds Test methodology

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	12.68491	10%	2.37	3.2
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Source: From the work of researchers based on the outputs of E-Views 12 program.

From the table, we conclude that value of F statistic reached 12.684, which is higher than all levels of the lower and upper limits, and this indicates the existence of co-integration relationship between the independent variables and the dependent variable.

Using ARDL model to estimate the long-run equation between independent variables

Table (6) shows the long-run equation for the autoregressive model for distributed lag periods, and we note a significant positive relationship for each of the independent variables (Agricultural trade openness index, agricultural imports) at the 1% level of significance, except for agricultural exports, which are insignificant and have a negative relationship with agricultural growth.

Table 6. Long-run equation

Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNT	-885287.0	129656.4	-6.827947	0.0000
LNEX	157697.4	90662.23	1.739395	0.1126
LNMI	1281506.	103985.6	12.32388	0.0000
C	-7734008.	1212577.	-6.378159	0.0001
EC = AP - (-885286.9895*LNT + 157697.4226*LNEX + 1281505.5990*LNMI -7734007.9444)				

Source: From the work of researchers based on the outputs of E-Views 12 program.

Testing the validity of the estimated model:

After estimating the relationship between the independent variables and the dependent variable using ARDL co-integration analysis, a residuals test performed to verify that there were no econometric problems in the estimated model. Hetero test implemented to detect the problem of homoscedasticity, and there are several tests that show

homoscedasticity, including ARCH test, which relies on the Chi-Square probability value of 0.4248, so null hypothesis that the model is accepted, that mean it does not suffer from heteroscedasticity, and the alternative hypothesis indicating the presence of homoscedasticity was rejected, since the value is greater than 0.01 as shown in Table (7).=

Table 7. Test to detect the problem of homoscedasticity

Heteroscedasticity Test: ARCH			
F-statistic	0.604147	Prob. F(1,25)	0.4443
Obs*R-squared	0.637083	Prob. Chi-Square(1)	0.4248

Source: From the work of researchers based on the outputs of E-Views 12 program.

Serial autocorrelation test for residuals (LM Test): LM test is used, which also depends on the Chi-Square probability value and the probability value appears in the table 0.330, which confirms the acceptance of null hypothesis that shows that the model does not

suffer from serial autocorrelation of errors. The alternative hypothesis, which indicates the presence of serial autocorrelation of errors rejected, since the value was greater than (0.01) as shown in Table(8).

Table 8. Serial autocorrelation test for the residuals

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.343573	Prob. F(2,8)	0.7192
Obs*R-squared	2.214779	Prob. Chi-Square(2)	0.3304

Source: From the work of researchers based on the outputs of E-Views 12 program

Jarque-Bera test for normal distribution of residuals: According to Figure (1), the distribution of the residuals appears normally in the model, with the Jarque-Bera value

reaching 14.59, which indicates acceptance of the hypothesis that the distribution of the estimated residuals is not proportional to the normal distribution, since the probability value

exceeds 0.05. This supports the disproportionality hypothesis that random errors are normally distributed and, therefore,

is a positive indicator of the accuracy of the estimated model.

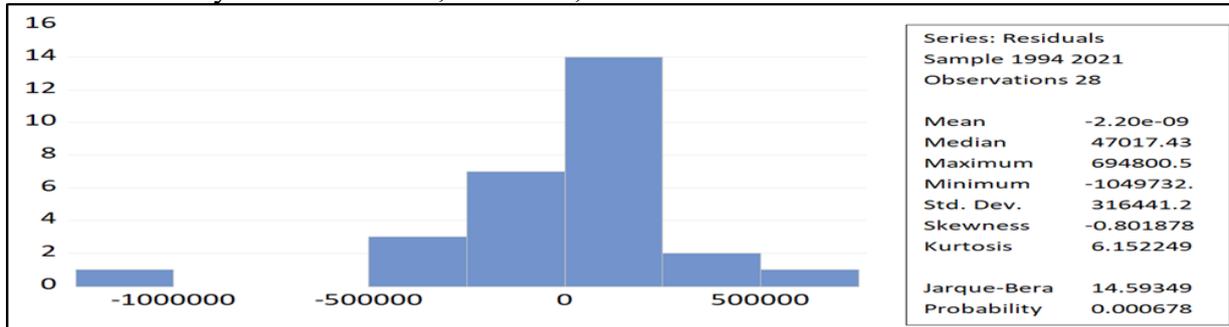


Figure 1.The distribution of the residuals

Source: From the work of researchers based on the outputs of E-Views 12 program.

Multicollinearity test

There are several tests to detect the presence of multiple linear correlation between independent variables, including the Kline Test. This test compares value of the coefficient of determination with the square of the simple linear correlation coefficient between any pair of independent variables in the model. If the value of the coefficient of determination is greater than the square of the simple correlation coefficient, this indicates that the estimated model is free from the problem of multicollinearity. If the value of the coefficient of determination is smaller than the

square of the simple correlation coefficient, this indicates a problem with multicollinearity in the estimated model. As we see from Table (9), the matrix of correlation coefficients between the independent variables shows that the square of value of the simple correlation coefficient between any pair of independent variables in the model is smaller than value of the coefficient of determination for the estimated model, which is 0.99. This indicates that there is no multicollinearity problem between the independent variables in the model.

Table 9. Multicollinearity test

Correlation				
	AP	LNT	LNEX	LNMI
AP	1.000000	0.654646	0.576744	0.850887
LNT	0.654646	1.000000	0.707076	0.897763
LNEX	0.576744	0.707076	1.000000	0.764856
LNMI	0.850887	0.897763	0.764856	1.000000

Source: From the work of researchers based on the outputs of E-Views 12 program.

CONCLUSIONS

The study concludes that the ARDL model's co-integration test indicates a long-term equilibrium relationship between the dependent and explanatory variables, signifying significant effects. High agricultural trade openness in Iraq suggests a heavy reliance on foreign markets, exposing the economy to fluctuations and increased imports, potentially leading to dumping practices. The impact of agricultural trade openness depends on overall economic performance and export quality. Policies should focus on importing raw materials to boost agricultural growth and promoting competitive exports. Recommendations include government support for farmers

through financial assistance and infrastructure development, regulation of agricultural markets to ensure fair pricing, and efforts to diversify and develop agricultural exports for sustainable economic growth.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

DECLARATION OF FUND

The authors declare that they have not received a fund.

AUTHOR/S DECLARATION

We confirm that all Figures and Tables in the manuscript are original to us. Additionally, any Figures and images that do not belong to us have been incorporated with the required

permissions for re-publication, which are included with the manuscript.

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تحليل اقتصادي للعلاقة بين الانفتاح التجاري الزراعي والنمو الزراعي في العراق للمدة (1990-2021)

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المستخلص

يهدف البحث إلى تحليل العلاقة بين الانفتاح التجاري الزراعي والنمو الزراعي في العراق باستخدام بيانات سلاسل زمنية سنوية للمدة (1990-2021). ويستند البحث إلى تحليل الحالة العراقية كدولة تتفتح على السوق العالمية ويسعى لفهم دور الانفتاح في تعزيز النمو الزراعي. ويدور سؤال البحث حول تأثير الانفتاح التجاري الزراعي على النمو الزراعي أو العكس. وتعتمد الدراسة على تحليل بيانات ثانوية واستخدام أساليب إحصائية مثل ARDL وتحليل التكامل المشترك. وتظهر أهمية البحث في فهم العلاقة السببية المعقدة بين الانفتاح التجاري الزراعي والنمو الزراعي. استنتاجات البحث تشير إلى أن ارتفاع مؤشر الانفتاح التجاري الزراعي يعني اعتماد الاقتصاد العراقي بشكل كبير على العالم الخارجي، مما يضعف القدرة الاقتصادية والسياسية على مواجهة التقلبات في النشاط الاقتصادي. ويتسبب ذلك في زيادة الاستيرادات الغذائية والزراعية وتعرض البلد لسياسة الإغراق. ويظهر اختبار التكامل المشترك لنموذج ARDL وجود علاقة توازنه طويلة المدى بين المتغير التابع والمتغيرات التفسيرية. ويوصي البحث إلى ضرورة تعزيز تنافسية المنتجات الزراعية الرئيسية وتبني سياسات تشجيعية لتعزيز التصدير، كما تبرز أهمية وضع سياسات زراعية فعالة توفر الدعم اللازم للمزارعين، للتكيف مع التغيرات الناتجة عن الانفتاح التجاري الزراعي.

الكلمات المفتاحية: الصادرات الزراعية، الاستيرادات الزراعية، النمو الاقتصادي، الميزات النسبية، ARDL.

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