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The Causal Relationship between Money Supply and Real GDP in the Libyan Economy

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Abstract: **This paper focuses on studying the relationship between Real GDP and the amount of money supply in the Libyan economy from 1980 to 2014. Modern econometric methods were used, and the study reached several conclusions. Among the main findings are the existence of a positive short-term effect between GDP and money supply, and a negative long-term effect between economic growth, represented by GDP, and money supply.**

Keywords: **Money Supply, Real GDP, Libyan Economy.**

1. INTRODUCTION

Money is central to monetary policy, which is an important tool of the general economic policy of the state and a key component of reform programs adopted by most countries in their shift towards economic liberalization and opening up to the outside world. This is especially true for modern economies, which are primarily monetary economies. Monetary policy is seen as an important tool that countries rely on to shape their economic policies through various tools and means used to manage liquidity and control the size of the money supply in the economy to achieve goals such as monetary stability and influence on the level of economic activity.

Economic theories have focused on analyzing monetary policy and its effectiveness in influencing economic activity by analyzing the factors determining the value of money and price levels. Studying the relationship between money supply, GDP growth, and price levels has been of significant interest to scholars at both local and global levels. Economic theories confirm that many economic variables such as income, investment, spending, and prices are affected by changes in monetary circulation. Thus, this study focuses on measuring the relationship between money supply and GDP in the Libyan economy.

Problem Statement

Real GDP is one source of funding for the money supply, and money supply is one of the most important tools of monetary policy for economic stability. According to economic theory, GDP influences money supply. Looking at the study data, GDP has been steadily increasing until it reached its highest level in 2010. In the years following 2010, GDP declined to its lowest levels, while money supply continued to increase steadily until it reached its highest value in 2013. The simple observation indicates that it is difficult to determine the relationship between GDP and money supply in the Libyan economy, especially with the inverse relationship where a decline in the primary funding source occurs alongside an increase in money supply.

Study Objective

The study aims to clarify the impact of GDP on the money supply, allowing policymakers in the Libyan economy and those interested in the economic affairs of Libya to benefit from the obtained results to contribute to building and stabilizing the economy.

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Study Hypothesis

There is no causal relationship between Real GDP and the money supply.

Study Methodology

This study adopted a quantitative approach to clarify the relationship between Real GDP and the money supply. Modern econometric methods were used, including unit root tests, cointegration tests to determine the existence of a long-term equilibrium relationship, error correction tests, and Granger causality tests to determine the direction of the relationship between the economic variables under study.

Study Limits

The spatial limits of this study included the Libyan economy, while the temporal limits covered the period from 1980 to 2014.

Previous Studies

- (Abdullah, 2013) studied the impact of broad money supply on the official exchange rate of the Libyan dinar against the US dollar using two variables: money supply as an independent variable and exchange rate as a dependent variable during the period 1970-2010. The study results indicated a bidirectional causal relationship between the variables.
- (Wang, 2012) focused on the relationship between money supply, economic growth, and inflation in China from 1998-2007, using cointegration and Granger causality tests. The results showed no cointegration between money supply and inflation and economic growth, but there was cointegration between money supply and inflation. There was a contradiction between the goals of economic growth and price stability in China.
- (Pradana, 2013) examined the short-term and long-term relationship between economic growth and inflation in three Asian countries during 1980-2010. The methodology used included cointegration and causality testing. Results indicated a significant negative long-term relationship between economic growth and inflation in Sri Lanka, while no statistically significant relationship was found between the variables in China and India. The short-term relationship was negative and significant for China, and the causality results showed a unidirectional causality from economic growth to inflation in China.
- (Nabil, 2015) studied the relationship between money supply and current GDP in the Iraqi economy during the period 1980-2012 and found a long-term and short-term equilibrium relationship between money supply and GDP.

Description of the Econometric Model

To find causal relationships between different phenomena, linear regression is one of the advanced statistical methods that ensures accuracy in identifying relationships to improve research results through optimal use of data. It is also a mathematical equation that represents the relationship between several variables and is used to estimate the regression of the dependent variable (Y) on multiple independent variables X1, X2, ... Xk (Cohen & Holliday, 1996). In this study, a linear regression model was used to determine the nature of the relationship between money supply and real GDP according to the following model:

$$\Sigma GDP_t = \alpha + \beta \, \Sigma MS_t + \varepsilon \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$\Sigma MS_t = \beta \, \Sigma GDP_t + \varepsilon \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where:

GDP: Real GDP

MS: Money Supply

Unit Root Tests

The Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test were used to check whether the variables under study are stationary. The results are presented in Tables (1, 2, 3, 4).

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Table (1): Results of the Augmented Dickey-Fuller (ADF) Test (Level)

TEST	Exogenous	%10	%5	%1	Calculated Value	Variable
ADF	In constant terms and the time trend	-3.21526I	-3.562882	-4.284580	-2.340312	GDP
	In constant terms only	-2.619160	-2.960411	-3.661661	-1.500470	
ADF	In constant terms and the time trend	-3.207094	-3.548490	-4.252879	-0.310287	MS
	In constant terms only	-2.614300	-2.951125	-3.639407	2.244957	

Table (2): Results of the Augmented Dickey-Fuller (ADF) Test (1st Difference)

TEST	Exogenous	%10	%5	%1	Calculated Value	Variable
ADF	In constant terms and the time trend	-3.212361	-3.557759	-4.273277	-5.731123	GDP
	In constant terms only	-2.61916	**-2.960411**	-3.661661	**-2.652037**	
ADF	In constant terms and the time trend	-3.209642	-3.552973	-4.262735	-4.806482	MS
	In constant terms only	-2.615817	-2.954021	-3.646342	-3.949805	

Table (3): Results of the Phillips-Perron (PP) Test (Level)

TEST	Exogenous	%10	%5	%1	Calculated Value	Variable
ADF	In constant terms and the time trend	-3.207094	-3.548490	-4.252879	-2.865334	GDP
	In constant terms only	-2.614300	-2.951125	-3.639407	-2.134348	
ADF	In constant terms and the time trend	-3.212361	-3.557759	-4.273277	1.393547	MS
	In constant terms only	-2.617434	-2.957110	-3.653730	4.444916	

Table (4): Results of the Phillips-Perron (PP) Test (1st Difference)

TEST	Exogenous	%10	%5	%1	Calculated Value	Variable
ADF	In constant terms and the time trend	-3.209642	-3.552973	-4.262735	-7.689652	GDP
	In constant terms only	-2.615817	-2.954021	-3.646342	-7.835116	
ADF	In constant terms and the time trend	-3.209642	-3.552973	-4.262735	-4.798412	MS
	In constant terms only	-2.615817	-2.954021	-3.646342	-4.121751	

Through the Augmented Dickey-Fuller (ADF) Test:

The results indicate that the original values of the time series for the variables (GDP, MS) are not stationary at the level, which shows that the variables are not integrated of order GDP(0), MS(0). However, they became stationary after taking the first difference GDP(1), MS(1). To confirm this, the Phillips-Perron (PP) test was applied, and its results, as shown in Tables (3, 4), indicated that the time series for the variables (GDP, MS) were not stable at the level but became stable after taking the first difference.

Co-Integration Test:

The Johansen Co-Integration Test was applied to examine the relationship between money supply and real GDP, as shown in Table (5). The results, based on the Trace Statistic and Max-Eigenvalue tests at the 5% level, indicate the rejection of the null hypothesis, which means there is no co-integrating vector, and acceptance of the alternative hypothesis, which indicates the presence of two co-integrating relationships between the study variables according to the Trace Statistic and Max-Eigenvalue tests. Therefore, it can be said that there is a long-term equilibrium relationship between Real GDP (GDP) and Money Supply (MS), suggesting that the variables should be represented by an error correction model to estimate the short-term and long-term effects between them.

Table (5): Results of the Johansen Co-Integration Test for the Study Variables

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.532271	34.38101	15.49471	0.0000
At most 1 *	0.245713	9.305411	3.841466	0.0023
Trace test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.532271	25.07559	14.26460	0.0007
At most 1 *	0.245713	9.305411	3.841466	0.0023
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Results of the Error Correction Model (ECM):

After confirming the existence of co-integration, a Vector Autoregressive Model (VAR) is designed. The results of the Error Correction Model are presented in Table (6).

Table (6): Results of the Vector Autoregressive Model

Vector Error Correction Estimates		
Date: 06/02/16 Time: 12:14		
Sample (adjusted): 1982 2014		
Included observations: 33 after adjustments		
Standard errors in ( ) & t-statistics in [ ]		
Error Correction:	D(GDP)	D(MS)
CointEq1	-0.433152	0.190735
	(0.08929)	(0.04911)
	[-4.85089]	[3.88368]

Examining the Results:

Looking at the results in the previous table, it is evident that the value of the adjustment coefficient, or the estimated parameter for the error correction term in the Real GDP equation, is significant and negative, at -0.433152. This indicates that the error correction term helps explain changes in the amount of money supply, implying a long-term causal relationship

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running from Real GDP to the money supply. Additionally, the speed of error correction in the money supply equation was significant, at 0.190735. The results suggest that Real GDP increases the money supply.

From the results obtained from diagnostic tests of the residuals of the Error Correction Model, as shown in Table (7), it was found that the value of Obs.R2 = 9.305574 indicates that the model does not suffer from serial correlation issues among the residuals, with a significance level (P-Value = 0.0095) according to the "Breusch-Godfrey Serial Correlation LM" test.

Table (7): Residual Diagnostics of the Error Correction Model

RESIDUAL DIAGNOSTIC TESTS	OBS.R^2	CHI-SQUARE	RESULT
Breusch-Godfrey Serial Correlation LM	9.305574	0.0095	No
Heteroskedasticity Test: Breusch-Pagan-Godfrey	16.19348	0.0028	No
Normality test	Jarque-Bera	0.400015	No
	1.832508		

Additionally, the estimated model, based on the results of the "Heteroskedasticity Test: Breusch-Pagan-Godfrey," does not suffer from the issue of heteroskedasticity, with a value of Obs.R2 = 16.19348 at a significance level (P-Value = 0.0028). The results, based on the Jarque-Bera test, with a value of Jarque-Bera = 1.832508 at a significance level (P-Value = 0.400015), indicate that the residuals are normally distributed.

Test for Serial Correlation: (Serial Correlation LM Test)

The LM test results show that the standard model is free from serial correlation issues, as indicated in Table (8).

Table (8): Results of the Serial Correlation Test

RESIDUAL DIAGNOSTIC TEST F	F- STATISTIC	PROBABILITY	RESULT
Breusch–Godfrey Serial Correlation LM	5.301891	0.0114	No

Granger Causality Tests:

Given the uncertainty about whether one variable affects the other, or whether the relationship is unilateral or bilateral, Table (9) presents the results of the causality tests between the two variables under study: Money Supply (MS) and Real GDP (GDP).

Table (9): Results of Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP does not Granger Cause MS	24	1.96831	0.1752
MS does not Granger Cause GDP		0.36884	0.5502

Results of Granger Causality Tests:

The results of the short-term Granger causality test, as shown in the previous table, indicate a unidirectional relationship from Real GDP to Money Supply. The F-statistic was 1.96831 with a significance level of 0.1752, suggesting acceptance of the hypothesis that changes in Real GDP cause changes in Money Supply according to Granger's concept. On the other hand, the test for causality running from Money Supply to Real GDP showed no significant relationship between Money Supply (MS) and Real GDP (GDP), indicating a unidirectional relationship from Real GDP to Money Supply, which aligns with economic theory.

2. DISCUSSION OF RESULTS

The relationship between real variables, represented by Real GDP, and monetary variables, represented by Money Supply, has been widely debated among economic schools of thought. This study aimed primarily to determine the causal relationship between Real GDP and Money Supply in both the short and long term. Identifying these relationships allows financial authorities to use effective policies to attempt to achieve economic balance. Key findings include:

1. **Stability Tests:** Results from unit root tests showed that economic variables are not stable at the level but become stable at the first difference.

2. **Error Correction Model:** The Error Correction Model tests revealed that the error correction term coefficient is negative and significant, indicating that the actual deviation from equilibrium is corrected each year by approximately 0.69.

Furthermore, statistical tests explained a long-term inverse relationship between economic growth, represented by Real GDP, and Money Supply, and a positive relationship with both inflation and exchange rate levels. The study also found a positive short-term relationship between Real GDP and Money Supply. The results show differing types of relationships in the long and short terms for all variables under study.

The relationship between monetary variables, represented by Money Supply, and real variables, represented by Real GDP, has been a topic of extensive debate among economists and economic schools. Classical economics suggests that any change in Money Supply growth will simply lead to inflation, implying that real income (output) is determined by real economic factors (such as savings and productivity) rather than monetary factors.

This proposal assumes there is no effective transmission mechanism between changes in Money Supply and output. According to classical theory, long-term interest rates are determined by the behavior of savers and investors, as described by the loanable funds theory. This implies that decisions by savers and investors and long-term interest rates are determined by long-term factors. This view was challenged by Keynes's General Theory and his interpretation of the relationship between monetary policy and output. Keynes argued that nominal interest rates are determined by the demand for and supply of money, which in turn links the monetary and real sectors.

Changes in nominal interest rates, according to Keynes, coincide with changes in real interest rates, affecting real variables (output and employment). Thus, changes in Money Supply lead to changes in real interest rates, which in turn result in real changes in the national economy. However, Keynes did not stop there; he believed that the demand for and supply of money are not independent of each other.

Therefore, an increase in Money Supply might not lead to the expected effect on nominal income. An increase in Money Supply lowers interest rates, which encourages higher demand for money due to fears of future interest rate increases. As a result, interest rates may not decrease significantly enough to convince people to hold the increased Money Supply, leading to only a small increase in investment and nominal income. Consequently, Keynes advocated for relying on fiscal policy to stimulate the economy (Bain and Howells, 2003).

REFERENCES

[1] Nabil, Adel Fadalah, 2015. "The Causal Relationship Between Changes in Money Supply and GDP Growth in Iraq During the Period 1980-2012." *Al-Qadisiyah Journal for Administrative and Economic Sciences*, Vol. 17, No. 3.

[2] Abdullah Ibrahim Nour El-Din, 2013. "The Causal Relationship Between Money Supply and Exchange Rate in Libya."

[3] Pradana, M., & Rathnayake, 2013. "Testing the Link Between Inflation and Economic Growth: Evidence from Asia." *Modern Economy*, 4, 87-92.

[4] Wang, Yan-liang, 2012. "Relationship Research on Money Supply, Economic Growth and Inflation." *Journal of Convergence Information Technology (JCIT)*, Volume 7, Number 11.

[5] Cohen, L., & Holliday, M. (1996). *Practical Statistics for Students: An Introductory Text*. SAGE Publications Limited.