American Journal of Economics and Business Management

Vol. 8 Issue 3 | **pp.** 1326-1340 | **ISSN:** 2576-5973
Available online @ https://www.globalresearchnetwork.us/index.php/ajebm

Article

Analyzing The Correlation Between Monetary Depth and Inflation and Measuring its Impact On Purchasing Power In the Iraqi Economy for the Period (2004-2023)

Dr. Faten Saeed Hameed[1]

1. College of Administration and Economics, Wasit University
* Correspondence: fsaeed@uowasit.edu.iq

Abstract: The research is interested in analyzing and evaluating the interaction of monetary depth with inflation as economic variables affecting and interacting in each other and measuring their impact on the purchasing power in the Iraqi economy, as this analysis contributes to understanding how to direct monetary and financial policy to work to reduce the inflationary effects and enhance stability in the currency, which is reflected in the economic activity and the standard of living of individuals, and it has become clear from the analysis that there is a reciprocal relationship between monetary depth and inflation, as the change in one can affect the other. Monetary depth can contribute to improving purchasing power by increasing productivity, enhancing investments and improving the efficiency of the distribution of financial resources to support price stability, as high inflation rates negatively affect the purchasing power of consumers in the Iraqi economy, leading to low living standards. The findings of the analysis provide an in-depth understanding of key economic trends that enables decision-makers related to monetary and fiscal policies to develop more accurate strategies that promote economic growth and stability.

Keywords: monetary depth, inflation, purchasing power, Iraqi economy

Citation: Hameed F. S. Analyzing The Correlation Between Monetary Depth and Inflation and Measuring its Impact On Purchasing Power In the Iraqi Economy for the Period (2004-2023). American Journal of Economics and Business Management 2025, 8(3), 1326-1340.

Received: 07th Mar 2025
Revised: 14th Mar 2025
Accepted: 21th Mar 2025
Published: 28th Mar 2025

1. Introduction

The subject of research in the analysis of the interactive relationship between monetary depth and inflation in the economy is one of the important topics that require an in-depth analytical study in developed or developing countries alike, especially in the Iraqi economy, this economy has faced unique challenges due to its complex economic and political history, which greatly affected the stability of its currency and inflation rates and the associated changes in monetary depth, which in turn affected the purchasing power of individuals. Iraqi after 2003 from a central economy to an internationally open economy and this is what enhanced the monetary depth by expanding its banking base and thus increasing access to its financial and monetary services and the interaction of monetary depth with inflation directly affects purchasing power as inflationary pressures are generated, especially when increasing monetary depth without a parallel increase in production and thus giving money a low value that negatively affects purchasing power and vice versa and this explains the reflections generated by the complex relationship between monetary depth, inflation and purchasing power This analysis is completed by presenting the changes in the real GDP growth rate using appropriate time models, which contributes to providing a clear picture of the different trends in time in the Iraqi economy

based on the analysis of data during the period (2004-2023) when analyzing the temporal relationships between the variables under research.

Importance of research:

The research focuses on an important vital topic related to economic dynamics through how to clarify the understanding of the complex interrelationship between the monetary depth represented by the variable of the broad money supply to real GDP and their interaction and impact on making changes in purchasing power in bilateral directions that have a relatively positive or negative impact on economic activities at the macroeconomic level.

Search problem:

Despite the efforts made to develop the financial sector and work to guide monetary policy in Iraq in a way that supports and enhances economic activity, especially after 2003, but the monetary depth is still relatively limited due to the dependence of the Iraqi economy on oil as a basic commodity in export operations, so the Iraqi economy is exposed to clear fluctuations in inflation rates, which affects the instability in purchasing power, hence the problem of research to assess the impact of monetary policy as one of the most important macroeconomic policies and work as much as possible on Directing them effectively in the future to promote and support economic stability.

Research hypothesis:

There is a reciprocal and interactive relationship between monetary depth (variable of the broad money supply to GDP) as the change in one can affect the other, increases in monetary depth can contribute to improving purchasing power by increasing productivity and enhancing investments, as well as that high inflation rates negatively affect the purchasing power of consumers in the Iraqi economy, which leads to low living standards, and the increase in monetary depth can in some cases lead to hyperinflation unless It is accompanied by real growth in the economy through the efficient distribution of financial resources to support price stability as one of the economic means used.

Research Objectives:

1- Analyze the relationship between monetary depth and inflation levels and measure their impact on purchasing power in the Iraqi economy.
2- Estimating the impact of inflation on purchasing power in the Iraqi economy by measuring its direct impact on it and how it is affected by fluctuating changes in monetary depth, high and low.
3- Clarifying the effectiveness of the impact of the impact of the broad money supply to GDP as monetary depth as a pivotal and influential monetary variable of monetary policy in Iraq by controlling inflation rates and supporting purchasing power.
4- Conducting a temporal analysis of the fluctuating changes in monetary depth and its relationship to inflation levels to clarify the different trends and patterns of them and measure their impact on purchasing power in the Iraqi economy.

Research Structure:

The research was divided into three sections, the first section included a theoretical review of monetary depth, inflation and purchasing power.

The second section dealt with the analysis of the relationship of the interaction of monetary depth and inflation and measuring their impact on purchasing power in the Iraqi economy for the period (2004-2023) using various statistical methodologies to analyze economic data, while the third section devoted to analyzing the stability of economic monetary variables in the Iraqi economy and estimating the ARDL model for the period (2004-2023).

Literature Review:

The first topic

Theoretical review of monetary depth - inflation and purchasing power

First: The theoretical concept of monetary depth in the economy

1- The concept of monetary depth as an economic indicator

Monetary depth represents the increase in the abundance of financial resources accompanied by a huge range of services for all members of society, and monetary depth is one of the most important indicators of access to financial services in the economy, as it measures the depth of economic decisions issued by the monetary authority [1].

2- Monetary depth measurement index and its importance in the economy

The monetary depth is embodied as an economic indicator, as it is expressed as a ratio of the broad money supply to the gross domestic product, as this ratio indicates the abundance and development of monetary and financial services provided to all individuals in society, as the broad money supply is used as it accurately expresses the amount of money in circulation within the economy and the role of money in economic activities in the sense that it represents the amount of total monetary mass as this ratio measures the percentage of liquidity available in the economy [2], it is The narrow money supply that represents paid services consistent with economic transactions includes [3] in addition to term deposits, special savings deposits and savings deposits in commercial banks [4] as the broad money supply provides services against savings that must increase very rapidly to achieve adequate monetary depth [5].

3- Theoretical and intellectual concepts of inflation according to economic theories

A- Theoretical concepts of inflation and how to calculate it mathematically

There are many concepts of inflation, including that it represents the continuous increase in the general level of prices during a certain period of time [6], and inflation is defined as the continuous rise in the general level of prices resulting from the surplus in aggregate demand in a way that exceeds the ability of aggregate supply to cover this rise in aggregate demand [7] and the inflation rate is calculated mathematically through the following equation:

$$\text{inflation rate} = \left(\frac{\text{The general price level continues to change}}{\text{the general price level in the previous year}} \right) 100 *$$

B- Explanations of inflation according to intellectual economic theories

The continuous rise in the general level of prices causes changes in the value of the currency and causes economic instability due to the phenomenon of continuous price rises and inflation as investments are directed towards low-productivity activities [8].It has been interpreted as follows:

C- Inflation according to classical monetary theory

Inflation in classical terms was explained through the theory of the quantity of money, which explained the changes in the general level of prices and their relationship to the size of the money mass, as these changes are in the same proportion and the same direction [9].

D- Inflation according to Keynesian theory

Inflation was explained through two directions, the first trend is when investment exceeds saving as a result of the low interest rate, as investors finance their economic activities by borrowing from banks, thus increasing the demand for investment goods, which results in their prices rising and increasing production and employment levels, which results in all this rising in the general level of prices and thus encouraging investors to increase investments in order to obtain more profits and continue to rise, so inflation occurs and the opposite happens in the other direction. The investor of his investments to reduce losses and avoid them as much as possible [10].

E- Inflation according to contemporary monetary theory

According to this theory, inflation is generated because of the imbalance between money supply and demand, and since the money supply is an independent external variable controlled by the Central Bank as a monetary authority, Friedman emphasized money demand as a monetary variable that pivotally and importantly affects the general

level of prices and focuses on the determinants of demand for the amount of money in individuals [11].

Second: Economic theoretical concepts of purchasing power and the factors affecting it

1- The theoretical economic concept of purchasing power

It is the ability of the individual consumer to obtain the quantity of goods and services and buy them with his certain monetary units during a specific period of time [12], and the term purchasing power expresses the size of the local economy and the ability of the individual and his family to adapt to all its indicators, when purchasing power increases, it means that the individual and his family live an economic life characterized by stability, and on the contrary, in the event of a decrease in the purchasing power of the individual, and purchasing power is linked to the general level of prices and the level of individual income and his possibilities to obtain different quantities of Produced goods and services [13].

2- The most important factors affecting purchasing power and its interaction with other economic phenomena and indicators [14]

– The mechanism of supply and demand in the economy

When supply exceeds demand, the value of the currency decreases to increase its supply in the market, generating a surplus in supply against demand, and thus this reflects negatively on purchasing power, on the contrary, when demand increases at both levels, whether domestic or external, the value of the currency will rise, resulting in a positive impact.

– The phenomena of inflation and economic deflation

The increase in prices means the decline in the value of the currency as the purchasing power of the local monetary units decreases, the inverse relationship between the purchasing power of the individual and the general level of prices and the opposite occurs in the economic contraction, as when the value of goods decreases, the purchasing power of the local currency rises.

– Economic Growth Forecast

Slow economic growth negatively affects purchasing power and thus the depreciation of the currency and growth is measured by key economic indicators such as GDP and retail sales, and with the decline of these indicators the value of the currency in the economy in question decreases.

– The phenomenon of trade deficit

This phenomenon is generated as a result of the high value of imported goods (imports) from the value of exported goods (exports), which leads to a decrease in the value of the local currency against the other currency, and it should be noted that the increased demand for goods produced in the country raises the value of its currency, which means a rise in its purchasing power.

– Constant fluctuations in the exchange rate

Continuous fluctuations in the currency exchange rate lead to changes in purchasing power and the exchange rate of the local currency against the foreign currency affects the purchasing power as the depreciation of the local currency against the foreign currency reduces the purchasing power of individuals for imported goods, as the high price of goods and services in a particular country leads to a rise in the value of its currency compared to the value of the currency of the other country, and this will not affect the purchasing power of locally produced goods in a direct direction, but companies dealing with external suppliers are affected. This causes the costs of importing goods to these companies to rise, which leads to an increase in the prices of imported goods in the foreign market for the local consumer

and thus a decrease in purchasing power that will create inflation and other economic risks that follow.

The weakness in purchasing power is caused by two main reasons: [15]:

- An internal reason at the local level is low income of individuals.
- An external cause at the global international level is economic crises and high commodity prices globally.

In fact, it is clear that purchasing power decreases in light of the use and spending of cash currencies on non-productive consumer areas, and therefore this consumption spending of the state means an increase in cash income against which there is no increase in the production of goods and thus the prices of goods and services rise and inflation is generated on the one hand, the work to raise the value of the currency to strengthen it This automatically works to improve the purchasing power of individuals and this may happen when injecting consumer loans into the economy and thus increasing the proportion of cash liquidity Their purchasing power improves according to their incomes, which can only be achieved by controlling inflation levels in a timely manner.

Third: Theoretical analysis of the relationship between monetary depth (ratio of broad money supply to GDP) and the variables studied under research (inflation and purchasing power) in the economy

1- Monetary depth fluctuations and inflation

In economies with a huge monetary depth, monetary policy has a significant impact on economic activity, as the increase in monetary depth works to provide various financial instruments that enable central banks to use a more effective monetary policy to control inflation levels, as with the lack of cash liquidity management in a correct direction, inflation increases [16], and GDP represents a major pivotal variable affected by changes in the money supply. This leads to the increase in the general level of prices and low interest rates, and this leads to the expansion of investments in the economy in question, and the opposite occurs by relying on a monetary policy with a restrictive or deflationary trend, which reduces the money supply, and this means as a result a rise in the interest rate and a decrease in the general level of prices and thus a decrease in the volume of investments [17].

2- Changes in monetary depth and their interaction with inflation and their impact on purchasing power in the economy

Inflation means the continuous increase in the general level of prices and thus the decrease in the purchasing value of money and this relationship between inflation and the monetary mass is evident depending on the theory of the amount of money, the increases in the money supply are commensurate with the same quantity and direction of the general level of prices [18], as for the impact of changes in monetary depth on purchasing power in the economy, when there is an increase in the broad money supply, the general level of prices increases, which means high levels of inflation and thus a decrease in the purchasing power of the cash currencyInflation works to reduce the purchasing power of the currency as the monetary unit can buy less goods and services over time and this impact is more evident on fixed income groups compared to groups with variable income [19], and with regard to the effects of monetary depth on purchasing power, increasing monetary depth can contribute to price stability if financial and monetary tools are used more effectively to control inflation levels by the monetary authority represented by the Central Bank, despite this Excessive liquidity without proper control increases the level of inflation and thus decreases purchasing power [20].

The second topic

Analysis of the relationship of the interaction of monetary depth and inflation and measuring its impact on purchasing power in the Iraqi economy for the period (2004-2023)

The Iraqi economy suffers from continuous inflation pressures for many reasons, the most important and most prominent of which is that it is a unilateral economy because it depends on exporting oil only as a basic export commodity, which means its continuous contact with the global oil market, which is often unstable, as well as the rise in the prices of local goods compared to imported goods due to the increase in costs in general, which include production and marketing costs and the costs of raw materials, as well as the imbalance between the forces of supply and demand for the lack of production apparatus in the Iraqi economy, which means Its failure to respond to the total demand and thus the rise in prices, as well as the increase in government spending, especially with regard to wages and salaries for the government sector and the granting of bonuses, donations, etc., which leads to an increase in the speed of money circulation and thus the rise in prices as well as the low purchasing value of money [21], as well as the rise in oil prices, which contributed to the diversity of investment opportunities and the accompanying announcements of huge projects for other countries for the purposes of foreign investment, all of which contributed to the increase in demand for commercial and residential real estate and thus the rise Various statistical methodologies were used to analyze economic data, in order to understand the economic dynamics associated with economic growth, inflation, cash liquidity, and other factors affecting economic performance. The analysis begins with the statistical description of the data, followed by the analysis of the stability of the variables using advanced statistical tests for analysis, and then the assessment of the ARDL model to study the long- and short-term relationship between the economic variables under consideration. Assess model quality by analyzing the remaining estimates, as well as verify the existence of a long-term equilibrium relationship through the cointegration test, and determine causal relationships between variables using Granger's causality test [22].

2. Materials and Methods

The research adopted methodology from the quantitative side by means of econometric modelling to glean the interactive effect of monetary depth, inflation and purchasing power over the Iraqi economy duration from 2004 to 2023. In conducting this study, secondary data have been derived from official economic bulletins of the Central Bank of Iraq and the World Banks, which cover such variables as the broad money supply (M2), real GDP, the inflation rate, GDP per capita (in PPP) and the monetary depth coefficient (M2/GDP). The central tendencies and dispersion of these variables over the length of the study period were captured using descriptive statistical techniques, and these initial foundational insights into their temporal trends were established. In order to study further the short and long run dynamics, a system was run using the Augmented Dickey Fuller (ADF) and theKPSS tests for stationarity, and subsequently the Auto Regressive Distributed Lag (ARDL) was implemented. Cointegration tests which indicate the long term equilibrium relationship among the variables were also conducted in the analysis and Granger causality tests were conducted to find out directional causality of the variables. Information criteria (AIC and BIC) were used to select the model specification (ARDL 1,1,1,1) as this is robust in the presence of mixed order integration. The empirical strategy allowed to estimate direct and indirect effects of the monetary depth and inflation on purchasing power while controlling for GDP dynamics. In order to perform a reliable econometric analysis of the relationships under study, the econometric analysis was carried out in Python using EViews software which supports the formulation of policy recommendations in order to enhance purchasing power of Iraqi citizens and economic stability.

3. Results and Discussion

First: The results of analyzing the impact of monetary depth and inflation changes on purchasing power in the Iraqi economy for the period (2004-2023)

1- Descriptive analysis of monetary economic variables under consideration over the period (2004-2023)

Table 1 provides a descriptive analysis of economic data over 20 years, showing the mean, median, standard deviation, and min & max values for each of the economic variables studied. This analysis helps to understand general economic trends and determine the extent of variation in economic values over the years, which contributes to the conclusion of the basic relationships between The studied variables are under consideration.

Table 1

Descriptive statistics of the economic variables studied under research

Simple economic growth rate of real GDP (%Real GDP Growth Rate)	Monetary depth coefficient 1/2 (%M2/GDP)	GDP per capita by purchasing power parity Thousand US dollars (GDP per Capita)	Inflation Rate	Real GDP GDP (Million Dinars)	M2 Wide Cash Supply (Million Dinars)	Years
19	20	20	20	20	20	Count
3.742105	39.447	12.504	10.295	1.58E+08	67565846	Mean
6.224392	18.52297	1.615225	14.75735	40386635	41599815	Std
-12.04	9.96	8.98	-0.2	1.02E+08	10148626	Who?
1.78	25.8675	11.4	1.775	1.24E+08	32022506	25%
3.38	41.845	12.65	4.15	1.53E+08	69063937	50%
7.55	48.295	13.45	9.4	1.96E+08	80064488	75%
13.94	78.4	14.9	53.1	2.22E+08	1.55E+08	Max

Source: Prepared by the researcherbased on the data of Appendix (1).

A- Analysis of inflation rates in the Iraqi economy over the period (2004-2023)

It is clear from Table (1) that the inflation rate witnessed a significant variation during the period (2004-2023), reaching a minimum (-0.2% in 2019, while it reached (53.1%) in 2006. This disparity reflects severe periods of inflation that may have been the result of economic turmoil or changes in monetary policy, which led to a significant decrease in purchasing power in some years..

The average inflation rate was (10.3%), which is a high rate that indicates repeated inflationary pressures that affected the Iraqi economy, and the standard deviation (14.76%) reflects a high degree of fluctuations in the inflation rate, which indicates the instability of prices over the period of time under consideration.

B- Analysis of the broad money supply in the Iraqi economy

The broad money supply (M2) has shown steady growth over the years, rising from KD 10 million in 2004 to more than KD 155 million in 2023. This growth reflects increased economic activity and high levels of liquidity in the market, which may be an indication of expanding bank lending or rising savings, which enhances the stability of the financial system..The average money supply (M2) was about (67.57) million dinars, which is higher than the median (69.06) million dinars, which indicates that there are some extreme values that may affect the average. The standard deviation of (41.6) million dinars also reflects a clear variation in the size of the money supply over the period under consideration, indicating the existence of periods of accelerated monetary expansion..

C- Analysis of real GDP in the Iraqi economy

The average real GDP during the research period was (158) million dinars, with a minimum of 102 million dinars and a maximum of 222 million dinars , noting that the standard deviation of (40.39) million dinars reflects a clear variation in GDP growth over

the years of research, which may reflect the effects of For various economic factors such as investment, production, and government spending.The large difference between lower and upper values indicates periods of strong economic growth and slowdowns, indicating that GDP was affected by market and macroeconomic changes during the research period in question (2004-2023).

D- Analysis of GDP per capita by purchasing power

GDP per capita showed a slight upward trend, averaging USD 12.5,000, with a minimum of $8.98,000 and a maximum of $14.9,000.The median value of $12.65 thousand reflects its proximity to the average, indicating a relatively balanced distribution of values over the years.Research The standard deviation of $1.62K indicates relative stability in per capita income growth, with some limited fluctuations that may be caused by changes in productivity, exchange rates, or inflation levels.

E- Monetary depth coefficient analysis (M2/GDP)

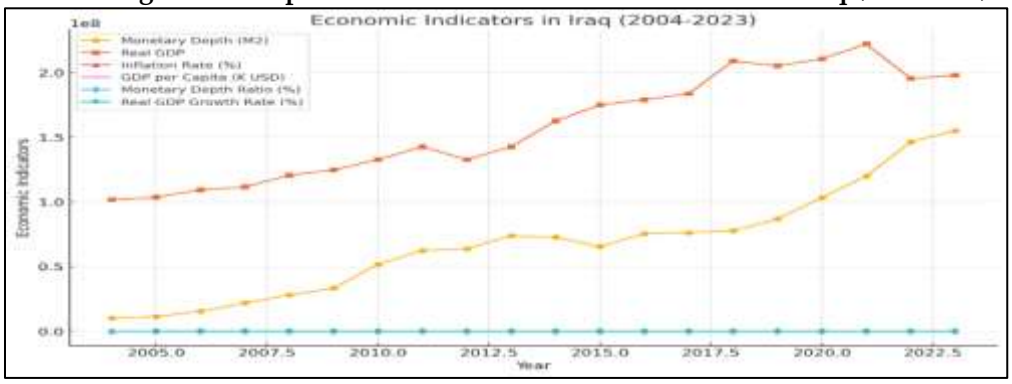
The average ratio of M2 to GDP was about (39.45%), which indicates an average degree of monetary depth, as this ratio reflects the relationship between the liquidity available in the economy and GDP, which is an important indicator indicating the extent of development of the financial system, as the minimum and upper values range between (9.96%) and (78.4%), reflecting a marked variation in the ratio of available liquidity compared to the size of the economy. The standard deviation of (18.52%) indicates that there are significant fluctuations in the degree of monetary depth over the period of the research studied, which may be related to monetary policies or fluctuations in GDP.

F- Analysis of the simple economic growth rate

The average economic growth rate during the research period was (3.74%), which is a positive indicator indicating the expansion of the economy, but with a noticeable variation in values, as it ranged between (-12.4%) as the lowest level and (13.94%) as the maximum growth rate.The standard deviation of 6.22% indicates clear fluctuations in growth rates over the years of research, which may be associated with economic cycles, external shocks, or changes in macroeconomic policies such as government spending or foreign direct investment. After analyzing the relationships between the variables surveyed and reviewing all the results, the descriptive analysis showed a large variation in inflation rates, indicating economically unstable periods of time that affected the purchasing power of consumers. The monetary expansion (M2) also witnessed continuous growth, reflecting an expansion in economic activity and increased liquidity in the market. Both GDP and GDP per capita maintained an overall upward trend, although there were annual variations associated with market changes and macroeconomic policies. This analysis provides a comprehensive view of the performance of the economy during the period under consideration, and helps in understanding general trends and economic fluctuations that may be caused by changes in economic policies or external factors. Figure (1) shows the development of the main economic indicators in the Iraqi economy during the period (2004-2023).

Figure 1

Chronological development of the main economic indicators in Iraq (2004-2023)



Source: Prepared by the researcher based on the results of Table (1) data based on the outputs of the results of the economic measurement program (Python 3.13.2).

Figure 1 reflects general trends in economic activity, monetary policy and the effects of inflationary pressures. It is noted that the broad money supply (M2) has seen continued growth, indicating an expansion in available liquidity and an increase in financial and banking activity. Real gross domestic product (GDP) has also shown an upward trend over the years of research studied, with some volatility that may be caused by changes in oil prices or economic policies. On the other hand, the inflation rate shows sharp fluctuations, reaching its peak in 2006, reflecting Economically unstable durations. GDP per capita recorded a slight upward trend, indicating a gradual improvement in the level of per capita income. The monetary depth ratio (M2/GDP) also reflects the development in the financial sector, as it has seen gradual increases indicating a deepening of financial and economic activity. However, the simple economic growth rate of real GDP shows marked volatility, indicating periods of accelerated growth. And another of the economic downturn, which may be related to fiscal policies and general economic conditions. Finally, these changes reflect the cumulative effects of economic policies and illustrate the importance of monetary and fiscal stability to promote sustainable growth.

Second: Analysis of the correlation coefficient between monetary depth, inflation rate, and GDP per capita according to purchasing power in the Iraqi economy over the period (2004-2023)

1- The results of the analysis of the correlation matrix between the economic monetary variables in the Iraqi economy for the period (2004-2023)

The correlation matrix shows the statistical relationships between different economic variables, as the correlation matrix reflects the relationship between different economic variables such as broad money supply, real GDP, inflation rate, GDP per capita, monetary depth coefficient (M2/GDP), and real economic growth rate. (Table 2)

Table 2

Correlation coefficient of the studied economic variables under research in the Iraqi economy over the period (2004-2023)

Real_GDP_Growth	M2_GDP	GDP_per_ Capita	Inflation	GDP	Critical Depth	Variables
-0.319	0.959	0.626	-0.650	0.862	1.000	Critical Depth
-0.066	0.730	0.754	-0.686	1.000	0.862	GDP
-0.030	-0.692	-0.807	1.000	-0.686	-0.650	Inflation
-0.047	0.628	1.000	-0.807	0.754	0.626	GDP_per_ Capita
-0.348	1.000	0.628	-0.692	0.730	0.959	M2_GDP
1.000	-0.348	-0.047	-0.030	-0.066	-0.319	Real_GDP _Growth

Source: Prepared by the researcherbased on the data of Appendix (1).

The following is a detailed analysis of these relationships as shown in the results of Table (2):

A- The relationship between broad money supply and real GDP

The correlation matrix shows that there is a strong positive correlation between monetary depth and GDP, as the correlation value is (0.86) this relationship means that as the broad money supply (M2) increases, GDP tends to rise, indicating the role of monetary expansion as an important indicator of monetary depth in supporting economic growth by boosting investments and productivity.

B- The relationship between broad money supply and inflation rates

The correlation value of (-0.65) indicates a strong negative relationship between monetary depth and inflation rate. This relationship supports the hypothesis that

increasing monetary depth can reduce inflation by improving the efficiency of the distribution of financial resources and increasing productivity. However, uncontrolled or excessive increase in liquidity can lead to higher inflation if it is not accompanied by real economic growth domestically and globally, especially in the open economy.

C- The relationship between GDP and inflation rates

The correlation matrix shows that there is a strong negative relationship between GDP and inflation rate, with a correlation value of -0.69 This means that when GDP grows, inflation decreases, reflecting the impact of high productivity and increased aggregate supply on price stability.

D- The relationship between broad money supply and GDP per capita

The relationship between monetary depth and GDP per capita shows a moderately positive correlation of (0.63)This suggests that as the broad money supply increases, the income of individuals increases according to purchasing power parity, which enhances the overall standard of living.

E- The relationship between inflation rates and GDP per capita

The correlation matrix shows a very strong negative correlation between inflation and GDP per capita, with a correlation value of -0.81. This shows that high inflation erodes purchasing power, negatively affecting the standard of living of individuals and reducing their purchasing power.

F- The relationship between the monetary depth coefficient (M2/GDP) and inflation rates

The correlation matrix indicates a strong negative relationship between the monetary depth coefficient and the inflation rate, as the correlation value reached (-0.69) This means that theincrease in the monetary depth coefficient (M2/GDP) leads to a decrease in inflation, which confirms the role of monetary policy in price stability when managed effectively (Figure 2).

Figure 2

The temporal relationship between the broad money supply and inflation rates in the Iraqi economy for the period (2004-2023)

Source: Prepared by the researcher based on the results of Table (2) data based on the outputs of the results of the economic measurement program (Python 3.13.2).

The graph in Figure (2) shows the temporal relationship between the broad money supply as an indicator of monetary depth and inflation rates in Iraq over the period (2004-2023). It is noted that it has taken a clear upward trend, especially after 2010, as it witnessed significant increases, after 2019, which may reflect the adoption of expansionary monetary policies or an increase in the money supply to meet economic challenges.In contrast, the inflation rate was high in the early years (2004-2006) and then gradually declined and stabilized at low levels after 2010, with some relatively minor fluctuations. A significant increase in monetary depth has not led to hyperinflation, suggesting a potential role for monetary policies in controlling inflation when liquidity is used to boost productivity and investment. This decline in inflation, despite an increase in the money supply, may also be the result of stabilizing commodity prices or improving liquidity control mechanisms by the central bank. However, the relationship between monetary expansion and inflation

needs further analysis, particularly to understand whether this relationship is stable in the long term or whether there are other factors at play such as the level of domestic production, the exchange rate, and fiscal policies. In general, this trend suggests that Iraq was able to This period of avoiding hyperinflation despite the expansions of the money supply, reflecting relative stability in monetary policy.

G- The relationship between the real economic growth rate and the rest of the economic variables

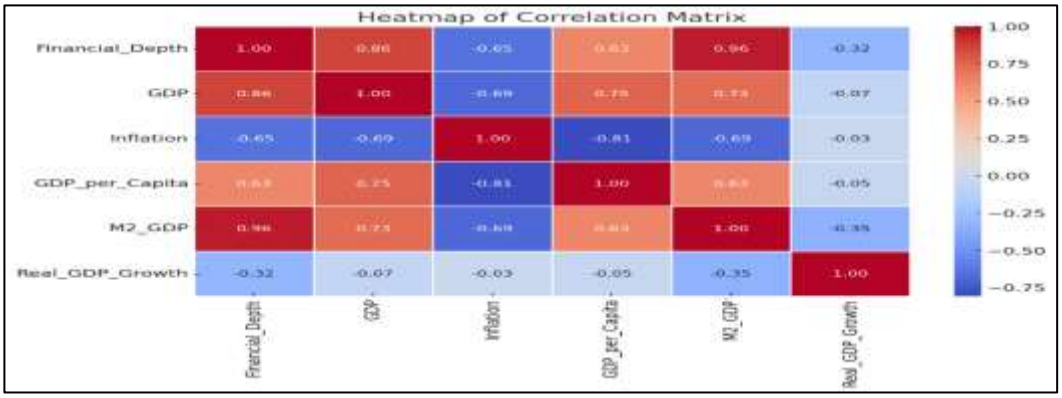
The economic growth rate shows a weak correlation with GDP (-0.07), which may reflect the impact of external factors on economic growth such as political conditions or oil price fluctuations. On the other hand, there is an average negative correlation between the rate of economic growth and the coefficient of monetary depth (-0.35), suggesting that overexpansion of money may not always be beneficial to growth if not supported by increased real production.

Third: The general interpretation of the results of the correlation matrixof the economic variables studied under research after conducting the standard analysis

1- There is a strong positive correlation between monetary expansion and GDP, which means that an increase in the broad money supply contributes to supporting economic growth.
2- There is a strong negative correlation between inflation and research variables of GDP and GDP per capita, reflecting the impact of negative inflation pressures on the economy.
3- The increase in the monetary depth coefficient (M2/GDP) leads to reducing and limiting inflation, which confirms the importance of the role of monetary policies in controlling prices in an attempt to achieve economic stability.
4- High inflation leads to a decrease in GDP per capita, which negatively affects living standards .Figure (3) shows the heat map of the correlation matrix between the studied economic variables under research in the Iraqi economy over the period (2004-2023).

Figure 3

Heat map of the correlation matrix between the economic variables studied under consideration



Source: Prepared by the researcher based on the results of the data of tables (1) and (2) based on the outputs of the results of the economic measurement program (python 3.13.2).

The third topic

Analysis of the stability of economic monetary variables in the Iraqi economy and estimation of the ARDL model for the period (2004-2023)

First: Analysis of the results of stability tests for the economic variables under research

1- Stability tests using the Cocky-Fuller Extended Test (ADF) and the KPSS Test

Stability tests were performed using the Cocky-Fuller Extended Test (ADF) andthe KPSS test to verify the stability of the economic variables studied. Table 3 presents the

results of these tests, which show that GDP, monetary depth, GDP per capita, and M2 to GDP ratio are unstable according to the ADF., indicating that there is a unitary root in these variables, that is, they follow an unstable process over time.In contrast, the inflation rate and real GDP growth rate showed stability according to the ADF test, which means that they do not have a unitary root and therefore can be used in analysis without the need for the first difference. However,the results of the KPSS test indicate that some variables, such as the inflation rate, remain unstable.

Table 3

Results of Stability Tests (ADF) and (KPSS) for Research Variables Studied Over the Period (2004-2023)

KPSS Result	KPSS Test P-Value	ADF Result	ADF Test P-Value	Variables
Non-Stationary	0.010961	Non-Stationary	0.939746	Critical Depth
Non-Stationary	0.011186	Non-Stationary	1	GDP
Non-Stationary	0.046847	Stationary	9.12E-29	Inflation Rate (%)
Non-Stationary	0.03038	Non-Stationary	0.332776	GDP per Capita
Non-Stationary	0.019487	Non-Stationary	0.726324	M2/GDP (%)
Stationary	0.1	Stationary	4.76E-09	Real GDP Growth Rate (%)

Source: Prepared by the researcher based on the outputs of the results of the econometric program (Eviews13), based on the data of Appendix (1).

2- Analysis of the stability of variables after applying the first difference

Based on the preliminary results in Table 3, the first difference was applied to the unstable variables, and then the stability was retested, as shown in Table 4. GDP (D_GDP) and M2 to GDP (D_M2/GDP%) ratio were shown to become stable after taking the first difference, suggesting that these variables follow the I(1) process, i.e. they become stable after applying the first difference.Monetary depth (D_ Critical Depth) and GDP per capita (D_GDP per capita) showed mixed results, with the ADF testing considering them unstable, while the KPSS showed stability, reflecting some discrepancies in data and its behavior over time.

Table 4

Results of Stability Tests (ADF) and (KPSS) after applying the first difference of variables

KPSS Result	KPSS Test P-Value	ADF Result	ADF Test P-Value	
Stationary	0.1	Non-Stationary	0.355435	D_ Critical Depth
Stationary	0.1	Stationary	0.010418	D_GDP
Stationary	0.1	Non-Stationary	0.452648	D_GDP per Capita
Stationary	0.1	Stationary	0.027971	D_M2/GDP (%)

Source: Prepared by the researcher based on the outputs of the results of the econometric program (Eviews13), based on the data of Appendix (1).

Second: Estimation of the ARDL model and estimated coefficients

1- ARDL Estimation Results (1,1,1,1)

Based on these results, the ARDL model was estimated using stable variables directly, while the first difference was included for unstable variables to ensure that the conditions for cointegration were met.During the estimation process, the model facedsome challenges related to determining the optimal delays, as the AIC standard was initially relied upon to choose the best order of delays. However, the ardl_select_order function showed the need for additional allocation of delay coefficients, requiring the model to be manually adjustedtaking into account the previous values of each variable to ensure that it complies with technical requirements. The ARDL model (1,1,1,1) was successfully estimated and the estimated coefficients, and the results with their statistical explanations were as follows:

A- Change in GDP (D_GDP): was statistically significant at the level of 0.000, indicating a strong impact of this variable on the real GDP growth rate.

B- The change in the ratio of M2 to GDP (D_M2/GDP%): was not statistically significant, which means that its impact on economic growth is unclear.

C- Inflation Rate %: It was not statistically significant, indicating that changes in inflation did not directly affect economic growth during the period studied.

D- Automatic coefficient of real GDP growth rate %: was not statistically significant, indicating a weakening of the subjective relationship of GDP over time.

2- Results of model selection criteria:

ACAIC standard : 75.896 , Schwartz standard (BIC): 83.909, and Hanan-Coin (HQIC): 77.001

The results indicate that the change in GDP (D_GDP) is the most influential variable on the real GDP growth rate, while M2/GDP and the inflation rate had no significant impact in this time sample. Furthermore, a negative automatic coefficient indicates that past values of GDP growth have little impact on its future values, which may indicate that there is no strong temporal correlation in GDP performance over differenttime periods.

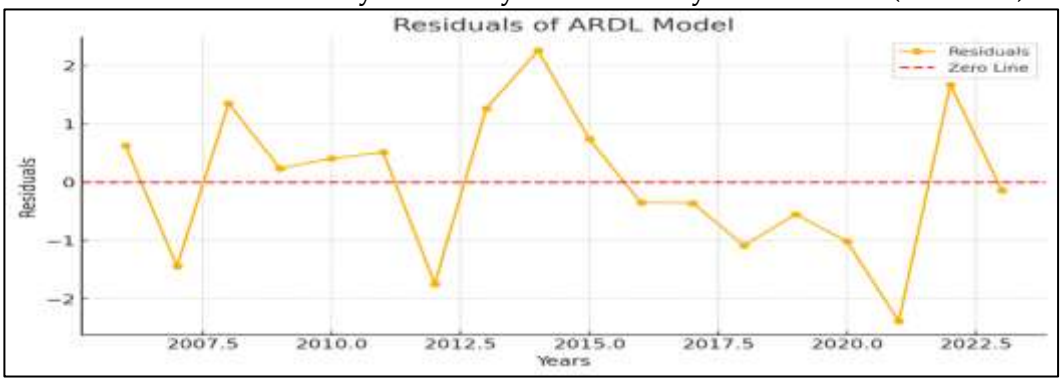
These results reflect the importance of focusing on economic policies that support real GDP growth, bearing in mind that the relationship between monetary factors and inflation is not always direct or has an immediate impact on economic growth. It also illustrates the importance of monetary and financial stability to promote sustainable growth and reduce economic volatility.

Third: Analysis of the remnants of the ARDL model and its statistical interpretations

Figure 4 presents the analysis of the remainder of the ARDL model to validate statistical hypotheses related to the model, such as the uncorrelation of errors, the normal distribution of residues, and random fluctuations around the zero mean. Residual analysis is an essential part of assessing the model's quality and compatibility with actual data.

Figure 4

ARDL model residual analysis to verify model stability over duration (2004-2023)



Source: Prepared by the researcher based on the results of the data of tables (3) and (4).

By comparing this figure with the previous analysis of the stability of the variables and estimating the ARDL model, the following can be observed:

1- The oscillation of the residuals around the zero line indicates that errors are randomly distributed, which means that the model does not suffer from the problem of systematic bias in predictions.

2- The presence of some outliers or large gaps in some time periods, such as between 2012 and 2013, and beyond 2021, may be indicative of shocks or structural changes in the economy that have not been fully captured by themodel.

3- The absence of a clear pattern or direction of the remainders, which supports the assumption that errors are independent of each other and not chronologically correlated, which is in line with previous tests of the stability of variables.

4- Residual fluctuations in some time periods may indicate that the model needs further improvement, such as improving the structure of delays used in the model.

4. Conclusion

1- There is a reciprocal and interactive relationship between monetary depth (the variable of the broad money supply to GDP) as the change in one can affect the other, increases in monetary depth can contribute to improving purchasing power by increasing productivity and enhancing investments, and the increase in monetary depth can in some cases lead to hyperinflation unless accompanied by real growth in the economy through the efficient distribution of financial resources to support price stability.

2- Inflation fluctuation: The descriptive analysis showed that the inflation rate witnessed significant fluctuations during the studied research period, reflecting the impact of external factors such as oil price fluctuations, monetary policies, and economic turmoil.

3- Expansion of monetary depth The broad money supply has witnessed continuous growth, indicating an expansion in economic activity and an increase in financial liquidity, which may be related to increased bank lending and stimulating investments.

4- Strong correlation between monetary depth and GDP The correlation matrix showed a strong positive correlation between monetary depth and GDP, emphasizing the role of cash liquidity in promoting economic growth when managed effectively.

5- Stability of some research variables studied after applying the first difference Stability tests showed that some variables were unstable at their original level but became stable after applying the first difference, which justifiesthe importance ofusing the ARDL model to study the relationship between the variables.

Recommendations

1- Economic policymakers must take measures to reduce inflation volatility by adopting effective and appropriately targeted monetary policies, such as controlling the money supply and interest rates.

2- Emphasizing the encouragement of productive investment by working to direct monetary expansion towards productive sectors instead of consumer activities only , to ensure sustainable economic growth and an increase in productivity.

3- Monetary policies must be monitored to ensure the stability of monetary depth, as increasing the money supply must be carried out according to market needs, so as not to lead to uncontrolled or high inflation or financial imbalances.

4- Promote economic diversification by avoiding overdependence on oil as the main source of GDP by encouraging non-oil economic sectors, such as industry, agriculture, and technology.

5- Improving the quality of economic forecasts: Through the use of more sophisticated forecasting models that take into account structural factors, such as foreign direct investment and fiscal policies, to ensure accurate future forecasts and achieve greater economic stability.

REFERENCES

[1]. Ismail Hammadi Mejbel and Abdullah Qasim Muhammad, "The relationship between monetary depth and the private investment index in the Iraqi economy for the period (2004-2021)", Journal of Business Economics for Applied Research, Vol. (6), Issue (1), College of Administration and Economics, University of Fallujah, 2023, p. 158.

[2]. Mustafa Kamel Rashid and Suhaila Abdul Zahra Mastour, "Banking Reform: Reality and Remedies to Diversify Sources of Output in Iraq", Al-Mustansiriya University, Baghdad, 2017, p. 14.

[3]. Taleb Awad and Malik Yassin Al-Hayadin, "The Impact of Monetary Development on Economic Growth in Jordan", Journal of Administrative Sciences Studies, Vol. (38), No. (2), 2011, p. 515.

[4]. Younis Ali Ahmed and Kamran Ahmed Hamma, "Measuring the relationship between the determinants of money supply and economic growth in Iraq for the period (1991-2018)", Kamaran University Journal, Vol. (6), No. (2), 2019, p. 206.
[5]. Sobhi Hassoun Al-Saadi, "Indicators of Financial Depth Measurement: An Analytical Study in a Sample of Selected Countries for the Period 1980-2008", Journal of Economic Sciences, Vol. (17), 2011, p. 220.
[6]. Mahmoud Muhammad Dagher, "Macroeconomics Theories and Policies", First Edition, Dar Al-Kutub and Documents in Baghdad, 2018, p. 199.
[7]. Muhammad Ahmad Al-Affendi, "Introduction to Macroeconomics", Fifth Edition, Al-Amin for Publishing and Distribution, Sana'a, 2013, p. 489.
[8]. Awad Fadel Ismail Al-Dulaimi, "Money and Banks", First Edition, Dar Al-Hikma, 1990, p. 613.
[9]. Sobhi Nadres Gereida and Ahmad Ramadan Nematallah, "The Economics of Money and Banking", University House, Beirut, Lebanon, 2006, 241.
[10]. Mohamed Abdel Moneim and Ahmed Farid Mustafa, "Monetary and Knowledge Economy between Theory and Practice", University Youth Foundation, 2000, p. 129.
[11]. Muhammad Ezzat Ghozlan, "The Economics of Money and Banking", Dar Al-Nahda Al-Arabiya for Printing and Publishing, 2002, p. 83.
[12]. Abdallah Yassin AbdelazizSufyan, "An Econometric Study of the Determinants of the Parallel Exchange Rate According to the Purchasing Power Parity Theory of the Algerian Economy," Journal of Economics, Al-Jadeed, Vol. (12), No. (4), 2021, p. 640.
[13]. Hussein Mezoud, "The Increase in Wages and its Impact on Improving Purchasing Power", Political Orbits Magazine, Vol. (6), Issue (1), 2022, p. 69.
[14]. Nadia Al-Aqoun, "An analytical study of the impact of the official exchange rate on purchasing power / the case of Algeria for the period 1970-", 2019, Journal of Industrial Economics, Vol. (11), Issue (2), 2021, pp. 100-101.
[15]. Hakim Ikram, "The Impact of Financial Inflation on Purchasing Power", Larbi Ben M'hidi University Oum El Bouaghi, Political Orbits Magazine, Vol. (6), Issue (1), 2022, pp. 40-41.
[16]. R.Glenn Hubbard and Anthony Patrick Obrien,"Microeconomics",Eighth Edition,Inc,U.S.A,2017,p532-533.
[17]. Rania Al-Sheikh Taha, "Inflation: Its Causes and Effects and Ways to Address it", Introductory Booklet Series, Issue (18), Arab Monetary Fund, UAE, Abu Dhabi, 2021, p. 6.
[18]. Suhair Mahmoud Maatouk, "Modern Trends in Critical Analysis", Faculty of Commerce and Business Administration, Helwan University, Egyptian Lebanese House, 1987, p. 31.
[19]. Ben Arabiya Rabia and Ayboud Qada, "The repercussions of imported inflation on the purchasing power of the Algerian consumer: an analytical and econometric study during the period (1990-2020)", Eliza Journal for Research and Studies, Vol. (8), No. (1), 2023, p. 272.
[20]. Raja Aziz Bandar, "Inflation Targeting - A Study of Developing Countries' Experiences in Monetary Policy", Central Bank of Iraq, Directorate General of Statistics and Research, Department of Macroeconomics and Monetary Policy, Baghdad, p. 1.
[21]. Kawthar Muhammad Dahim, "The relationship between inflation variables and some economic variables in the Iraqi economy for the period 2010-2020", Iraqi Journal of Economic Sciences, Issue (76), 2022, p. 7.
[22]. Ahmed Hassan Al-Hiti and others, "Inflation in the Iraqi Economy for the Period 1990-2007: Causes and Effects and the Role of Fiscal Policy in Addressing it", Anbar University Journal of Economic and Administrative Sciences, Vol. (2), No. (3), pp. 6-8.