World Economics & Finance Bulletin (WEFB)
Available Online at: https://www.scholarexpress.net
Vol. 15, October 2022
I7SSN: 2749-3628,

Financial Development and Economic Growth in Iraq: The Role of Financial Institutions using NARDL

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Article history:

Received: 8th August 2022
Accepted: 8th September 2022
Published: 11th October 2022

Abstract:

In this research, we examine the relationship between financial development through indicators of financial institutions and economic growth in Iraq by annual data (2004–2019). Unlike the studies and as an alternative to the conventional method in using the ARDL model, the Nonlinear Autoregressive Distributed Lag (NARDL) model and Toda-Yamamoto causality were applied to analyze the relationship between financial development and economic growth. The results of the F-bounds test show that there is a stable long-run relationship between indicators of financial institutions (financial depth, financial efficiency, financial access) and economic growth. On the other hand, the results of the causality test, show that there is no causal relationship between all the indicators of financial institutions and economic growth. The dynamic impact multiplier shows that (a) the final impact of financial depth of financial institutions was negative, that is, economic growth declines due to a decrease in the level of financial depth of financial institutions; (b) the final impact of the financial efficiency of financial institutions at the beginning of the period is positive and then stabilizes at the negative level, that is, economic growth declines due to a decrease in the efficiency of financial institutions; and (c) the final impact of financial access to financial institutions was positive, that is, economic growth increases due to the high level of financial access to financial institutions.

Keywords: Financial Development, Economic Growth, Nonlinear impact, dynamic multiplier, Toda-Yamamoto Causality, Nonlinear Autoregressive Distributed Lag NARDL.

JEL Classification: G0, G20, N20, O40, O53, P34, C49

1. INTRODUCTION:

The financial system is one of the most important components of economic growth, because the financial system plays the role of mediator between the economic units with financial surplus and economic units with the financial deficit, in order to achieve thus contributing to the financing of economic growth through investment and thus increasing economic activity and high growth rates at the same time. Therefore, the development of the financial system is clearly reflected in economic growth.

Economists have dealt with the subject of the relationship between financial development and economic growth in detail, to determine the nature and direction of this relationship. The study of Schumpeter (1911) is one of the first economic studies related to this topic. It indicated that the financial sector has a great impact on promoting economic growth through the role of regulator.

In Iraq, and through the market system followed after 2003, Iraq proceeded to follow many reforms and procedures to achieve financial development through the supervision of the Central Bank to increase the degree of development of the financial system, by increasing financial depth, financial access, and financial efficiency in financial institutions to play an important role in supporting The process of economic growth in Iraq. It must be noted that banking institutions represent the main part of the financial system because the financial system in Iraq is a bank-based system.

The research aims to analyze and measure the nonlinear impact of development in financial institutions on economic growth in Iraq during the

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period (2004-2019) using the Nonlinear Autoregressive Distributed Lag (NARDL).

2. THE THEORETICAL FRAMEWORK FOR FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH:

2.1 Financial development - Definition and Indicators:

Financial development is defined as "improving the quantity, quality, and efficiency of financial intermediation services" (Sanusi et al., 2012). This improvement appears in financial intermediation services and financial indicators in general through transactions between financial institutions and non-financial economic entities, including Money Supply and Bank Loans (Ono, 2017). Therefore, financial development can be defined as the ability of the financial system in a country to provide financial services to facilitate and intensify financial transactions between individuals and economic units, as it is the key to the economic growth of countries.

In general, there is no general agreement on the indicators used to measure financial development, but a new indicator of financial development was used in a study prepared by the International Monetary Fund (2015) to measure all dimensions of financial development and to avoid weaknesses experienced by the single traditional indicators that were used in a manner Extensive research and studies. The purpose of this indicator is to identify the main features of financial systems in terms of their depth, efficiency, and accessibility. The financial development index proposed by the International Monetary Fund, shown in Figure (1), includes the following sub-indicators: (Svirydzenka, 2016)

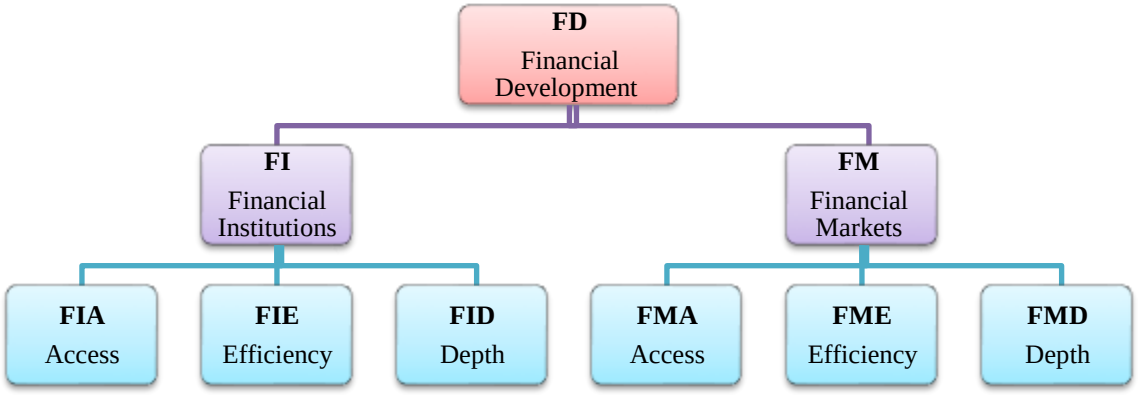
First: Financial Institutions Indicators:

1. Financial Institutions Depth Index (FID): It is measured by:
   a. Ratio of credit to the private sector to GDP
   b. Ratio of pension fund assets to GDP
   c. Ratio of investment funds assets to GDP
   d. Ratio of life and non-life insurance premiums to GDP
2. Financial Institutions Efficiency Index (FIE): It is measured by:
   a. net interest margin.
   b. Lending to deposit ratio.
   c. Non-interest income to total income.
   d. Overhead costs to total assets.
   e. Return on assets.
   f. Return on equity.
3. Financial Institutions Access Index (FIA): It is measured by:
   a. Number of bank branches per 100,000 adults.
   b. Number of ATMs per 100,000 adults.

Second: Financial Market Indicators:

1. Financial Market Depth Index (FMD): It is measured by:
   a. The ratio of stock market capitalization to GDP.
   b. The ratio of shares traded to GDP.
   c. The ratio of a government's international debt securities to GDP.
   d. The ratio of total debt securities of financial companies to GDP.
   e. The ratio of total debt securities of non-financial companies to GDP.
2. Financial Market Efficiency Index (FME): It is measured by:
   a. Stock market turnover ratio (shares traded to capitalization).
3. The Financial Market Access Index (FMA): It is measured by:
   a. Market capitalization ratio excluding the top 10 largest companies.
   b. Total number of debt issuers (Local and foreign companies, financial and non-financial companies).

Figure (1) Financial Development Indicators



Source: Svirydzenka, K. (2016). "Introducing a New Broad-based Index of Financial Development", International Monetary Fund, IMF Working Papers, 16 (05).

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2.2 Economic Growth - Definition and Indicators:

The concept of economic growth was introduced into circulation in economic sciences by Simon Kuznets (Nobel Prize winner), who observed this process taking place at the end of the eighteenth century. However, another point of view supported by the majority of modern researchers is that they are sure that the process of economic growth began in the 1820s (Poliduts & Kapkaev, 2015).

Economic growth is defined as "the increase in the tools and products that will be used to satisfy human needs in a country". The method of measuring the rate of economic growth includes asking whether there is a real increase (excluding price increases) in the gross domestic product from year to year. GDP is the market equivalent of all measurable values produced by one economy (ÇalÕúkan, 2015).

Indicators of economic growth are an important tool in measuring the volume and quality of the economic performance of countries (Eboi, 2015). Therefore, the economic theory proposes a wide range of indicators to measure the growth rate of an economy, using a set of variables that control other factors related to growth.

For example, "inflation" is used for economic policy variables, as an indicator of macroeconomic stability, and for structural variables "trade" is used to capture the degree of openness of the economy; "Infant mortality rate" is used for social policy variables that attempt to assess the impact of population dynamics on growth.

Regardless of the conceptual and econometric problems associated with the use of GDP as an indicator of growth, the use of GDP to express the growth rate is supported by the new internal growth theory. Sometimes real GDP per capita (which measures the ratio of real GDP to total population in an economy) is used as an indicator of economic growth (Awili, 2015) (Peterson, 2017).

It also uses the GDP growth rate after excluding the population growth rate from it as an indicator of economic growth. Thus, economic growth is expressed according to the following equation: (Zeghair, 2017)

$$Economic\ growth\ rate = GDP\ growth - Population\ growth$$

Economic growth does not only mean an increase in GDP, but that the increase in GDP must result in an increase in real per capita income, and therefore the growth rate of GDP must exceed the rate of population growth.

2.3 The relationship between financial development and economic growth:

Many growth and development economists, such as Ragnar Nurkse and Hans Wolfgang Singer, have emphasized the logic of circular causation in linking economic manifestations through a set of forces that are linked together and cause and impact interact to form a self-sustaining cycle. This explains why some countries remain poor just because they are poor, and other countries remain rich just because they are rich. However, Gunnar Myrdal denounced stability and balance in the economic situation, as it is contrary to logic, the idea of circular causation includes in its essence the existence of a cumulative loop down or up It does not include the existence of stability or balance, as the economic and social system in terms of its existence does not know stability and balance.

Any economic change would generate forces that reinforce the direction of this change, and this explains the increase in poverty and the increase in wealth, and thus the widening of the gap between them. However, there is a possibility to change the direction of this cumulative cycle from the bottom up through many internal and external forces through The mechanism of action of the multiplier and then the accelerator. Among these forces - for the achievement of change - is the financial development that would break and change the direction of this cycle towards the top in order to achieve more economic growth. Therefore, it is of great importance to developing the financial system, especially the banking system, which aggregates financial resources from surplus economic units, and then passes them to economic units with deficits, thus contributing to stimulating economic growth through financing investments and developing channels to mobilize and stimulate savings towards banks, and then credit and investment, as well as the development of financial markets, which will fuel economic well-being, social justice and economic growth (Saleh & Hatem, 2017).

In modern societies, investments are separated from savings that will finance the investments, and the interaction between saving and investment is carried out by the financial system. The relationship between financial development and economic growth occurs at this stage. The impact of financial development on achieving economic growth can be illustrated through the following:

1. Cycle of the Financial Development - Investment - Economic Growth:

The investment increases as a result of the credit facilities provided and the reduction of the financial risk provided by the financial system. This cycle can be clarified in Figure (2):

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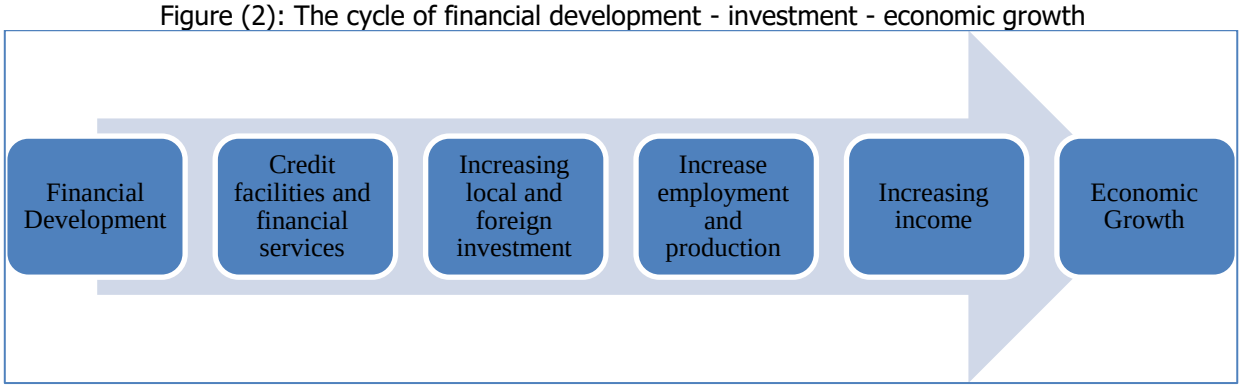
Figure (2): The cycle of financial development - investment - economic growth

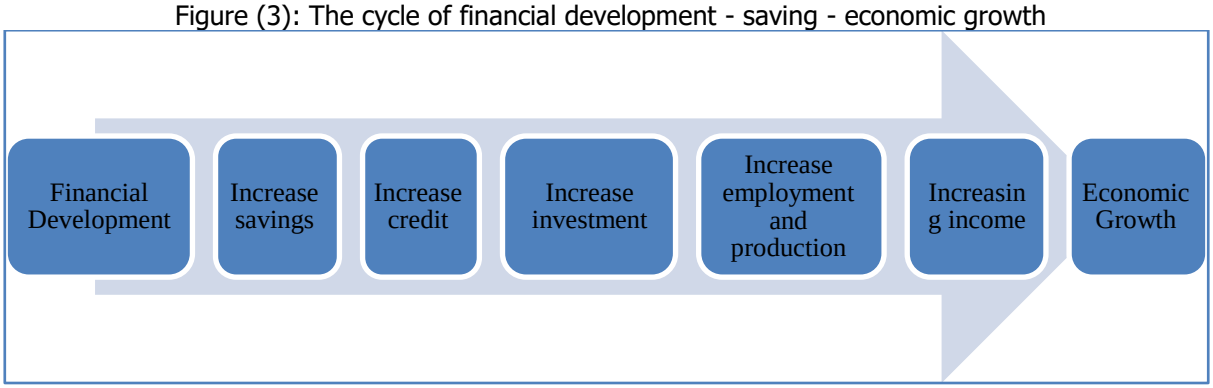


Source: Saleh, L. Y. & Hatem, G. (2017). Economic growth in the context of financial development in Iraq for the period 1990-2013, Journal of Baghdad College of University Economics, No. (53), pp. 203-230.

2. The cycle of financial development - saving - economic growth:

Financial development helps mobilize savings and direct them towards financial institutions with the aim of obtaining financial returns and then converting them into credit, thus financing many investment projects that contribute significantly to increasing production, use, and economic growth. This episode can be clarified in Figure (3):

Figure (3): The cycle of financial development - saving - economic growth



Source: Saleh, L. Y. & Hatem, G. (2017). Economic growth in the context of financial development in Iraq for the period 1990-2013, Journal of Baghdad College of University Economics, No. (53), pp. 203-230.

The relationship between financial development and economic growth is one of the relationships that economists have studied extensively. This relationship is a subject of great controversy among economists, both from the theoretical and practical side, and many theories have emerged that explain the nature and direction of this relationship, including: (Al-Khatib & Sundouq, 2020: 24-26) (Al-Nuaimi et al., 2019: 307)

1. *Theory of financial structuring*: It states that banks have a major role in supporting the economic sectors through their financing operations, whether short or long-term. This theory explains the relationship between financial development and economic growth through the structure and access of the financial sector, as the presence of a wide network of financial institutions that work to provide various financial services has a significant impact on the saving and investment process, which contributes to raising economic growth rates. It was found that this relationship is determined based on the level of economic growth in the country according to two mechanisms: the leading supply mechanism and the dependent demand mechanism.

Hugh T. Patrick (1966) explains that in the early stages of economic growth, the leading supply hypothesis is realized, which says that financial development positively affects economic growth, as the presence of financial institutions and financial markets increases the supply of financial services, and through the presence of financial services, the financial sector performs two functions: the first is the transfer of resources From the traditional sectors that do not contribute to economic growth to the vital sectors that contribute to economic growth, and the second is to strengthen and motivate companies within these sectors to respond to their services and

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allocate funds in good investments, which raises returns, and this gives an incentive to save and invest, and thus contributes to economic growth. But after reaching a high economic growth rate, a new stage begins, which is dependent demand, which says that the increase in the supply of financial services is in response to the increase in demand for them due to the rise in economic growth rates, and thus the increase in investment and production operations.

2. *Theory of financial constraint*: It takes into account the restrictions imposed by governments on the financial system, as these restrictions hinder the development of the financial system and reflect negatively on economic growth, while the policy of financial liberalization reflects positively on economic growth. The study of Mckinnon (1973) and Shaw (1973) is one of the most important studies that explain the relationship between financial development and economic growth, as when the government reduces the restrictions it imposes on the financial sector (such as legal reserve requirements), savings will increase and the supply of private credit will increase, and thus will increase Investments as a result of increased funds allocated to lend, which raises economic growth rates. While the existence of restrictions on the financial system will lead to a decrease in savings and an increase in consumption, and thus a decline in economic growth rates.
3. *Theory of internal growth*: The financial sector affects economic growth according to this theory through two main channels, namely, the channel of capital accumulation and the channel of capital productivity. As for the capital accumulation channel, the impact is through an increase in the level of savings, as the more savings there are, the more money available for investment increases, so economic growth rates rise in proportion to the rise in investment rates. As for the capital productivity channel, the development of the financial sector enables the collection and analysis of information and the evaluation of available investment projects, which contribute to removing the problems of information heterogeneity and improving the quality and efficiency of investments by pooling financial resources in their best use, which leads to increased capital productivity and thus raise economic growth rates.

3. Analysis of the financial development and economic growth in Iraq:

3.1 The Evolution of Financial Development Index in Iraq for the period (2004-2019):

An aggregate indicator (synthesis indicator) of financial development in Iraq was built, guided by the indicator proposed by the International Monetary Fund [shown in 2.1] and according to the available data on Iraq related to financial institutions. The aggregate index of financial development in Iraq included the indicators of the following financial institutions:[(1) the ratio of credit provided to the private sector to GDP, (2) the ratio of total deposits to GDP (an expression of financial depth)], and [(3) number of bank branches per 100,000 adults, (4) number of ATMs per 100,000 adults (an expression of financial access)], and [(5) rate of return on assets, (6) rate of return on equity (an expression of financial efficiency)].

The aggregate index has been built to range in value between zero and one according to the (Experimental Transformation Method) used in constructing the aggregate indicators by converting the original values into standard values while giving the same weight to all sub-indicators to prevent some indicators from having a greater impact than others. Also, all indicators have the same variance (Abdullah, 2019: 27).

Table (1) and Figure (4) show the degree of financial development in the Iraqi financial system during the period (2004-2019), as the closer degree of financial development from (1) indicates the high development of the financial system. In contrast, a lower score indicates lower financial development.

Table (1) The aggregate indicator of financial development in Iraq

Year	Credit to the private sector to GDP	Total deposits to GDP	Number of bank branches per 100,000 adults	Number of ATMs per 100,000 adults	Return on assets	Return on equity	Financial Development Aggregate Index	Annual rate of change %
2004	1.2	16.2	1.8	0.47	1.8	14.7	0.17	-
2005	1.3	14.6	2	0.75	2.2	11.4	0.17	- 1.3
2006	2	17.7	3.4	0.51	2.5	12.5	0.28	64.7
2007	2.1	23.5	3.41	0.63	4.5	21.7	0.5	78.6
2008	2.5	22	3.46	0.7	3.9	23.1	0.49	-2

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2009	3.6	29.5	4.8	1.2	1.7	10	0.46	-6.1
2010	5.3	29.6	5.3	2.2	3.1	14.9	0.66	43.5
2011	5.2	25.8	5.1	2.17	3.6	14.6	0.63	-4.5
2012	5.8	24.4	5.5	2.29	4.1	16.8	0.7	11.1
2013	6.2	25.2	5.4	2.08	4.5	17.2	0.72	2.9
2014	6.7	27.8	5.3	1.61	2.7	8.8	0.58	-19.4
2015	7.3	33.1	4.9	1.86	0.4	3.3	0.5	-13.8
2016	9.2	31.7	4	2.38	1.9	10.5	0.63	26
2017	8.8	30.2	4.21	2.85	1.6	7.6	0.6	-4.8
2018	7.5	28.6	4.4	3.65	0.8	3.7	0.54	-10
2019	7.6	29.5	3.9	4.16	2	11	0.66	22.2

Source: Table prepared by researchers based on:

- Iraq Stock Exchange, Annual Report for the years 2004-2019, Baghdad, Iraq.
- The Securities Commission, the annual report on the movement of trading in the Iraqi Stock Exchange for the years 2007-2019, Department of Research and Studies, Baghdad, Iraq.
- Website data: < https://databank.worldbank.org/home.aspx >.
- Website data: < https://www.cbiraq.org/default.aspx >.

It is noted from Table (1) that the degree of financial development increased from (0.17) in 2004 to reach (0.5) in 2007, with a growth rate of (78.6%), then decreased to (0.49) in 2008, then (0.46) and with a negative growth rate of (6.1%), due to the global financial crisis and its impact on the global economy and its associated financial systems, commodity prices and cross-border trades. After that, the degree of financial development began to rise until 2013, when it reached its highest level, reaching the degree of financial development (0.72). This came as a result of the expansion of the work of financial institutions during these years due to the rise in global oil prices and its reflection on the activity of the financial and banking system. Then in 2014, the degree of financial development decreased to (0.58) and then to (0.5) in 2015 with a negative growth rate of (14.8), which led to a decrease in the degree of financial development due to the terrorist attacks on Iraq by ISIS, as well as the economic crisis due to the drop in global oil prices. In the banking sector, many banks and bank branches were controlled, as well as the decline in the provision of financial services by banks and their tendency to finance internal debt, and the decrease in the confidence of individuals in the banking system in general, which led to a decrease in deposits and less credit being granted. Then, the degree of financial development in the following years gradually increased as a result of the improvement of conditions in Iraq in general. It is noted that the degree of financial development in Iraq, in general, is above average and that the general trend for it was positive, which indicates the continuous improvement in the level of development of the financial system in Iraq

Figure (4) Financial Development Index in Iraq for the period (2004-2019)

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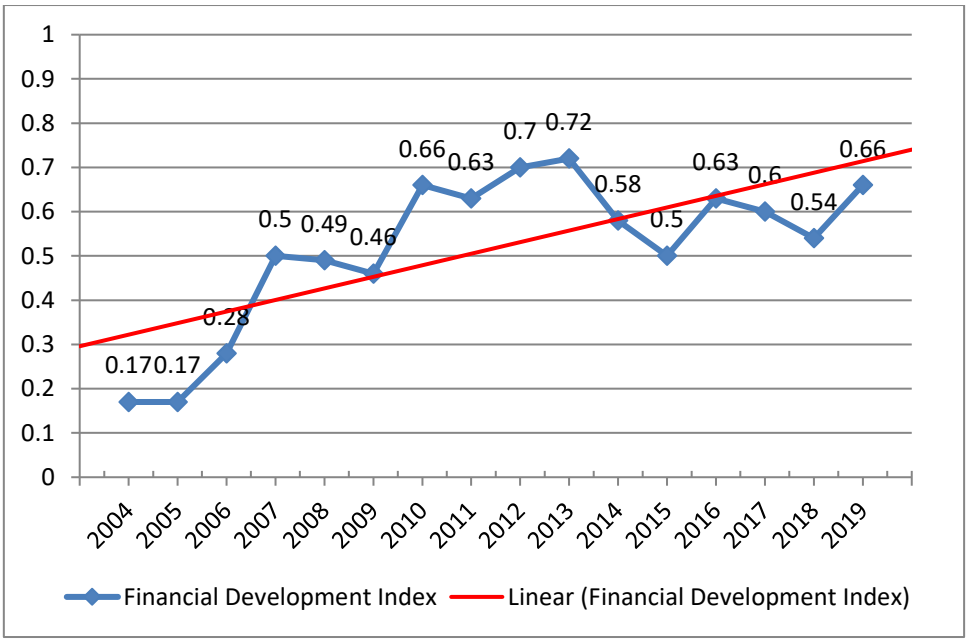

Source: Figure prepared by researchers based on the data in Table (1).

It is clear from Figure (4) that the general trend of the financial development indicator was clearly positive, which indicates that the financial development in Iraq is gradually being achieved. It is also noted that the highest degree of financial development in Iraq was (0.72) in 2013, while the year 2004 was (0.17) the lowest during the period (2004-2019).

3.2 Analysis of Economic Growth Index in Iraq for the period (2004-2019):

The dependence of foreign trade in Iraq on the exported quantities of crude oil in achieving financial surpluses has deepened the imbalance in economic sectors and activities, as the lack of diversification in the volume of Iraq's exports makes the country economically exposed, and is characterized by dependence on foreign markets.

This means that the drop in the price of a barrel of oil in the global markets will directly affect the Iraqi economy, as it depends on its exports from a single source (crude oil). Thus, the oil output has a clear impact on the gross domestic product and thus its impact on the macroeconomic variables and the associated financial and monetary indicators and capital markets.

Table (2) The economic growth rate in Iraq for the period (2004-2019)

Year	GDP (Million ID)	Annual change %	Population (Million people)	Annual change %	Economic Growth*	Economic Growth Index**
2004	53235358.7	79.9	26.31	2.6	77.3	1
2005	73533598.6	38.1	26.92	2.3	35.8	0.61
2006	95587954.8	30	27.45	2	28	0.54
2007	111455813.4	16.6	27.91	1.7	14.9	0.42
2008	157026061.6	40.9	28.39	1.7	39.2	0.65
2009	130643200.4	-16.8	28.97	2	-18.8	0.11
2010	162064565.5	24.1	29.74	2.7	21.4	0.48
2011	217327107.4	34.1	30.73	3.3	30.8	0.57
2012	254225490.7	17	31.89	3.8	13.2	0.40
2013	273587529.2	7.6	33.16	4	3.6	0.32
2014	266332655.1	-2.7	34.41	3.8	-6.5	0.22
2015	194680971.8	-26.9	35.57	3.4	-30.3	0
2016	196924141.7	1.2	36.61	2.9	-1.7	0.27
2017	221665709.5	12.6	37.55	2.6	10	0.37
2018	268918874	21.3	38.43	2.3	19	0.46

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2019	277884869.4	3.3	39.31	2.3	1	0.29

Source: Table prepared by the researcher based on: (https://data.worldbank.org)
* Economic growth rate = GDP growth - population growth

** Experimental Transformation Method was used to convert the economic growth rate from the original values to the standard values in order to enable the economic measurement process.

It is noted in Table (2) and Figure (5) the growth of the gross domestic product of the various productive sectors and activities. It achieved a nearly tenfold increase during the period (2004-2019). The gross domestic product increased from (29585,788.6) million Iraqi dinars in 2003 to about (277884869.4) million Iraqi dinars in 2019, i.e. a growth rate of about (89.5%) during the research period, and average growth of (17.5%), as it rose from 2004 to 2008. The reason for the rise to this extent as a result of the rise in the price of a barrel of oil is due to More than (100) dollars, in addition to the increase in the quantities of exported oil and the exploration of new oil fields, which contributed to the rise in the gross domestic product. In 2009, the gross domestic product decreased to (130643200.4) million dinars, with a negative growth rate (16.8%), as a result of the global financial crisis and the drop in global oil prices. Then it began to rise until the years 2014 and 2015, as the gross domestic product decreased as a result of the decline in oil prices in global markets, as well as the repercussions of the war with ISIS, and the economic recession that hit the world at that time, which negatively affected the reality of the Iraqi economy and stopped production and services operations on a large scale.

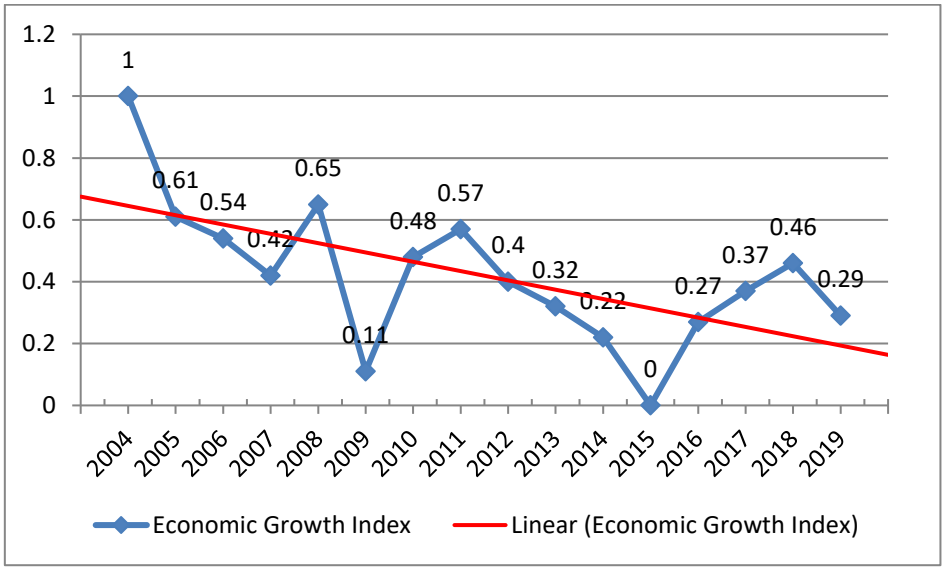

Figure (5) Economic Growth Index in Iraq for the period (2004-2019)
Source: Figure prepared by researchers based on the data in Table (2).

Table (2) also shows the rate of economic growth, after excluding the population growth rate from the growth of the gross domestic product according to the aforementioned equation. The economic growth came at a (relatively) descending rate during the research period, reaching (35.8%) in 2005 after If the population does not exceed (27) million people, and the economic growth decreased to (-18.8%) in 2009 due to the repercussions of the global financial crisis and the decrease in the gross domestic product to about (-16.8%) compared to (40.9%) in 2008, to rise The growth rate is gradual, reaching (21.4%) in 2010 and (30.8%) in 2011, due to the improvement in oil prices and the recovery of the country's gross domestic product. Then economic growth decreased due to the crisis of the war with ISIS in 2014 to (-6.5%) and (-30.3%) in 2015, to return and rise in 2018 to about (19%) as a result of the recovery of the oil markets, which significantly and positively affected the output the country's gross domestic product.

4. METHODOLOGY:

Using the NARDL for measuring the Nonlinear impact of development in financial institutions and economic growth in Iraq for the period (2004-2019).

4.1 Introduction of NARDL:

The NARDL method is used to test the non-linearity hypothesis of the relationship between some variables,

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both in the short and long term. The NARDL method is an extension or generalization of the linear estimation of the (ARDL) method developed by (Pesaran et al., 2001) to take into account the possibility of nonlinearity in the influence of the independent variable on the dependent variable, whether in the short or long term. This NARDL method, as in ARDL, detects short-term and long-term impacts in one equation and does not necessarily need long time series compared to the nonlinear cointegration method (Chen et al., 2020), as well as its flexibility in using stable variables from Rank I(0) or I(1), meaning whether the variables are stable in the level or the first difference or the mixture between them (Akber & Paltasingh, 2019), therefore the stable variables in the second difference are not taken into account, i.e. integration rank I(2).

Also, this NARDL method enables us to detect hidden cointegration, meaning that it avoids deleting the intangible relationships between the phenomenon and the factors that explain it, based on the random assumption of the linearity of the relationship between them. The NARDL method enables us to test a complex hypothesis whether the relationship between the two variables of the subject of the searcher is linear or nonlinear, or even whether there is no cointegration relationship between them.

4.2 Model, Data, and Descriptive Statistics:

The measurement of nonlinear economic relations is a recent topic that has been associated with economic growth. The phenomenon of nonlinear measurement is an important topic to show the different impacts of economic variables on each other in their rise and fall. To achieve this, an autoregressive nonlinear distributed slowdown methodology is followed, in order to measure the positive and negative impact of development in financial institutions and economic growth in Iraq for the period (2004-2019), using the standard program (E-views9). Due to the lack of observations in the series used in the research (2004-2019), which is represented by only sixteen views (Obs=16), so the relationship cannot be measured on a few observations. Accordingly, the time series was converted from annual data to quarterly data, so that the number of observations became (Obs=64), as the data was converted from annual data to quarterly data, through the Quadratic method through its mean.

In principle, the econometric model equation used in the application of the ARDL model is explained in the following:

Y = f (X1_pos, X1_neg, X2_pos, X2_neg, X3_pos, X3_neg)

Since:

Y = Economic Growth

X1_pos = Positive Impact of Financial Institutions Depth

X1_neg = Negative Impact of Financial Institutions Depth

X2_pos = Positive impact of Financial Institutions Efficiency

X2_neg = Negative impact of Financial Institutions Efficiency

X3_pos = Positive impact of Financial Institutions Access

X3_neg = Negative Impact of Financial Institutions Access

4.2.1 The results of the Unit Root test according to the Philips-Peron test:

The results of the (Phillips–Perron test) show through Table (3) that the dependent variable (economic growth) was static at level, while the independent variables (financial depth, financial access, financial efficiency) - as indicators of development in financial institutions - were not static at level and became static at first difference.

Table (3) Phillips–Perron test

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UNIT ROOT TEST TABLE (PP)

At Level					
		Y	X1	X2	X3
With Constant	t-Statistic	-3.4280	-1.1734	-1.7902	-2.1754
	Prob.	***0.0135***	***0.6808***	***0.3820***	***0.2171***
		**	n0	n0	n0
With Constant & Trend	t-Statistic	-3.4420	-1.7349	-1.4667	-2.3606
	Prob.	***0.0550***	***0.7239***	***0.8307***	***0.3961***
		*	n0	n0	n0
Without Constant & Trend	t-Statistic	-2.6207	0.7219	0.6997	-0.9892
	Prob.	***0.0095***	***0.8684***	***0.8641***	***0.2859***
		***	n0	n0	n0
At First Difference					
		d(Y)	d(X1)	d(X2)	d(X3)
With Constant	t-Statistic	-4.8243	-3.7301	-3.4639	-3.8874
	Prob.	***0.0002***	***0.0058***	***0.0123***	***0.0037***
		***	***	**	***
With Constant & Trend	t-Statistic	-4.7812	-3.7510	-3.6624	-3.8555
	Prob.	***0.0014***	***0.0261***	***0.0326***	***0.0200***
		***	**	**	**
Without Constant & Trend	t-Statistic	-4.7835	-3.4141	-3.1907	-3.9196
	Prob.	***0.0000***	***0.0009***	***0.0019***	***0.0002***
		***	***	***	***

Source: Table prepared by researchers based on Eviews9 results.

Since all of time series (model variables) became stable at level or at first difference according to the Unit Root test (Phillips–Perron test), the conditions of the NARDL model have been met.

4.2.2 Testing the model safety:

The model safety test is one of the initial tests before entering into short and long-term relationships. This test is to identify the integrity of the model from spurious regression and then reach real results. When there is a spurious regression in the model, it indicates that the results are incorrect and the model is not acceptable. Table (4) shows the results of the model's safety:

Table (4) Safety of the NARDL model

Safety measurements model			
R-squared	0.832123	Durbin-Watson stat	2.098322
F-statistic	13.01144	Prob (F-statistic)	0.000000

Source: Table prepared by researchers based on Eviews9 results.

The results of Table (4) show the value of the high R-squared coefficient of determination, which is 0.832123, and it shows the changes that occur in economic growth as a result of changing the indicators of financial institutions (financial depth, financial access, financial efficiency), that is, the development indicators of financial institutions change economic growth by 83.2%, and 16.8% of the changes that occur in economic growth are the result of other factors not present in the model.

Also, the Durbin-Watson value of (2.098322) indicates that there is no autocorrelation problem, and the probability (F) is (0.000000), which is very high and indicates that the model is acceptable.

4.2.3 Cointegration test between the model variables:

The cointegration test means that the variables in the standard model are integrated with each other. The cointegration test in the NARDL model shows us the relationship of nonlinear cointegration by clarifying the impact of the rise and fall between the dependent variable and the independent variables and the degree

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of their integration at a significant level (5%), by comparing the value of (F-statistic) with the highest value and the lowest value at a significant level (5%). The presence of nonlinear cointegration leads to knowing the long-term impact between the dependent variable and the independent variables. Table (5) shows the results of nonlinear cointegration:

Table (5) Test of limits for nonlinear cointegration according to NARDL model

NARDL Bounds Test Date: 08/06/22 Time: 03:01 Sample: 2005Q2 2019Q4 Included observations: 59 Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	24.29171	6
Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99

Source: Table prepared by researchers based on Eviews9 results.

It is noted from Table (5) the test of limits represented by the lower bound (I0 Bound) and the upper bound (I1 Bound). The results show the existence of a nonlinear cointegration relationship between the independent variables represented by development indicators for financial institutions (financial depth, financial efficiency, financial access) and the dependent variable (economic growth). Accordingly, the alternative hypothesis which states that there is a nonlinear cointegration relationship is accepted, and the null hypothesis which states that there is no nonlinear cointegration is rejected, depending on the value of (F) that was greater than the upper and lower limits of the parameter at a significant level of 5%, Its value was (24.29171), while the upper limit of the parameter I(1) Bound was (3.28), and the minimum limit of the parameter I(0) Bound was (2.27) at the significant level (5%). The economic explanation for the existence of a linear cointegration between economic growth and development indicators for financial institutions corresponds to the economic logic on the one hand and the reality of the Iraqi economy on the other.

It must be noted that the Iraqi economy is an economy open to the outside world. Therefore, the Iraqi economic growth is affected by global crises in addition to being affected by the prosperity taking place in the global economy, as Iraq depends on oil by up to (65%) of the gross domestic product, and therefore the increase in demand for Iraqi oil leads to an increase in economic growth in it and thus raise indicators development of financial institutions. The increase in the development of financial institutions is reflected in the increase in economic growth, and therefore the external multiplier plays a major role in the Iraqi economy.

4.2.4 Error correction model according to NARDL:

The error correction model is considered one of the most important tests in the NARDL model, as it shows the long-term positive and negative impacts. The error correction model includes the long-term parameters, which is the next step after the presence of nonlinear cointegration. Table (6) shows the results of the error correction test.

Table (6) Long-Term Error Correction Model According to NARDL

NARDL Co-integrating And Long Run Model Dependent Variable: Y Selected Model: NARDL(4, 1, 4, 4, 1, 1, 0) Date: 08/06/22 Time: 03:01 Sample: 2004Q1 2019Q4 Included observations: 59				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CointEq(-1)	-1.955116	0.143195	-13.653553	0.0000
Long Run Model				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

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X1_POS	-0.193226	0.159587	-1.210791	0.2327
X1_NEG	0.661111	0.229867	2.876060	0.0063
X2_POS	0.050953	0.087892	0.579724	0.5652
X2_NEG	-0.115253	0.172236	-0.669160	0.5071
X3_POS	0.145454	0.060372	2.409299	0.0204
X3_NEG	-0.051468	0.050495	-1.019259	0.3139
C	-0.006170	0.013524	-0.456222	0.6506

Source: Table prepared by researchers based on Eviews9 results.

It is evident from Table (6) that the value of the error correction coefficient amounted to (-1.955116) at a significant level of less than 5%, as its probability reached (0.000000), meaning that the imbalances that occur in economic growth in the short term can be adjusted or corrected by 195% in the long term, noting that the error correction coefficient was negative and significant, meaning that the results are identical to the items of the error correction coefficient.

Table (6) also shows the long-term parameters of indicators of development in financial institutions, which are non-linear, that is, they show the positive and negative impacts of development indicators in financial institutions and the extent of their impact on economic growth. The results were as follows:

- A decrease in the financial depth of financial institutions by 1% leads to a decrease in economic growth by (0.66%), at a level of significance less than 5%, as the probability of this impact is (0.0063), while the increase in the financial depth of financial institutions does not affect economic growth because its probability is greater than (5%), amounting to (0.2327). Therefore, in the case of a decrease, the alternative hypothesis which states that there is a long-term relationship between financial depth and economic growth is accepted, and vice versa in the case of a rise.
- The efficiency of financial institutions in the positive and negative impacts was at a significant level greater than (5%), and therefore the financial efficiency of financial institutions does not affect economic growth, and therefore we accept the null hypothesis that states that there is no long-term relationship between the financial efficiency of financial institutions and growth Economic.
- Increasing financial access of financial institutions through increasing the number of branches of financial banks on the one hand and increasing the number of ATMs, on the other hand, leads to an increase in economic growth by (0.14%) at a significant level less than (5%), as the morale reached (0.0204), Whereas, the decline in financial access to financial institutions does not affect economic growth, because the probability is greater than (5%), reaching (0.3139). Therefore, in the case of the rise, the alternative hypothesis states that there is a long-term relationship between financial access to financial institutions and economic growth is accepted, and vice versa in the case of a decrease.

4.2.5 Wald-Test:

Wald's test indicates the importance of the independent variables affecting the dependent variable in the short term, and it shows the impact of each independent variable separately on the dependent variable in the short term

Table (7) Wald-Test

	Variable	Df	Probability
Chi-square	X1_POS	1	0.0000
	X1_NEG	1	0.0001
	X2_POS	1	0.7499
	X2_NEG	1	0.5891
	X3_POS	1	0.0002
	X3_NEG	1	0.3710

Source: Table prepared by researchers based on Eviews9 results.

It is evident from Table (7) Wald-Test, that it is clear from its results that increasing or decreasing the financial depth of financial institutions is of importance in the model in the short term, and thus the alternative hypothesis that states that there is a short-term relationship between the financial depth of financial institutions and economic growth is accepted. And we reject the null hypothesis that there is no

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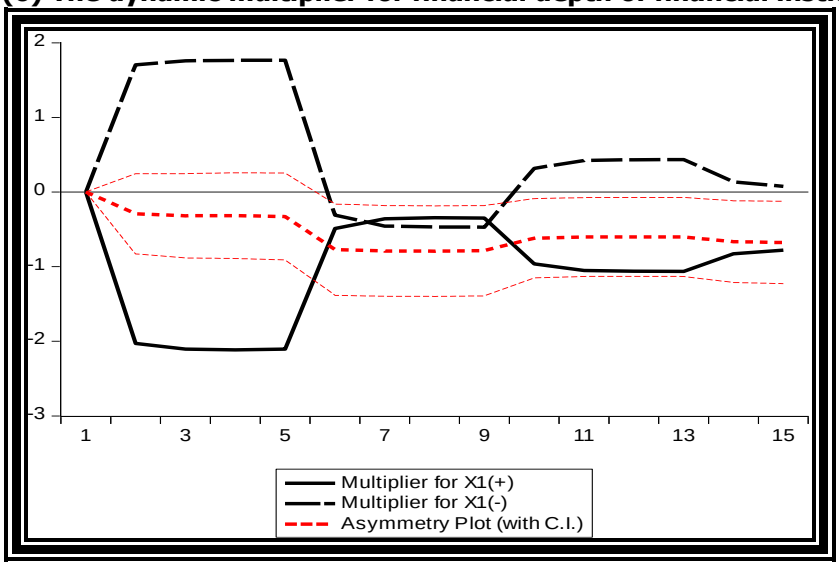
short-term relationship. It is also clear from Table (7) that the financial efficiency of financial institutions has no impact on economic growth, whether it decreases or rises, and thus the alternative hypothesis that states the existence of a short-term relationship is rejected. Thus, accepting the null hypothesis that there is a short-run relationship between the efficiency of financial institutions and economic growth. It is clear from Table (7) that the increase in financial access to financial institutions has a positive relationship in the short term with economic growth, and has no relationship in the case of decline.

4.2.6 The dynamic impact multiplier between indicators of development in financial institutions and economic growth:

The dynamic multiplier test shows the positive and negative impacts on the dependent variable as a result of the changes that occur in the independent variable. Figure (6) shows the graph showing the impact of the dynamic multiplier of the financial depth index of financial institutions on economic growth.

Figure (6) The dynamic multiplier for financial depth of financial institutions



Source: Figure prepared by researchers based on Eviews9 results.

Through Figure (6) of the dynamic multiplier, it is noted that there are three lines for the independent variable (the financial depth of financial institutions), which are:

- The full black line (not dotted): indicates the positive movement of the dependent variable (economic growth) as a result of the change of the independent variable (the financial depth of financial institutions).
- The black dotted line: indicates the negative movement or negative shock of the dependent variable (economic growth) as a result of negatively changing the independent variable (the financial depth of financial institutions).
- The dark red dotted line: It is the asymmetric plot, and it shows the difference between the positive and negative change in the asymmetry regression, and this red dotted line is located between the two light red lines, which are the confidence bars at the (5%) level. Thus, the dark red dotted line (which is the cumulative result of the positive and negative impacts) indicates that the final impact is negative, that is, economic growth declines due to a decrease in the level of financial depth of financial institutions.

Figure (7) The dynamic multiplier for financial efficiency of financial institutions

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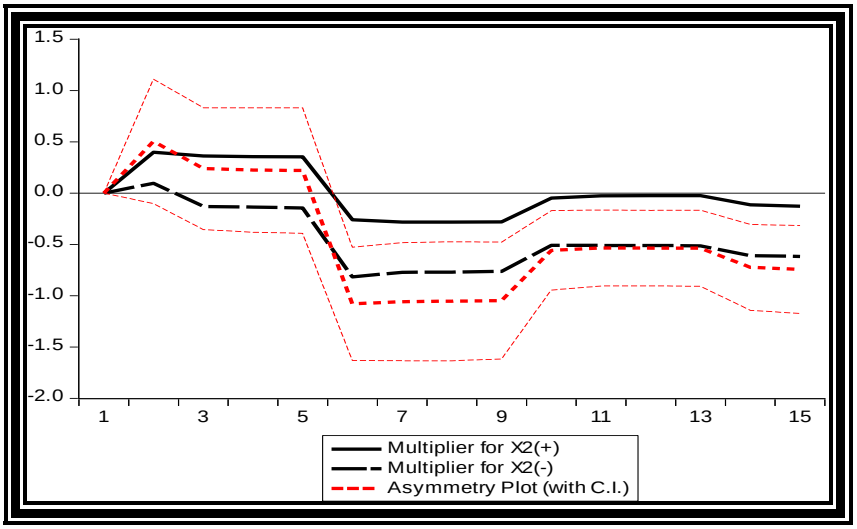
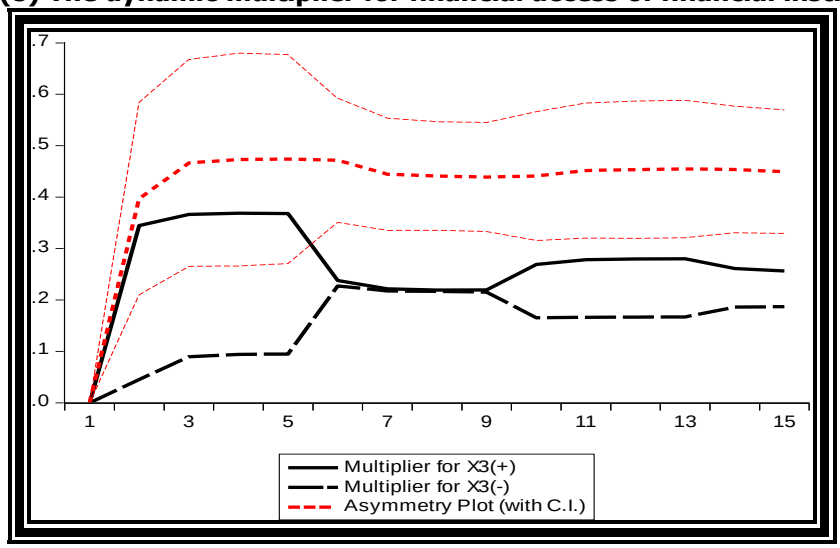


Source: Figure prepared by researchers based on Eviews9 results.

Figure (7) shows the impact of the dynamic multiplier for the financial efficiency of financial institutions. The dark red dotted line (the cumulative result of the positive and negative impacts) indicates that the final impact at the beginning of the period is positive and then stabilizes at the negative level, meaning that economic growth declines due to a decrease in the efficiency of financial institutions.

Figure (8) The dynamic multiplier for financial access of financial institutions



Source: Figure prepared by researchers based on Eviews9 results.

Figure (8) explains the impact of the dynamic multiplier of financial access to financial institutions, and therefore the thick red dotted line (the cumulative result of the positive and negative impacts) indicates that the final impact is positive, that is, economic growth increases due to the high level of financial access to financial institutions.

4.2.7 Model Quality Tests:

The quality tests of the NARDL model usually include main tests to determine the quality of the model, through testing the statistical problems, which are:

4.2.7.1 Normal Distribution of Residues:

This test shows the normal distribution of the residuals of the model depending on the probability value of (Jarque-Bera), as there is no normal distribution of residuals if the probability value is less than (5%), or that the residuals are distributed normally if the result of the probability is greater than (5%).

Figure (9) The normal distribution of the residuals

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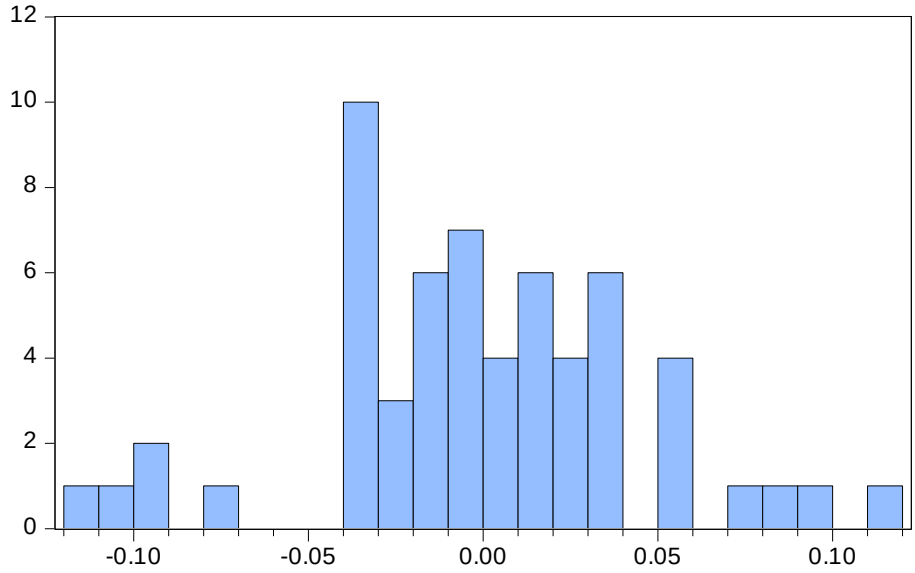

Source: Figure prepared by researchers based on Eviews9 results.

It is clear from Figure (9) that the residuals of the model are distributed naturally, because the probability is (0.688554) and this value is greater than (5%).

4.2.7.2 Tests of Heteroscedasticity problem and Serial autocorrelation:

The autocorrelation test clarifies the problem of autocorrelation or not, which depends on the probability (chi-square). There are many tests that show the homogeneity of error variance or heterogeneity, including the (ARCH) test, which depends on the probability value of (Chi-Square). Table (8) shows the model's autocorrelation test and the homogeneity stability problem.

Table (8) Testing the Heteroscedasticity problem and Serial autocorrelation

Model Quality		
ARCH	Prob Chi-Square(1)	0.3844
Correlation LM Test	Prob Chi-Square(2)	0.2638

Source: Table prepared by researchers based on Eviews9 results.

It is clear from Table (8) the Chi-Square probability for each of the tests of the heteroscedasticity problem and the autocorrelation problem, which shows the quality of the model and the spurious regression problem or not. The test results show the value of the chi-square probability, which is greater than (5%) for both tests. Therefore, the null hypothesis that there is no problem in the test for heteroscedasticity is accepted, and the alternative hypothesis is rejected. As well, the null hypothesis which states that there is no problem in the autocorrelation stability test is accepted, and the alternative hypothesis which states that the model has a serial autocorrelation problem is rejected.

4.2.7.3 Model Stability Test:

The stability test shows whether the model is stable or unstable during the research period, by relying on the cumulative sum of the residuals test. This test shows the stability of the model: the red lines are the confidence limits for the level of significance (5%), and the blue series shows the cumulative sum of the residuals in the model. The stability of the model as a whole depends when the cumulative sum of the residuals in the model is within the confidence limits at the (5%) level. Therefore, it is clear from Figure (10) that the model had a high stability during the research period, as the presence of the blue series was within the confidence limits (the red dashed lines).

Figure (10) Test the cumulative sum of residuals (Cusum)

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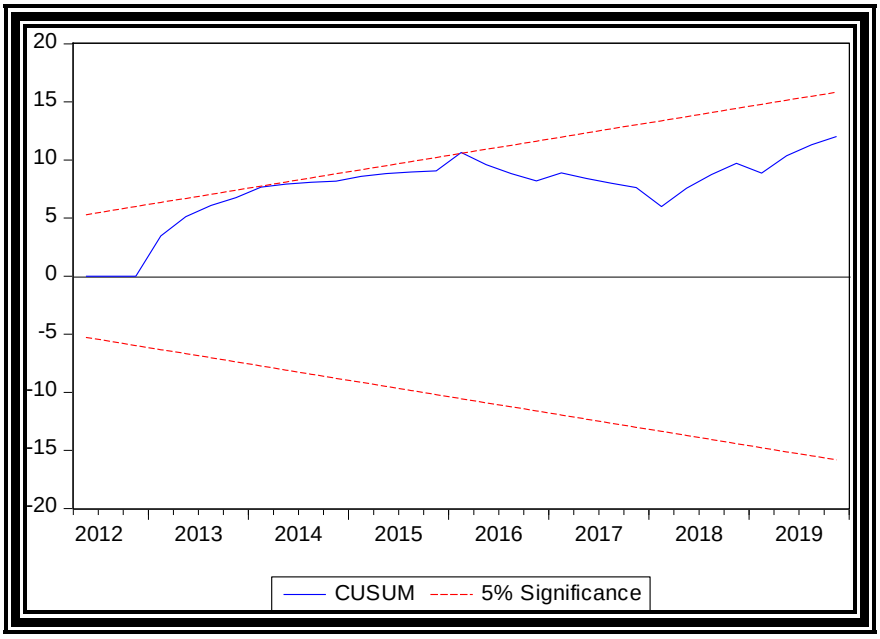

Source: Figure prepared by researchers based on Eviews9 results.

4.2.8 Toda-Yamamoto causality test:

The Granger causality test is "a way of examining whether one variable helps predict another. Traditional Granger causality testing methods should ensure the stability of time series data and the integration process should be clear. However, the effectiveness of the Granger causality test is poor if the time series integration process is different or unclear". As an alternative, the Toda-Yamamoto method is used (AİMER & DİLEK, 2021).

Toda-Yamamoto causality explains the causal relationship between the dependent variable and the independent variable. It depends mainly on the optimum deceleration period, as well as the highest degree of integration or stationarity of the variables used. The results concluded that the optimal deceleration period was (5), while the highest degree of stationarity was (1), i.e. at the first difference. The causality of Toda-Yamamoto states that there is a causal relationship destined from the independent variable to the dependent variable if the probability is less than 5 %, meaning that the independent variable causes the dependent variable and therefore the alternative hypothesis is accepted, and vice versa. Table (9) shows the results of the Toda-Yamamoto causality test.

Table (9) Toda-Yamamoto causality test

Relationship direction	The sum of the optimum deceleration period and the degree of integration	Probability	Chi-square	Decision
X1 → Y	6	0.3624	6.570546	There is no causal relationship
Y → X1	6	0.9479	1.663181	There is no causal relationship
X2 → Y	6	0.9926	0.779176	There is no causal relationship
Y → X2	6	0.8679	2.504713	There is no causal relationship
X3 → Y	6	0.6465	4.222851	There is no causal relationship
Y → X3	6	0.7925	3.128734	There is no causal relationship

Source: Table prepared by researchers based on Eviews9 results.

Table (9) shows that there is no causal relationship between all the indicators of financial institutions [financial depth (X1), financial efficiency (X2), financial access (X3)] and economic growth.

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CONCLUSION:

The importance of financial development stems from the importance of the financial system in the economy, which has a prominent role in the movement of economic activity, as the financial system affects economic growth primarily by influencing the allocation of community savings. The analysis of variables in financial institutions is an important indicator to determine the level of financial development in Iraq, according to the available data, and then to determine the impact and relationship of financial development with economic growth.

Unit root tests, the NARDL model, and the causality of Toda-Yamamoto were used. Firstly, all variables in the model were determined to be stationary in the first difference by unit root tests (Phillips–Perron test). The cointegration between the variables was then determined by the NARDL test. In addition, model quality tests were used to determine the model safety from the problem of spurious regression in the time series, and the safety from the econometric problems (Heteroscedasticity and Autocorrelation). Finally, the Toda-Yamamoto causality test was used for variables with long-term relationships between model variables.

According to the test results, the bounds F-test yields evidence of a long-term positive relationship between indicators of financial institutions and economic growth in Iraq. Thus, the econometric analysis suggests that any causal relationships within the dynamic ECM can be estimated. The value of the error correction factor [(CointEq(-1)] is (-1.955116) at a significant level of less than (5%), and its probability is (0.000000), meaning that the imbalances that occur in economic growth in the short term can be adjusted or corrected by (195%) in the long term. All model results simulate the reality of the Iraqi economy because according to the safety test of the model there is no problem of spurious regression in the time series. As well as no problems that the model suffers from, that is, the model does not suffer from the problem of heteroscedasticity and the problem of autocorrelation, in addition to that the model was Stable according to test of the cumulative sum of residuals (Cusum Test). Toda-Yamamoto causality tests show no causal relationship between all the indicators of financial institutions (financial depth, financial efficiency, financial access) and economic growth.

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