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The Role of Early Warning Indicators of Banking Crises and Their Effect on GDP in Iraq (An Analytical Study for the Period 2003-2016)

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The objective of this research is to investigate the role played by the indicators of bank liquidity and the foreign exchange rate as indicators of early warning of the banking crisis on the economic development in Iraq, by constructing an econometrics model and conducting a statistical analysis to show the effect of these indicators on the GDP in Iraq as an indicator of economic development. On how to use them to be cautious of banking crises, and address the problems that may occur as a result of those crises. The research includes an introduction and two axes: the first of which dealt with the theoretical aspect, which included both the concept of banking crises and early warning indicators, the reality of banking liquidity, exchange rate and GDP in Iraq. The second axis was devoted to clarifying the practical aspect of the research and included both tests used in research such as stability tests Joint integration tests and the construction of a econometrics model for the impact of early warning indicators of bank liquidity and the exchange rate on Iraq's GDP as an indicator of economic development, as well as the inclusion of a set of conclusions and recommendations on the subject.

Key words: *Early warning, Banking crises, Bank liquidity, GDP.*

Introduction

The banking sector is very important in economic and social life because it is the main element in consolidating confidence in the policy of the state and its sponsorship of economic interests. This requires the creation of a strong banking sector that helps to provide

the various sectors with the necessary financing to operate and provide banking services of all kinds, in order to maintain the integrity of the financial centres of banks and to reach a sound banking sector that preserves the rights of depositors and investors and ensures the proper implementation of the monetary policy of the State in an appropriate manner to effectively contribute to the development of the R national prosperity.

Achieving the principle of banking safety requires that each unit of the banking system has a good financial system and has the administrative capacity and competency to manage its liabilities and assets efficiently, perform its role in financial intermediation, and be able to meet the requirements of capital adequacy and liquidity.

The phenomenon of the recurrence of banking crises is a risk faced by the banking sector in many countries of the world, because of the negative effects of these crises, including excessive lending without adequate collateral, in order to obtain the greatest possible profit, this leads to higher cases of default by borrowers and then raises the risk ratio faced by banks' assets, which results in bank contraction, leading to loss of confidence in the banking system and then the crisis of banking.

There are several early warning indicators used to measure the soundness of banking performance. These indicators are used as indicators to assess the performance of banks and then to classify them and to detect financial imbalances in their performance well before they are exposed to major financial problems that lead to their collapse.

Research Importance

The importance of research is the need to identify appropriate means to help detect the banking crises by monitoring the warning indicators of those crises before they occur, and to try to reduce the negative effects that result from them.

Research Problem

The problem of research can be determined by the following question: What are the effects of using the indicators of bank liquidity and the exchange rate as indicators of early warning of the banking crisis, and what role does this play in achieving growth in the GDP in Iraq?

Research Hypothesis

The research hypothesis is that there is a strong positive relationship trending from early warning indicators towards Iraq's GDP for the period (2003-2016).

Research Objectives

The research objectives are:

1. A brief descriptive presentation of the banking crises.
2. Knowing the reality of the banking liquidity and foreign exchange rate in Iraq for the period 2003-2016.
3. Studying the Reality of Domestic Product in Iraq for the period 2003-2016.
4. A theoretical summary of the statistical tests used in the research.
5. Measuring the stability of the temporal sequence of the research data.
6. Examining the effect of the liquidity indicators of the bank and the foreign exchange rate on GDP in Iraq for the period 2003-2016 using modern economic measurement methods.

The Temporal Boundaries of the Search

The period 2003-2016

Spatial Boundaries of Research

Iraqi banking sector

Theoretical Framework of Research

Theoretical Framework of the Banking Crisis
A: The Concept of Banking Crisis and Its Dimensions

Economists did not agree on a specific definition of the crisis in order to integrate its concept with other concepts related to it. This is due to the overlap between these concepts (crisis, conflict, disaster, problem, incident). All of them express one concept (ALamari, 1993: 16).

The English concept of the term Crisis is derived from the Greek word Krisis. It means a decision, which Webster defines as a "turning point of the best or the worst."

The crisis is also known as an "event that threatens the national interest, which occurs in circumstances of lack of time and lack of possibilities, and arises from differences of views or natural or economic disasters, which exploits all or some of the state forces to confront them through forced compromise or urgent action."

The crisis in other words is the result of a set of cumulative sequences feeding each other until they reach the state of explosion.

From the above it can be said that the crisis is a sudden and unpredictable event, leading to a defect and threat to the public interest and have negative results and that facing it requires quick decisions in a short time.

The banking crisis is a form of financial crisis, which is defined as a sudden and severe disturbance in the value or prices of physical or financial assets or financial derivatives, whether real or financial, such as shares and savings accounts (AL-Sadi and Kazem: 2011: 28) .

The crisis threatens the public interest: it affects the interests of the state and its entities in all its joints through the serious threat to current and future interests and objectives, and the crisis is seen through its future effects, as a real danger not related to the past, the present, and the future.

It happens suddenly: the most important thing that distinguishes the crisis, because it is located suddenly it is difficult to expect.

The face of the crisis must be in a very limited time, and the possibilities already available at the time of the accident without waiting for the availability of other possibilities that will not meet the time to meet them.

B: The Types of Banking Crises

The banking crisis includes several types that can be summarised as follows (AL-Toukhi, 2003: 3):

1- Liquidity Crisis - a situation in which the Bank is unable to respond promptly to applicants' requests even if the value of its current assets is positive.
2- Bankruptcy Crisis - an expression of the situation in which the bank's liabilities exceed the present value of the assets and are more serious than the liquidity crisis.
3- Credit Crisis - this situation is unlike the previous two cases, which appear when deposits are available with banks. The latter refuses to grant loans for fear of not being able to respond to withdrawal requests. There is a crisis in lending, which is called the credit crisis.

Early Warning Indicators and Forecasting of Banking Crises
The Concept of Early Warning

As a result of financial liberalisation and integration with the global market, and the result of the interdependence between the financial markets and global banking, all this led the crisis of banking to the speed of moving from one country to another, and therefore needs specific means to help in early detection of these crises before they occur and to try to prevent damage.

Early warning indicators are a set of signs and signals that are capable of absorbing relevant signals in predicting future risks and crises, including banking crises, in order to take the necessary measures to avoid them by monitoring indicators that indicate the imminent occurrence of a particular banking crisis (ALShirani, 2005 : 65).

Early Warning Indicators in Banking Crises

There are many monitoring indicators that are used as a tool for predicting bank crises and detecting imbalances in banks' performance before they are not exposed to risks that lead to their collapse. These indicators include a number of partial economic variables related to the nature of banking performance as early warning indicators of banking crises, exchange rate and liquidity index, which we will summarise in this paper.

A: Liquidity Index

It can be said that the banking crisis may arise as a result of the Bank's inability to meet the shortfall in commitments or to finance the increase in assets. Banks need liquidity to supply liquidity and demand. The Bank faces a liquidity deficit when total liquidity demand exceeds its total offer (Abdul-Hussain Jalil Al-Ghalbi, Al-Araji, 2016 : 103-104).

B: Foreign Exchange Rate Indicator

The exchange rate is one of the factors influencing the occurrence of banking crises, and more specifically, if it is higher than the normal rate, it is a warning indicator of a banking crisis. The real exchange rate of the local currency relative to its rate two years before the crisis is a warning sign for such a situation. The type of crisis (Jamil, 2003: 284), when the real exchange rate is not directed will lead to a state of economic instability, and then reflect negatively on the banking system.

The reality of the two indicators mentioned above in the Iraqi economy for the period 2003-2016 can be shown in the following table:

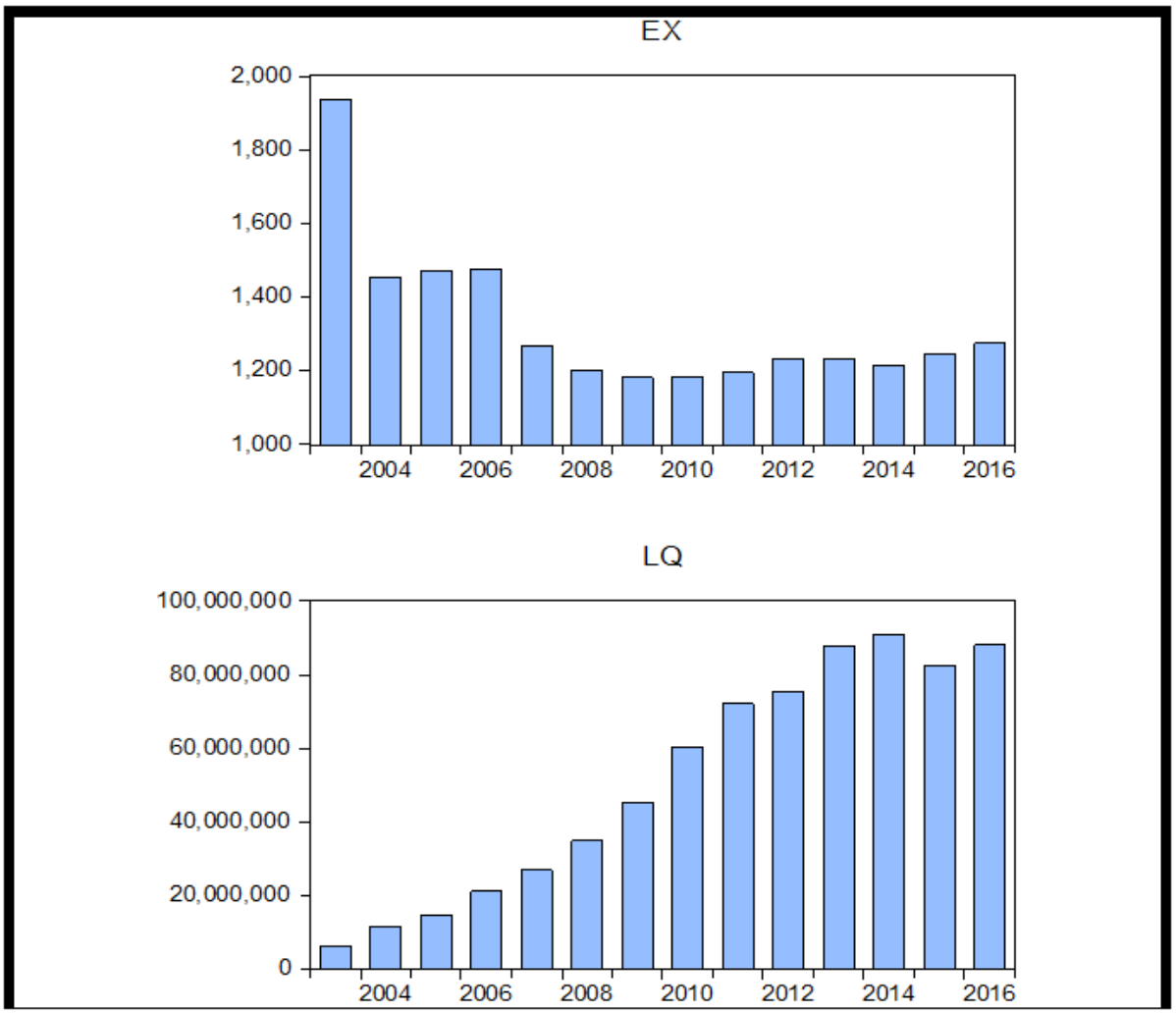
Table 1: Iraq's liquidity and Foreign Exchange Rate indicators for the period 2003-2016

Years	Foreign Exchange Rate (DI/$)	Liquidity (million DI)
2003	1936	6350961
2004	1453	11498200
2005	1472	14659450
2006	1475	21050249
2007	1267	26919996
2008	1203	34861927
2009	1182	45355289
2010	1185	60289165
2011	1196	72069177
2012	1233	75336125
2013	1232	87700000
2014	1214	90944900
2015	1247	82595000
2016	1275	88082000

Source: from the work of the researcher depending on the reports and publications of the Central Bank of Iraq for various years.

The path of the early warning indicators of both (liquidity indicator, the Foreign exchange rate) in Iraq for the period (2003-2016) can be illustrated in Figure 1.

Figure 1. The path of the liquidity indicator and Foreign exchange rate in Iraq for the period (2003-2016).



Source: From the work of the researcher based on the data of Table 1.

The Reality of the GDP in Iraq and Its Relation to the Indicators of Crisis

The banking crises tend to be closely correlated with the decline in economic growth rates, especially growth in GDP, because banks are very sensitive to developments in the real sector. The most important characteristics of the relationship between the banking crisis and the low rate of growth or stagnation are the following (Bassiouni, 2010: 13-14) :-

a. The banking crisis before the economic recession occurs a short period of time may exceed a few months.
b. The recession is usually preceded by a boom in bank borrowing.
c. The nature of the structure of the unilateral economy helps in the occurrence of banking crises. The correlation between the economic growth rate and these crises is more

pronounced. Therefore, any fluctuations in the primary sector are reflected in macroeconomic activity and thus on the functioning of the banking system.

d. The negative impact of the economic growth rate is partly due to the fear of depositors during the recession, accompanied by increased credit risk that prompts them to demand the withdrawal of their deposits.

The following table shows the reality of Iraq's GDP for the period (2003-2016).

Table 2: Iraq's GDP (2003-2016)

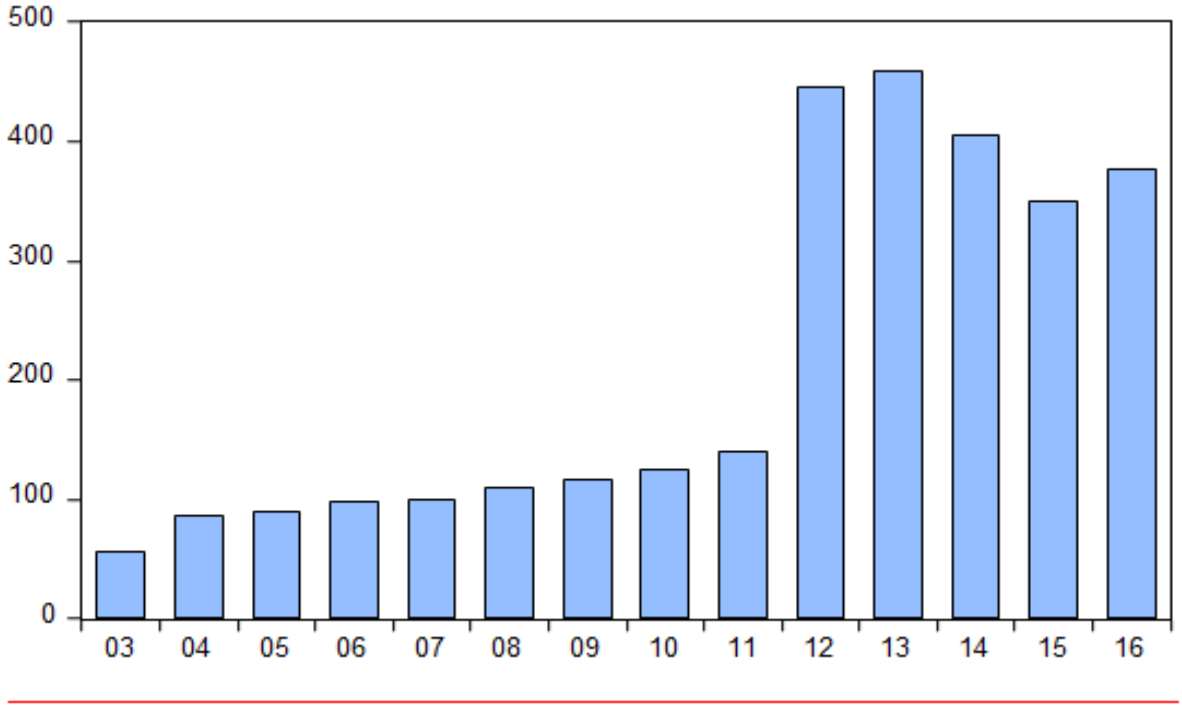
Years	Gross domestic (product (million D)
2003	**55.636**
2004	**85.770**
2005	**89.544**
2006	**98.639**
2007	**100**
2008	**110.33**
2009	**116.52**
2010	**124.98**
2011	**139.23**
2012	**444.92**
2013	**459.44**
2014	**405.04**
2015	**349.67**
2016	**375.82**

Source: From the work of the researcher depending on:

- Ministry of Planning and Development Cooperation, Central Organisation for Statistics and Information Technology, National Accounts Department.
-Arab Monetary Fund, Consolidated Arab Economic Report, various annual publications.

The path of Iraq's GDP (2003-2016) can be illustrated in Figure 2.

Figure 2. Iraq's GDP (2003-2016)



Source: From the work of the researcher based on the data of Table 2.

The Applied Framework of the Research

The Econometrics Model for the Impact of Early Warning Indicators of the Banking Crises on the GDP in Iraq for the Period (2003-2016).

Measuring the Stability of the Time Series of the Search Variables by Using the Unit Root Test.

Economic data are often characterised by reciprocal changes that affect them. This creates instability. Therefore, the determination of the degree of static is important before testing the integration relationships. This requires the data to be static and integrated. If the first series of differences in the random variable series are static or stable, the original series is integrated from the first rank (1) , (1) ~ I (Engle and G Ranger, 1987). If the series is static or stable after obtaining the second differences, the series is complementary from the second order (2); if the original series is stable or static, it is said to be integrated grade zero, which indicates it does not hold the root of the unit, (0) ~ I (Al-Abdali, 2005: 18-19).

There are a number of options that can be used to determine whether or not a unit root exists, to determine the stability of the time series including the Dickie Fuller test (ADF) method. In this study, we will use the extended (ADF) for the test of stability (Hodan ,2015: 122).

This is the test that was developed to include self-regression greater than (1), which is adopted in our analysis for being the best tests. This test depends on three elements to ascertain the stability or instability of time series: model formula used, sample size and Significant level, (Hammoud , 2012: 46). After conducting an ADF test, we will test the two hypotheses:

The null hypothesis Io: $\lambda = 0$
Alternative Hypothesis I1: $\lambda > 0$

We accept the alternative hypothesis and reject the null hypothesis when the string is stable and free from the root of the unit. If the series is unstable, contains the root of the unit, we accept the null hypothesis and reject the alternative hypothesis (Abd, 2012: 17).

A: Stability Test for Time Series of Flow Data and Foreign Exchange Rate in Iraq for the Period (2003 – 2016).

Table 3 shows the results of the unit root test for the data series of some of the early warning indicators of the banking crises used in the research (liquidity, Foreign exchange rate) in Iraq. The results of the ADF test showed that the time series was stable from the beginning, (10%). This indicates that the series are stable and integral of the class (0) ~ I and this leads to rejection of the null hypothesis and acceptance of the alternative hypothesis that the series is stable at the level and free from the root of the unit as shown in Table 3.

Table 3: Test (ADF) for banking and foreign exchange data series in Iraq for the period 2003-2016

At the level With a fixed limit	Variable	
-3.075135	Liquidity Index	
-4.057910	**%1**	Significant level
-3.119910	**%5**	
-2.701103	**%10**	
-2.717127	Exchange rate Foreign	
-4.004425	**%1**	Significant level
-3.098896	**%5**	
-2.690439	**%10**	

Source: From the work of the researcher based on the data of Table 1.

B: Stability Test of the Iraq GDP Series for the Period (2003 – 2016).

Table 4 shows the results of the unit root test for the GDP data series in Iraq. The ADF test showed that the time series data (GDP) were unstable, starting with a constant limit and at the Significant level (1%, 5% (10%), and 10%. Also, when the analysis is performed, there is a constant limit with a general trend of the series at all previous levels of Significant level, but when conducting the analysis of the series without a constant limit and general trend, this means that the series is stable and integral of class (0) ~ I and this leads to rejection of the null hypothesis and acceptance of the hypothesis. Alternatively, the series is stable at its level and free from the root of the unit as shown in Table 4.

Table 4: Test (ADF) for Iraq's GDP series for the period 2003-2016

Levels			Variable	
Without a fixed limit and general direction	Fixed limit and a general trend	With a fixed limit		
6.732028	-2.522281	0.071624-	Gross domestic product	
-2.754993	-4.667883	-3.920350	**%1**	Significant level
-1.970978	-3.733200	-3.065585	**%5**	
-1.603693	-3.310349	-2.673459	**%10**	

Source: From the work of the researcher based on the data of Table 2.

Quantitative Analysis of the Impact of Early Warning Indicators of the Banking Crises on the GDP in Iraq for the Period 2003-2016.

We will focus on this requirement to study the impact of early warning indicators represented by the liquidity indicator and the foreign exchange rate on the GDP in Iraq by studying the long-term equilibrium relationship between them through the joint integration model.

The idea of co-integration dates is attributed to Granger in 1981, and this idea was largely developed by Engel-Granger in 1987 (Muhammad 2012: 211).

This analysis provides support for economic theory by modelling the relationships between economic variables in a statistical framework (Engle, G Ranger, 1987: 55). From an economic perspective, some economic variables move regularly with one another over time, although they are characterised by random fluctuations when they move. Individually, integration is one of the important tools for studying long-term relationships between economic variables. It also helps to determine the level of balance between unstable and stable data. In other words, the divergence of variables from equilibrium in the short term does not lead to divergence. Some of them in the long term because there are economic forces working to restore these variables to balance in the long term, hence the idea of joint integration mimics the idea of long-term balance of the economic system.

The most important tests used to determine common integration are:

-The Angel-Granger (1987) test has two phases and is used in models consisting of only two variables (Abd, 2017: 412).
- The Johannes - Jeselius test - Which will be used in this research. This test is used to detect the existence of co-integration if the test is consistent with the results obtained from the extended Dicky Fuller test for stability. The model has more than two variables and therefore is better than the Engel- Kranger test. It also has preference in the test if the model contains only two variables (Batal and others, 2013: 13).

These two models are used if the time series is integrated from the same rank. If integrated from different grades, the ARDL distributive regression model is used.

Short-Term Relationship Analysis: Through the Kranger Model to Measure the Causal Relationship between GDP and the Indicators of Banking Crises in Iraq (2003-2016).

The results of Kranger's analysis showed that there is a causal relationship that is directed by the independent variables in the aforementioned model towards the GDP in Iraq, there is an

impact by both the banking and foreign exchange on the GDP in Iraq as shown in the following table:

Table 5: Kranger analysis of the existence of the causal relationship between the gross GDP and warning indicators in the banking crisis in Iraq for the period (2003-2016)

Pairwise Granger Causality Tests			
	Sample: 2003 2016		
Prob.	F-Statistic	Obs	Null Hypothesis:
0.0405	5.39008	14	X2 does not Granger Cause X1
0.0420	0.70073	X1 does not Granger Cause X2	
0.0253	1.44930	14	Y does not Granger Cause X1
0.**03**69	0.34467	X1 does not Granger Cause Y	
0.0497	4.86090	14	Y does not Granger Cause X2
0.0208	0.39833	X2 does not Granger Cause Y	

Source: From the work of the researcher based on the data of tTables 1. and 2.

Long-Term Analysis: Through the Johansen Model To Analysis of the Relationship between GDP and Iraq Crisis Indicators for the Period 2003-2016.

The Johansen model was used to test the existence of the combined integration of Iraq's gross domestic product (GDP) and liquidity (Foreign exchange rate). This model is used to analyse the model if it contains more than two variables, and the time series is integrated from the same rank. There is a relationship of common integration (long-term equilibrium relationship) between GDP and those indicators, both methods (method of effect and method of the maximum value) , as shown in Table 6.

Table 6: Johansen analysis of the combined integration of GDP in Iraq (liquidity, Foreign exchange rate) for the period 2003-2016

		Date: 02/28/19 Time: 13:11		
		Sample (adjusted): 2003 2016		
	Included observations: 15 after adjustments			
	Trend assumption: Linear deterministic trend			
			Series: Gdp Lq EX	
	Lags interval (in first differences): 1 to 1			
	Unrestricted Co-integration Rank Test (Trace)			
	0.05	Trace		Hypothesised
Prob.**	Critical Value	Statistic	Eigenvalue	No. of CE(s)
0.0317	29.79707	31.48033	0.725854	None *
0.1537	15.49471	17.06893	0.418667	At most 1
0.0474	3.841466	3.932449	0.230615	At most 2 *
Trace test indicates 1 co-integrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
	**MacKinnon-Haug-Michelis (1999) p-values			
Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
	0.05	Max-Eigen		Hypothesised
Prob.**	Critical Value	Statistic	Eigenvalue	No. of CE(s)
0.0855	21.13162	29.41140	0.725854	None
0.3650	14.26460	18.13680	0.418667	At most 1
0.0474	3.841466	3.932449	0.230615	At most 2 *

Source: From the work of the researcher based on data Tables 1. and 2.

Conclusions

1. The research hypothesis, which provides for a long-term balance between the early warning indicators of liquidity, Foreign exchange rate and GDP in Iraq, has been proven.
2. The time series of the search variables within the studied period were all stable at their level (liquidity, Foreign exchange rate, GDP) and integrated grade 0 (~) I, allowing us to use the Johansson model in the analysis.
3. The results showed that early warning indicators have a strong impact on Iraq's GDP.
4. The research found that the correlation between the GDP and the early warning indicators (liquidity and exchange rate) is correlated with the long-term equilibrium relationship.

Recommendations

1. The need to take advantage of the indicators of early warning and to know their effects on macroeconomic variables to address these effects.
2. Attention should be paid to early warning indicators in the banking crises by tracking the amount of liquidity in the banking system and addressing the liquidity crisis as a banking crisis before it becomes an economic crisis.
3. Fluctuations in the foreign exchange rate can significantly lead to economic crisis, so these fluctuations must be addressed and attempts made to reach stable exchange rates.
4. The need to direct research efforts by researchers, especially postgraduate students, to study indicators of early warning and other banking and knowledge of their impact on the development of the Iraqi economy.
5. The need to benefit from the experience of others in the use of indicators of early warning in the detection of economic crises and then how to prevent them before they occur and exacerbate.

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