

Causal Relationship According to Toda-Yamamoto Methodology Between Economic Growth Rates and Inflation in the Iraqi Economy During the Period (1990 - 2021)

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ABSTRACT

This study aims to test the causal relationship between inflation and economic growth during the period (1990-2021) in Iraq. The long-term causality test was conducted using the Toda-Yamamoto methodology, developed based on a study conducted in 1995 by Toda and Yamamoto. The results indicated a unidirectional causal relationship between economic growth and inflation, meaning that an increase in growth rates has an impact on inflation. The study recommends the implementation of monetary policies to reduce monetary growth. This could include reducing interest rates or implementing other monetary policies to control the increase in money supply, in addition to improving the supply by increasing production and enhancing efficiency in the economy. Policies encouraging investment and promoting production can contribute to meeting growing demand without causing an increase in inflation.

Keywords- Economic growth, inflation rate, causal relationship, Iraqi economy, Toda-Yamamoto methodology.

I. INTRODUCTION

Over the past decades, Iraq has undergone significant and crucial political developments that have left their mark on various aspects of life, including the economic dimension. The economic sector has witnessed fluctuations in many economic variables due to the political reality and other surrounding conditions. Despite the diversity in economic policy trajectories and their tools, there is a common thread among most studies in this field. In economic literature, numerous discussions revolve around the relationship between growth and inflation, approached in various ways concerning the stages of global economic development according to the perspectives of current economic schools.

According to the prevailing economic viewpoints, there appears to be a negative relationship between economic growth and inflation. This seems to align with the fact that economic growth has been

adversely affected by high inflation rates in Iraq. Therefore, improving long-term growth prospects depends on eliminating uncertainties arising from elevated inflation rates. When inflation is consistently high, it can erode the purchasing power of individuals and companies, subsequently reducing consumption and investment. This, in turn, negatively impacts economic growth. Inflation is considered a significant economic issue affecting economic growth not only in Iraq but also in many other countries. Inflation indicates a prolonged increase in the prices of goods and services, leading to a reduction in the purchasing power of citizens and devaluing the local currency. Additionally, it influences investment decisions for companies and entrepreneurs, as the costs of materials and production rise, diminishing lucrative investment opportunities and thereby exerting a negative impact on economic growth rates.

In general, the phenomenon of inflation in Iraq can be traced back to various deep-rooted historical factors. In economic terms, inflation is not a spontaneous

occurrence but rather a consequence of the overall and systematic economic deterioration in the years leading up to the fall of the political regime after 2003. The Iraqi economy underwent a complete transformation into a rentier economy, heavily reliant on oil revenues to cover its expenses. This shift occurred, especially after the failure of most industrial production projects due to poor planning, management, and a lack of consideration for the future prospects of the industry.

The decline of the industrial sector led Iraq to heavily depend on imports, resulting in the importation of external inflation and its negative impact on economic growth rates. The economic challenges were exacerbated by the country's sole reliance on oil exports, underscoring the need for diversified and sustainable economic strategies. The lack of successful industrial projects contributed to the importation of external inflation, amplifying its detrimental effects on the overall economic growth of Iraq. Addressing these historical and structural issues is essential for mitigating inflation and fostering a more resilient and self-sufficient economy.

II. IMPORTANCE OF THE RESEARCH

Understanding the relationship between inflation and economic growth is crucial for planning a more economically sustainable future. It can assist in making wise economic decisions and avoiding the negative effects of excessive inflation in the long term.

III. RESEARCH PROBLEM

Iraq is considered a rentier country that heavily relies on importing most goods and services. This has a negative impact as inflation leads to a decrease in the purchasing power of individuals and families. With the prices of goods and services rising without a corresponding increase in their income, this results in a reduction in the purchasing ability of consumers. Consequently, it adversely affects consumer demand and impedes economic growth.

IV. RESEARCH OBJECTIVE

The research aims to understand the nature and direction of the causal relationship between inflation and economic growth and to determine whether there is a causal impact between them. In other words, the research seeks to identify whether inflation causes changes in economic growth rates or vice versa.

V. RESEARCH HYPOTHESIS

The research hypothesis assumes the existence of a long-term causal relationship between inflation and the economic growth rate in Iraq during the study period.

VI. RESEARCH METHODOLOGY AND STRUCTURE

The research consists of two parts: the first is theoretical, addressing the concepts of economic growth and inflation and the relationship between them. The second part is empirical, using the long-term causality methodology between economic growth and the inflation rate in the Iraqi economy during the period (1990-2021) to clarify this relationship.

VII. PREVIOUS STUDIES

A study by Ruba and others (2013) aimed to examine the causal relationship between economic growth and inflation in Jordan using the Granger methodology to determine the direction of the relationship between the two variables during the period 2000-2012. The study found a causal relationship between inflation and economic growth, not the other way around. Based on the results of causality tests, changes in inflation help explain changes in economic growth[1]

A study by Marwa and Chokri (2019) investigated the relationship between the unemployment rate, economic growth, and inflation in North African countries during the period 1965-2016. They used the Granger causality test and cointegration analysis. The study found a unidirectional causal relationship extending from inflation to economic growth and from economic growth to unemployment, as well as from inflation to unemployment[2]

In a study by Ramazan and others (2020), the relationship between price stability and economic growth in countries implementing inflation targeting was clarified. According to the study's results, if inflation remains below a certain threshold (4.182%), it does not have a negative impact on economic growth. The study also found that the relationship between inflation and economic growth is non-linear[3]

A study by Ayfer ÖZYILMAZ (2022) illustrated that the way inflation affects economic growth is directly related to its level. If inflation exceeds a certain threshold, it negatively affects growth. The study examined the relationship between inflation and growth during the period 1996-2019 in 27 European Union countries using a causal approach. The study found a two-way causal relationship between inflation and growth for both inflation indices[4]

A study by Piumi and others (2022) explored the impact of inflation on economic growth in Sri Lanka using a distributed lag regression model as an estimation method. The results indicated a negative relationship between inflation and short-term economic growth. When inflation increases by 1%, short-term economic growth decreases by 3,427.94 million USD, and long-term economic growth decreases by 107,263.8 million USD. Therefore, given Sri Lanka's current economic

reality, macroeconomic policies should be adaptable to maintain inflation stability for a sustainable economy[5].

This study attempted to integrate both economic growth and inflation and survey each variable against the other in the Iraqi economy during the period (1990-2021). This study is considered one that researchers have not explored in the Iraqi economy, especially during the mentioned time series.

Section One: The Theoretical Framework

(1) Concept of Economic Growth

The concept of economic growth is relatively new in human history, as it became associated with the emergence of capitalism and its industrial production, as well as the accumulation of capital. The appearance of this concept coincided with the development of systematic economic analysis, which began with the classical economists. Economic growth is a goal for every society seeking to achieve it by increasing the volume of goods and services and augmenting capital accumulation. Despite the various interpretations of this term, there is a consensus that it refers to the increase in the Gross Domestic Product (GDP) and national income, leading to a continuous rise in individual prosperity [6]. And this definition is derived from basic conditions, namely that an increase in the volume of Gross Domestic Product (GDP) requires an increase in per capita income. This means there must be a balance between GDP growth and population size. Additionally, it necessitates an increase in real income for individuals, not just nominal income. This implies that price increases should be lower than the increase in cash wages. Here, the significant impact of inflation on economic growth is highlighted. Therefore, economic growth rates should equal cash income minus inflation rates. Furthermore, this increase should be continuous and not sporadic. Hence, we can conclude from the above that economic growth rates are "the occurrence of an increase in real per capita income resulting from an increase in the actual GDP [7]

(1-1) Economic Growth in the Iraqi Economy

The overall economy operates through a wide range of variables, which are constantly sought to achieve economic goals. One of the most important of these goals is economic growth, along with the reduction of inflation and others. This is accomplished through both monetary and fiscal macroeconomic policies. It is worth noting that during the 1980s, the economic growth in Iraq experienced fluctuations due to wars and global economic recessions. The contribution of the oil sector to the Gross Domestic Product (GDP) decreased from 62% in 1980 to 11% in 1986 due to falling oil prices resulting from wars. At the same time, the relative contribution of the agriculture and industry sectors increased, reaching approximately 14.11% collectively in 1986. During the period of sanctions and Iraq's entry into the "Oil-for-Food" program, which was effectively implemented in 1996, significant developments occurred, bringing the GDP to approximately 46 billion

dollars despite the high inflation rates. However, by 2002, it had decreased to 26.1 billion. In general, it should be noted that all these numbers are approximate due to the absence of official information and data released by the relevant official institutions [8]

During the period (2000-2005), the Iraqi Gross Domestic Product (GDP) changed slightly, reaching approximately 43,438.8 million dinars in the year 2005. However, there was a significant decrease when comparing this GDP to the 2003 GDP, which was approximately 26,990.4 million dinars. This decrease was, of course, due to the invasion by coalition forces, which led to the cessation of oil exports and the destruction of most industrial institutions during the war. During the period (2005-2010), the local GDP increased significantly from 43,438.8 million dinars in the year 2005 to 60,627.3 million dinars in the year 2010. The growth rate was approximately 6.8%, driven by the expansion of the oil sector and its increased contribution to the formation of the total GDP, reaching around 56% in 2007. In addition, the substantial rise in global oil prices played a significant role in increasing foreign currency reserves and reducing the deficit [9]

In general, the Gross Domestic Product (GDP) growth rate was fluctuating during the period (2004-2020), alongside a significant jump between the years 2010 and 2011 due to the rise in oil prices. However, the GDP for the year 2015 reached \$127.4 billion after being \$223 billion in 2014 due to military operations and a decline in oil exports. But it soon began to gradually recover from the impact of the coronavirus pandemic and the collapse in oil prices, both of which were witnessed in 2020. Oil and non-oil growth in Iraq continues on the right path to return to pre-pandemic levels with increased oil production and the resumption of local economic activity following the easing of COVID-19 restrictions. It is expected that the general fiscal balance and the external account balance will shift from deficit to surplus as oil prices continue to rise. Estimates indicate that the oil sector will drive medium-term economic growth with the gradual elimination of production cuts agreed upon by the OPEC+ group. The economic prospects of Iraq remain exposed to significant risks, including uncertainty related to geopolitical tensions, the ongoing pandemic, security challenges, and climate change [10]

(2) The concept of inflation and its types

Inflation is defined as a general increase in the prices of goods and services across the economy, or in other words, a general decrease in the value of money. In contrast, deflation is a general decrease in the prices of goods and services throughout the economy, or a general increase in the value of money. These definitions generally vary depending on their causes, as it is a multi-dimensional dynamic phenomenon. It can result from an increase in the quantity of money in circulation without a corresponding increase in the supply of goods, leading to a rise in overall price levels. Alternatively, it can result

from an increase in total spending that is not accompanied by an increase in production or may be attributed to rising production costs, such as raw materials and labor wages [11]. Among the most common and widespread definitions is linking inflation to continuous increases that occur in the general price level over a specified period of time. It is worth noting that temporary price increases due to exceptional circumstances, such as adverse weather conditions affecting agricultural crop yields, are not considered inflation because prices will gradually return to normal as the causes diminish. Additionally, political crises like revolutions and wars that push prices upward and create a form of inflation are noteworthy [12]

(2-1) Types of Inflation

- Demand-Pull Inflation:

This type of inflation occurs when economies are active and growing rapidly, leading to increased spending and consumption by individuals and companies. This increase in demand makes producers increase their output to meet it, but they may not be able to keep up with the demand, leading to rising prices. To counter demand-pull inflation, governments and central banks may take measures such as raising interest rates to curb borrowing and consumption, or implementing other monetary policies to control the amount of money in circulation. These measures aim to encourage savings, reduce demand, and thereby alleviate inflationary pressures [13]

- Cost-Push Inflation:

This type results from an increase in costs due to rising prices of services and final goods in general, especially a notable increase in wages. The term "cost-push" refers to a significant increase in the costs of the main production factors far exceeding their current production levels. Cost-push inflation is typically caused by sellers, in contrast to demand-pull inflation, which is generated by buyers [14]

- Imported Inflation:

This type of inflation arises due to the influence of external factors in shaping the overall price level in the local market. It is characterized by a continuous and accelerating increase in the prices of services and final goods imported from abroad, which is reflected in their selling prices in local markets. Developing countries, especially smaller economies that are open to other economies, often import this type of inflation. There are two cases for the emergence of imported inflation: The first case involves a balance of payments deficit. When there is a deficit, the country produces less than it consumes, leading to increased foreign obligations. The country resorts to increasing its money supply to finance the deficit, which devalues the local currency. In this scenario, the value of the local currency decreases. The second case occurs when there is a surplus. In this situation, the country is compelled to increase the local currency in exchange for foreign currency, which affects local prices. Additionally, an increase in the prices of

imported raw materials leads to price increases in the local market [15]

- Structural or Built-In Inflation:

This type of inflation occurs due to changes in the structure of overall demand. While there are no specific indicators for this, it is characterized by a surge in demand for goods in certain industries that outpaces other industries due to the difficulty of transferring production factors from one industry to another. This results in higher prices in those industries. In general, structural inflation is defined as one of the components of inflation stemming from structural distortions in economic decisions [16]

(2-2) Inflation in the Iraqi Economy

Iraq experienced various types of inflation after the 1970s due to the increase in oil production revenues, which created a significant gap between supply and demand, resulting in price fluctuations. In 1970, the average per capita income was approximately 527, but this figure increased to 1270.5 in 1979. This increase, combined with the existence of a semi-fixed production system, couldn't absorb the growing demand for goods, leading to a general increase in the prices of consumer goods and services [17]. During the economic blockade in the 1990s, inflation reached its peak due to a significant decline in growth rates, reaching as low as -28%, along with an annual increase in the money supply at a rate of 193% [18]. These figures highlight the significant gap that occurred between the volume of output and the money supply. Due to the large purchasing power, there was no corresponding meaningful local production. Total demand increased by more than twice the real volume of local and imported goods and services alike [19]. This was all due to the economic blockade, which led to a halt in imports, a shortage of goods, and a significant increase in prices [20]. During the period (2003-2009), the inflation rate averaged 23%. In 2006, it reached its highest level at 53.2% due to the increase in oil derivative prices. This percentage decreased significantly to 2.5% in 2010 due to the availability of oil derivatives and exchange rate stabilization. Additionally, the Central Bank adopted a type of restrictive policy, which helped stabilize the inflation rates [21]

It's worth mentioning that the Iraqi economy is greatly affected by the inflation of its trading partners due to its heavy reliance on foreign imports, which has a negative impact on its economy. This reliance creates inflationary expectations, which are considered more dangerous than inflation itself, especially for the country's budget, as they accelerate the rising trend in price levels. Inflation in trading partner countries is one of the most significant long-term inflation determinants, along with increases in growth rates that may not lead to a decline in inflation rates. This is because this growth is driven by the oil sector and not by other sectors that could help absorb all the inflationary pressures. Exchange rate stability has played a role in relatively

stable transactions, evident through the money velocity index, which recorded 3.4 in 2018 compared to 3.2 in 2017. This helped maintain a stable flow of imports and consequently stability in the inflation rate and the monetary stability factor. Additionally, the Iraqi economy is highly vulnerable to external factors due to the dominance of the oil sector and the low contribution of commodity sectors to the creation of the gross domestic product. The consumption basket of the Iraqi citizen is almost entirely imported, ranging from 70% to 80% of general consumption. This creates external shocks with negative effects. The table below shows the inflation rates imported from abroad for the period 2014-2018 [22]

Table 1: Imported Inflation in the Iraqi Economy for the Period (2014 - 2018)

Imported Inflation	Gross Domestic Product at Current Prices	Imports (Billion Dinars)	Global Inflation	Year
53.2	266332.7	71518.5	2.29	2014
50.1	194681	72359.1	1.43	2015
46.4	196924.1	67075.9	1.47	2016
54.2	225722.4	47873.7	2.19	2017
54.2	251064.5	54426.1	2.5	2018

The source: Central Bank of Iraq, 2018:10

After the COVID-19 pandemic, the inflation rate began to rise significantly, reaching 6% in 2021. One of the main reasons for this increase was the rising oil prices, which cast their shadows on all goods and services. In addition, the change in the exchange rate of the dinar against the dollar played a role. The inflation hike resulted from the recovery of local demand and the depreciation of the currency, leading to inflationary pressures in the country. Despite the past eight years experiencing stable inflation at low levels due to declining import prices and weak demand [23]

(3) The Relationship between Inflation and Growth

There are three main intellectual trends in analyzing the relationship between inflation rates and economic growth. The first trend suggests that persistent inflation during the economic development phase promotes economic growth by increasing investment and stimulating economic activity. This reflects the view that rising prices encourage profit growth, leading to increased investments and business expansion and diversification. This trend is based on observations similar to those of Keynes regarding the impact of large quantities of gold and silver on the economies of some European countries in the Middle Ages. The positive relationship between production and inflation is evident when transitioning from point E0 to point E1, as illustrated. Producers can be seen raising the prices of their products, and as a result of this concept, producers

will have the desire to increase production, even in the case of rising prices, while the prices of other producers will remain at the same previous levels [24]

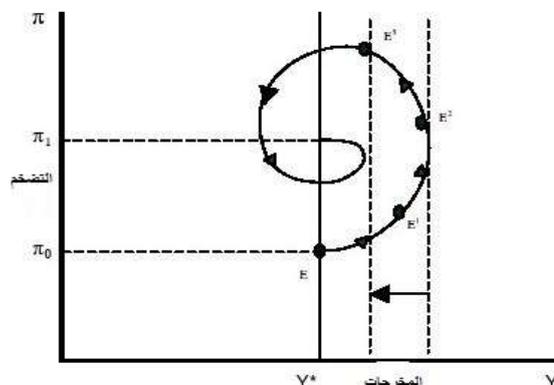


Figure 1: The Relationship between Production and Inflation
The source: [25]

The second direction indicates that inflation, which usually rises undesirably, can be harmful to the national economy. Despite its necessity at times for achieving sustainable growth, inflation can lead to economic instability and negative effects. It can reduce investment and shift towards consumption spending instead of saving. This can diminish investment opportunities and profitability, leading to a decrease in welfare and economic growth. Rising price rates can also result in reduced profits and economic efficiency, affecting financial markets and long-term investment plans for companies and increasing price volatility [26]

The third direction suggests that the impact of inflation goes through different stages. In the first stage, the impact of inflation is positive as it encourages investment and promotes economic growth. However, when the inflation rate exceeds a certain threshold (such as 11%), it can lead to economic growth decline and currency devaluation. This indicates that inflation has a temporary positive impact. In the third stage, when the inflation rate exceeds 10%, it can lead to a 0.6% reduction in the growth rate [27]

Section Two - Applied Aspect

Stage One: Building the Standard Model and Defining its Basic Variables:

In order to build and estimate the standard model for this study, it is necessary to identify the study's variables upon which the model will be based, and which will take the following mathematical form:

$$G = \beta_1 + \beta_2 F$$

Wherein:

G: Represents the economic growth rate (% annually).

F: Inflation, consumer prices (% annually).

β₀: Represents the constant term in the standard model.

β_1 : Represents the model parameter that indicates the extent of the variables' influence on each other.

The following table provides descriptive data for the study's variables and the time series data over a period of thirty-two years.

Table 2: Data Description

	F	G
Mean	49.24189	7.729788
Median	6.481356	5.580044
Maximum	448.5000	57.81783
Minimum	-16.11733	-64.04711
Std. Dev.	108.4776	22.02313
Skewness	2.730866	-0.608883
Kurtosis	9.502054	6.017570
Jarque-Bera	96.14295	14.11825
Probability	0.000000	0.000860
Sum	1575.740	247.3532
Sum Sq. Dev.	364789.1	15035.57
Observations	32	32

Source: Prepared by the researcher using outputs from Eviews 12

In order to conduct the causality test using the (Toda and Yamamoto) methodology, it is necessary to complete the following steps:

Step One: Adoption of Study Variables and Identification of Data Sources After reviewing previous studies and conducting surveys on all the variables of this study, both inflation and economic growth have been adopted, which were sourced from publications of the World Bank.

Step Two: Spatiotemporal Boundaries of the Study The study has adopted a time series data approach with a time span of 32 years (1990 - 2021) and is geographically confined to the country of Iraq.

Stage two Model Estimation Stage

First - Unit Root Test Table 2 below presents the unit root test for each of the model variables. It is evident that the economic growth rate variable is stationary at level, indicating that we reject the null hypothesis and accept the alternative hypothesis, which states that the variable does not have a unit root. As for the inflation rate variable, it indicates non-stationarity (non-stationary) at level, which means that we accept the null hypothesis that these variables have a unit root since the p-value of this test is greater than (5%). Therefore, we resort to taking first differences to achieve stationarity, as shown in the table below:

Table 3: Unit Root Test

Variable	Augmented Dickey Fuller			
	Level		First Difference	
	No Trend	Trend	No Trend	Trend
G	-9.223973	-11.22017
	-3.661661	-4.284580		
	*-2.960411	*-3.562882		
N	-2.677743	-3.481094	-10.12682	-10.87367
	-3.661661	-4.284580	-3.670170	-4.296729
	*-2.960411	*-3.562882	-2.963972*	*-3.568379

Source: Prepared by the researcher using outputs from Eviews 12

Secondly, determining the optimal lag periods using the Vector Autoregression (VAR) model: There are several criteria used to identify and select the optimal lag periods for the variables in the study with the aim of addressing the issue of self-correlation that occurs among the residuals in the model. One of the most

important criteria among these is the Akaike and Schwarz criteria. Therefore, the optimal lag period in the model, according to these three criteria, Schwarz, Akaike, and Hannan, is the first lag (1), as shown in Table (4) below:

Table 4: Optimal Lag Period

VAR Lag Order Selection Criteria

Endogenous variables: G F

Exogenous variables: C

Sample: 1 32

Included observations: 30

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-307.9174	NA	3221819.	20.66116	20.75457	20.69105

1	-297.9971	17.85659*	2173959.*	20.26647*	20.54671*	20.35612*
2	-295.6947	3.837340	2446502.	20.37965	20.84671	20.52906

Source: Prepared by the researcher using outputs from Eviews 12

Thirdly, Johansen Cointegration: Cointegration is of significant importance in economic policy analysis. It allows policymakers to conduct a better assessment of the potential effects of various changes in economic policies, such as simulating the impact of changes in growth, inflation, investment, and more on different sectors simultaneously. In general, the Johansen cointegration test helps determine the number of cointegrated relationships among a set of variables and their coefficients. This test is widely used in various fields, with the economic field being one of the most important. However, referring back to Table (), it is evident that the time series of the study variables do not have the same order. This indicates that the variables used are not integrated and cointegrated at the same degree and order, as they are a combination of first differences and levels. Since the Johansen cointegration test requires that all study variables be integrated at the first order (first differences), meaning they should be stationary in first-order differences and not in levels, we cannot perform this test to determine the long-term relationship between inflation and economic growth.

Fourthly, Diagnostic Tests for the Study Model: Before embarking on the Toda and Yamamoto test, it is necessary to ensure that this model is acceptable and meets all the required conditions through a series of tests, as follows:

1- Stability of the Model Using the Unit Root Test:
 In order to ensure the degree of stability of the model, we must use (AR) any inverted roots test, where the results of self-regression are stable if the reciprocal of the single roots is located within the unitary circle and vice versa, and from Figure (1) it is clear to us that the reciprocal of the single roots of both variables is within

the single circle on it, we can say that the model is stable.

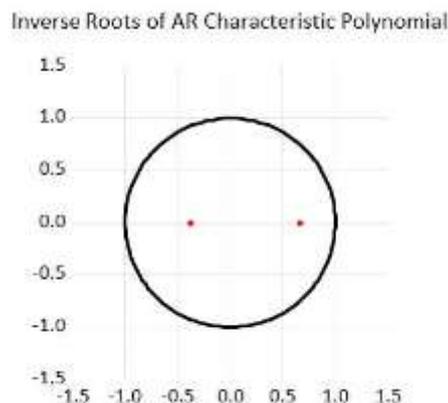


Figure 2: Model Stability According to the Univariate Unit Circle

Source: Prepared by the researcher using data from Eviews 12.

2. Testing Autocorrelation of Model Residuals:
 In order to confirm the absence of any autocorrelation among the residuals of the study model, it is necessary to use the Lagrange Multiplier (LM) test. The null hypothesis assumes no autocorrelation among the model residuals, while the alternative hypothesis suggests the presence of autocorrelation. As shown in Table (5), the results lead to accepting the null hypothesis, indicating no autocorrelation among the model residuals. This is supported by the calculated p-values for this test in all periods, which statistically exceed the acceptable threshold of 5%.

Table 5: Autocorrelation Test for Model Residuals

VAR Residual Serial Correlation LM Tests						
Sample: 1 32						
Included observations: 31						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	3.755472	4	0.4401	0.955196	(4, 50.0)	0.4403
2	4.064266	4	0.3974	1.036911	(4, 50.0)	0.3976
3	11.24847	4	0.0239	3.084656	(4, 50.0)	0.0240
4	1.549553	4	0.8178	0.385621	(4, 50.0)	0.8179

Source: Prepared by the researcher using outputs from Eviews 12.

3- Testing the Normal Distribution of Model Residuals:

To determine whether all of the model residuals follow a normal distribution, it is necessary to conduct the Jarque-Bera test. The hypotheses for this test state that the residuals follow a normal distribution under the

null hypothesis and do not follow a normal distribution under the alternative hypothesis. Table (6) presents the results of this test, where we find that the probability value (Prob) for the test is greater than (0.05) at a significance level, indicating that the residuals will follow a normal distribution.

Table 6: Normal Distribution of Model Residuals

VAR Residual Normality Tests				
Orthogonalization: Cholesky (Lutkepohl)				
Null Hypothesis: Residuals are multivariate normal				
Sample: 1 32				
Included observations: 31				
Component	Skewness	Chi-sq	df	Prob.*
1	-0.105166	0.057142	1	0.8111
2	-0.620882	1.991719	1	0.1582
Joint		2.048861	2	0.3590
Component	Kurtosis	Chi-sq	df	Prob.
1	8.774929	43.07683	1	0.3627
2	4.596548	3.292415	1	0.0696
Joint		46.36925	2	0.1234
Component	Jarque-Bera	df	Prob.	
1	43.13397	2	0.6478	
2	5.284134	2	0.4 712	
Joint	48.41811	4	0.4785	

Source: Prepared by the researcher using outputs from Eviews 12

Fifthly, Causality Results

After confirming all the diagnostic tests and ensuring that the estimated model is free from statistical issues, and that the model enjoys statistical acceptance, we proceed to employ the Toda and Yamamoto methodology to elucidate the long-term causal

relationship between economic growth and inflation rates in Iraq. As shown in Table (7), a unidirectional causal relationship between economic growth and inflation rates is evident, meaning that an increase in growth rates has an impact on inflation rates.

Table 7: Long-Term Causality Test

VAR Granger Causality/Block Exogeneity Wald Tests			
Sample: 1 32			
Included observations: 31			
Dependent variable: G			
Excluded	Chi-sq	df	Prob.
F	0.078151	1	0.7798
All	0.078151	1	0.7798
Dependent variable: F			
Excluded	Chi-sq	df	Prob.
G	5.192502	1	0.0227
All	5.192502	1	0.0227

Source: Prepared by the researcher using outputs from Eviews 12

Sixthly, Impulse Response Function Analysis:

Figure (3) below illustrates the response functions to the impact of a shock in one of the model variables at a specific time on the current and future

values of that variable and other variables in the model. This helps uncover various interrelated relationships and interactions between the study variables, as shown in the figure below.

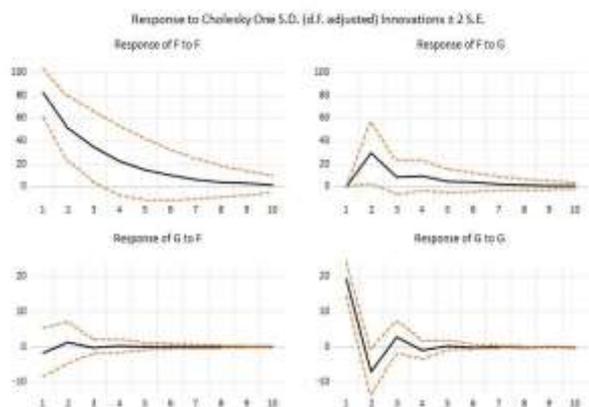


Figure 3: Illustrates the response functions

Source: Prepared by the researcher using outputs from Eviews 12

The figure above shows that when a random shock occurs in the Gross Domestic Product (GDP) variable, with a one-unit standard deviation deviation, it will have a positive impact on inflation rates, with the highest impact occurring during the second period. It then gradually decreases and stabilizes completely at the beginning of the eighth period. Conversely, when a random shock occurs in GDP, it will initially have a negative impact during the first period of the shock, then return to a positive impact during the second period, and continue to remain stable throughout the response period, starting from the third period. The impact of growth on itself oscillates during the first three periods and then stabilizes completely at the beginning of the fourth period.

VI. CONCLUSIONS

- 1- There is a unidirectional causal relationship between economic growth and inflation, meaning that an increase in growth rates has an impact on inflation rates.
- 2- When the economic growth rate increased excessively, it led to an increase in general demand for goods and services. However, the economy could not keep pace with this surge in demand by increasing production at the same rate, resulting in higher prices and, consequently, increased inflation rates.
- 3- The Iraqi economy is significantly affected by the inflation of its trading partners due to its heavy reliance on foreign imports, which has a negative impact on its economy.
- 4- When a random shock occurs in Gross Domestic Product (GDP), it initially has a negative impact during the first period of the shock.
- 5- The stability level varies among economic variables between the level and the first difference, making it impossible to conduct a cointegration test.

RECOMMENDATIONS

- 1- Central banks typically use monetary policy to control inflation. This policy may involve increasing the key interest rates. Raising interest rates makes borrowing more expensive, reducing spending and investment, thus easing inflationary pressures.
- 2- Improving the economy's productivity and substituting it for external imports can contribute to reducing imported inflation. Enhancing technology, developing infrastructure, and improving production efficiency allow the economy to increase its output without a significant increase in costs, thus helping alleviate price pressures.
- 3- Governments can use fiscal policy to address inflation by increasing investment spending and reducing consumption.

REFERENCES

- [1] Ruba Abu Shihab, Thikraiat Soufan, Shatha Abdul-Khaliq, The causal relationship between exports and economic growth in Jordan, *International Journal of Business and Social Science* 5 (3), 2014, 302-308
- [2] Marwa Sahnoun and Chokri Abdennadher, Causality Between Inflation, Economic Growth and Unemployment in North African Countries, *Economic Alternatives*, 2019, Issue 1, pp. 77-92
- [3] Ramazan: Tuzun, Osman, Ceylan, Fatih, The relationship between inflation and economic growth: Experiences of some inflation targeting countries, Provided in Cooperation with: "Victor Slavescu" Centre for Financial and Monetary Research, National Institute of Economic Research (INCE), Romanian Academy, Vol. 24, Iss. 1 187,2020, pp. 6-20
- [4] Ayfer özyilmaz1, Relationship Between Inflation and Economic Growth in EU Countries, *Journal of Economic Policy Researches Cilt/Volume: 9, Sayı/Issue: 2, 2022, pp 425-435*
- [5] Piumi Atigala, Tharaka Maduwanthi', Vishmi Gunathilake', Sanduni Sathsarani', Ruwan Jayathilaka, 2022, Driving the pulse of the economy or the dilution effect: Inflation impacting economic growth ·PLOS ONE.org/10.1371/bone link 027337% ,August 19
- [6] Naïma, Zeremi, 2016, The Impact of Trade Liberalization on Economic Growth in Algeria, Unpublished Doctoral Thesis, Faculty of Economic and Business Sciences, University of Abou Bakr Belkaïd, Ministry of Higher Education and Scientific Research, Algeria.
- [7] Ajeemah, Mohammed Abdelaziz, and Yaman Naif, *Economic Development: A Theoretical*

- and Applied Study, The University Press, Egypt, 2003.
- [8] Al-Fatlawi, Ru'a Ali Hussein, 2018, Measuring Some Economic Growth Indicators for the Iraqi Economy for the Period (1980 - 2003), Unpublished Master's Thesis, College of Management and Economics, University of Karbala.
- [9] Hussein, Kareem Salem and Musa Khalef Awad, The Global Financial Crisis and its Potential Effects on the Iraqi Economy, (The First Scientific Conference, College of Administration and Economics, University of Al-Qadisiyah, December 2009, p. 114.
- [10] The World Bank, Iraq: Economic Outlook, April 14, 2022, <https://www.albankaldawli.org/ar/country/iraq/publication/economic-update-april-2022>
- [11] Martin Höflmayr, Inflation explained: What lies behind and what is ahead?, European Parliamentary Research Service, 2022, PP 2
- [12] Hamadi, Khadija, 2009, The Relationship Between Inflation and Wages in Algeria During the Period (1990 - 2003), An Economic Empirical Study, Unpublished Master's Thesis, University of Algeria, Algeria.
- [13] Ramisa, Aqshish, 2018, The Impact of Inflation on Economic Growth in Algeria during the Period 1987-2018, Unpublished Master's Thesis, University of Mohamed Khider - Biskra, Algeria.
- [14] Al-Durzi, Mahand, 2010, Addressing Inflation in the Syrian Economy through Enhancing Integration between Monetary and Fiscal Policies, Unpublished Master's Thesis, University of Damascus, Syria.
- [15] Al-Ghaish, Masad Mohammed, The Effectiveness of Interest Rates in Controlling Imported Inflation in Egypt during the Period 1990-2022, Journal of the College of Political Science and Economics, Issue 8, 2023, Egypt
- [16] Donath, L., & Bogdan, D. (2011). The Structural Inflation In Romania, West University Timisoara, Faculty of Economics, 2011, P5
- [17] Dawood, Samir Suhaim, The Impact of Structural Economic Imbalances on Inflation: A Case Study of the Iraqi Economy, Journal of Economic and Administrative Sciences, Volume 19, Issue 70, 2008, University of Baghdad, Iraq.
- [18] Al-Rubaie, Falah Khalef, Interpreting the Phenomenon of Inflation in the Iraqi Economy, Iraq Journal of Economic Reform, Special Issue on Inflation and the Role of Fiscal and Economic Policies, 2006, Baghdad, Iraq.
- [19] AbdulRahim, Thuraya, 2007, Evaluation of Monetary Policy Performance in Iraq and Its Impact on Inflation - Analytical Study for the Period (1980-2003), Journal of Economic and Administrative Sciences, Volume 13, Issue 48, 2007, Baghdad, Iraq.
- [20] Al-Mousawi, Rahman Hassan Ali, Economic Inflation in Iraq: Causes and Remedies, Al-Qadisiyah Journal of Administrative and Economic Sciences, Volume 9, Issue 1, 2007, University of Al-Qadisiyah, Iraq.
- [21] Yas, Asmaa Khudair, 2013, Analysis of Inflation Rates in Iraq for the Period (2000-2010), Baghdad College of Economic Sciences Journal, Issue 36, 2013, Baghdad, Iraq.
- [22] Central Bank of Iraq, Annual Report on the Role of Monetary Policy of the Central Bank of Iraq in Inflation Management for the Year 2018, Annual Report 2018, Statistics & Research Department <http://www.cbi.iq>
- [23] The World Bank, Iraq: Economic Outlook, 2018, <https://www.albankaldawli.org/ar/country/iraq/publication/economic-update-april-2018>
- [24] Al-Anzi, Saadoun Hussein Farhan, 2006, The Impact of Exchange Rate Fluctuations on Several Macroeconomic Variables in a Number of Developing Countries, Unpublished Doctoral Thesis, College of Management and Economics, University of Mosul.
- [25] Vikesh Gokal and Subrina Hanif, (2004), Relationship Between Inflation and Economic Growth, Economics Department Reserve Bank of Fiji, Working Paper.
- [26] Pollin, Robert & Zhu, Andong, (2005), Inflation and Economic Growth: A Cross-Country Non-linear Analysis, Department of Economics and Political Economy Research Institute (PERI) University of Massachusetts, Working Paper Series, N: 109.
- [27] Al-Hiti, Ahmed Hussein and Aws Fakhruddin Al-Joujaati, The Role of Monetary and Fiscal Policies in Economic Growth, University of Anbar Journal of Economic and Administrative Sciences, Volume 4, Issue 8, 2012, University of Anbar, Iraq.