An empirical study of the relationship between public expenditures and money supply in Algeria: ARDL model for the period (1980-2020)

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Abstract:

This study aims to know the nature of the relationship between public expenditures and the money supply in Algeria, during the period between 1980 and 2020 using an Auto-Regressive Distribution lag model. The results of the bounds test indicated the existing of a long-run equilibrium relationship between the study variables, The results also found that there is a statistically significant negative relationship in the short and long term between the inflation rate and the money supply, As for public expenditures, they have a negative moral effect on the money supply in the short run only.

Keywords: public expenditures, money supply, inflation rate, Auto-Regressive Distribution lag model, Algeria.

JEL Classification Codes: H50 ; E51 ; E31 ; C32.

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Introduction:

Economists have always been interested in the topic of the money supply and how to manage it. Beginning with the classical theory, which held that money is neutral and has no effect on economic activity. Interest rates could be seen as a monetary phenomenon relating to savings and investment exclusively, with no impact on the amount of the money supply. In its presentation of the exchange equation, the conventional theory also demonstrated a clear relationship between the money supply and the general level of prices (the inflation rate), providing the stability of both the volume of transactions and the speed of money circulation. Thus, money is merely a medium of exchange under classical theory, and changes in the money supply impact solely prices. It also highlighted the state's or government's non-interference in the economy, believing that fulfilling the public interest is automatic as a result of individuals pursuing their own goals, and hence the ineffectiveness of fiscal policy in economic activity. In its formulation of the exchange equation, the conventional theory also showed that there is a direct link between the money supply and the general level of prices (the inflation rate), given the stability of both the volume of transactions and the speed of money circulation.

After the emergence of the Keynesian theory which stated that money plays a vital function in the economy by serving as a medium of exchange, speculation, and reserve. The latter did not distinguish between the functions of demand for money and money supply, and it asserts that investments are what affect saving and that the interest rate has been determined by a point of convergence between the demand for money for liquidity and the quantity of money supplied to meet that demand. It also emphasized the state's intervention in economic activity based on the usage of fiscal and monetary policy. The Keynesian theory holds that public expenditures are necessary to run and equip government agencies as the state expands its projects which serve the public interest and that the private sector cannot handle, in addition to that, it is implemented in the case of economic recovery and the presence of financial resources that are related to the volume of total income, and that the state must organize the date for expansion or reduction of the level of public spending in response to cases of inflation. . Just as Keynesian theory's analysis is restricted to the short term, it believes the long term to be nothing more than a series of brief periods during which economic policies are implemented. Furthermore, it is thought that monetary policy is ineffectual in a liquidity trap, which implies that when the interest rate reaches its lowest levels, it is useless.

Because speculators prefer to store cash in the form of liquidity rather than invest, fiscal policy must intervene to boost the amount of national output to lift the economy out of its depression.

Finally, the classical theory assumptions reappear in a new form as a solution to the inflation issue that has afflicted several wealthy countries. Friedman, a proponent of the new classical theory, believed that commodities are money substitutes and that changes in aggregate spending directly explain changes in the quantity of money. Inflation, on the other hand, is viewed as a monetary phenomenon caused by the growth of the quantity of money in proportions greater than the quantity of production, and it is assumed that monetary policy is very effective in determining the optimal amount of money.

Based on the above, and in light of several theories regarding the efficiency of fiscal policy manifested in public expenditures and their impact on the level of the money supply in the presence of inflation rates, the following primary problematic arises: What is the nature of the short- and long-term connection between state spending and money supply in Algeria?

Trying to answer the problematic of the research, we relied on three main hypotheses, which will be tested to prove their validity:

- ✓ The existence of a long-term equilibrium relationship between the variables of the study in Algeria.
- ✓ There is a negative significant effect of public expenditures on the money supply in the short term in Algeria.
- ✓ There is no effect of public expenditures on the money supply in Algeria in the long run.

To review and analyze the literature, one applied and used the descriptive approach, adding the various concepts of the model used in our study, to move in the last part to the experimental method to apply the autoregressive model for distributed time gaps to extrapolate the results and verify the hypotheses of the study.

In order to test the validity of the study hypotheses, we identified a set of goals that our research seeks to achieve, which can be formulated in the following points:

- ✓ Familiarization with the Auto-Regressive Distribution lag model methodology.
- ✓ Verifying the existence of a long-term integrative relationship between the study variables.
- ✓ Knowing the extent to which the results of the standard models match the lived economic reality.

We will analyze a group of previous studies related to the topic of our research, which shows the reality of the relationship between public expenditures and the money supply, in order to determine the location of our research compared to these studies, which are represented in the following:

- ✓ (**Georgantopoulos & Tsamis , 2012**), investigated the short run as well the long run relationships between money supply, inflation, government expenditure and economic growth by employing the Error Correction Mechanism (ECM) and Johansen co-integration test respectively for the case of Cyprus using annual data from 1980 to 2009. Collectively, empirical results imply that public spending promotes economic development in Cyprus. However, deficit financing by the government causes more liquidity effects but also inflationary pressure in the economy. Results show that inflation negatively effects economic growth probably due to adverse supply shock. Money supply should be allowed to grow according to the real output of the economy but excess growth of money causes inflationary pressure in case of Cyprus. Therefore, this paper suggested that the government should control its current expenditure that stimulates aggregate demand and to focus more on development expenditure which stimulates aggregate supply and increases real output level.
- ✓ **(Iya & Aminu, 2014)**, investigated the determinants of inflation in Nigeria between 1980 and 2012, using Granger causality test of causation between inflation and money supply, government expenditure, exchange rate, and interest rate, cointegration and vector error correction. The results of Causality suggested causation between inflation and some of the included variables. The Johansen cointegration result shows that there existed long run relationship between inflation and the included variables. The VEC error correction result also confirmed the existence of long run relationship between the variables of the model with only money supply and exchange rate causing interest rate. The OLS results revealed that money supply and interest rate influenced inflation positively, while government expenditure and exchange rate influenced inflation negatively. Therefore, a good performance of the economy in terms of price stability may therefore, be achieved by reducing money supply and interest rate and also increasing government expenditure and exchange rate in the country.
- ✓ **(Nguyen, 2015)**, empirically investigated effects of fiscal deficit and broad money M2 supply on inflation in Asian countries,

namely Bangladesh, Cambodia, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, and Vietnam in the period of 1985-2012. By applying the Pooled Mean Group (PMG) estimation-based error correction model and the panel differenced GMM (General Method of Moment) Arellano-Bond estimator, the study finds out broad money M2 supply has significantly positive impact on inflation only in the method of PMG estimation whereas fiscal deficit, government expenditure and interest rate are the statistically significant determinants of inflation in both methods of estimation.

- ✓ **(Mehraraa, Behzadi Soufiani, & Rezae, 2016)**, examined the nonlinear relationship between inflation and government spending using quarterly data over the period of 1990-2013, by using Smooth Transition Regression Model. Results suggested a two regime model by using inflation, government expenditure growth, GDP growth and liquidity growth. Lag of liquidity was recognized as transition variable. This study showed that in regime of tight money or low growth of liquidity, government expenditure is not inflationary. In regime of low growth of liquidity, this variable has low inflationary impact and probably stimulates economic growth. Inflationary expectations in first regime are more effective in causing short run inflation. In expansionary regime, increase of money supply has more effects on inflation rather than production. So monetary and fiscal policies could be used to control inflation and stimulate aggregate demand in low regime. Also in easy money regime, monetary and fiscal discipline can be useful for inflation decrease.
- ✓ **(Narayan, Narayan, & Prasad, 2019),** aimed to model the relationship between inflation, budget deficits, and money supply in Fiji, they find that inflation, deficits and money supply are cointegrated when inflation is the endogenous variable, and the long-run elasticities confirmed this study that money supply and deficits induce inflation. While there is a short-run, unidirectional causality running from money supply to inflation and a bidirectional causality between money supply and budget deficits, in the long run both money supply and deficits Granger-cause' inflation.
- ✓ **(MOHSIN & FARHANI, 2021)**, seeked to clarify and measure the relationship between public Expenditure and money supply in the broad sense (M2) as explanatory variables on inflation expressed in the overall price level (as a dependent variable) in the Iraqi

economy during the period 2005-2019. they relied on the Autoregressive Distributed Lag (ARDL) model to measure the relationship between study variables, It turns out that there is a positive relationship between public expenditure, the general level of prices, the supply of money and the general level of prices. These variables have a role to play in raising the overall level of prices because of higher aggregate demand for aggregate supply and thus deepening the inflationary gap within the Iraqi economy.

After analyzing the previous studies related to the present study, but they differ in several aspects, namely the selection of variables and the appropriate model for the study, which is a tool for extrapolating results and verifying the hypotheses of these studies, we add to that the presence of variation of place and study period from one paper to another. other. Our study differed from the rest of the previous research in the following points*:*

- Our study is distinguished from other foreign studies in the way that it is applied to the Algerian economy using annual data during the period between 1980 and 2020*;*
- We identified three variables that express the subject of our study, which are the money supply, the inflation rate and public expenditures*;*
- The present study will provide an enrichment of the subject from the quantitative side using standard methods represented in testing the stability of time series, Auto-Regressive Distribution lag model.

Firstly: Methodology

1. data

In this axis, we will study the nature of the relationship between public expenditures and money supply in Algeria, during the period between 1980 and 2020. Using an autoregressive model for distributed time gaps, one will use the logarithm to smooth out the fluctuations in the study variables and reduce the variance of the time series for the following variables:

- ✓ **The money supply (% of GDP):** is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper.

- ✓ **Inflation:** Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.
- ✓ **public expenditures (% of GDP)**: Gross national expenditure (formerly domestic absorption) is the sum of household final consumption expenditure (formerly private consumption), general government final consumption expenditure (formerly general government consumption), and gross capital formation (formerly gross domestic investment).

2. Unit root test

Since the data analysis of the effect of government expenditure and inflation rate on the money supply used the ARDL model, the first step was to test stationary data or integration order. This is due to the explanatory variables in the ARDL model can be either all I(0), or all I(1) or a combination of I(0) and I(1). In addition, the variables involved in the model should not be integrated with the stochastic trend I(2). Although the ARDL co-integration technique does not require unit root testing, it is necessary however to test the order of integration to ensure there is no variable I(2) in the model.

The unit root test used was Augmented Dickey-Fuller (ADF) test developed by Dickey and Fuller (1981) as well as Phillips-Perron (PP) test developed by Phillips and Perron (1988). The ADF equation associated with the unit root test for variable y is:

$$d(y_t) = a_0 + a_1 t + \emptyset\, y_{t-1} + \sum_{i=1}^{n} \theta_i\, d(y_{t-i}) + \varepsilon_t \quad \text{.....(1)}$$

where:

$d(y_t) = y_t - y_{t-1}$ = y – y(-1) is the first difference of y_t :

Notation $\alpha, \beta, \emptyset \text{ and } \theta_i \ (i = 1,2, \dots\dots, n)$ are parameters;

t is a trend,

ε_t is white noise.

The parameter test $\emptyset$ in the equation (1) used statistic that is usually called τ_t-statistic Meanwhile, unit root test of PP used the equation:

$$d(y_t) = b_0 + b_1 t + \theta\ y_{t-1} + v_t \quad \text{.....(2)}$$

where: v_t is white noise.

The parameter test θ in the equation (2) used t-statistic following PP-statistics distribution. In the unit root test, p-value criterion of the statistic test was used. If the p-value of the statistic test is smaller than the significance level of 1%, 5%, or 10%, then a time series is said to be stationary or integrated of order d, I(d), d$\geq$ 0. (Adam, Rafiy, Sani, Rosnawintang, & Saenong, 2018, p. 956)

3. Model Specification

This study is built on the ARDL – bounds test approach to cointegration. The ARDL approach has been designated for many outstanding benefits. The ARDL technique utilises a single reduced form of equation to examine the cointegration of the variables as opposed to the conventional Johansen test that employs a system of equation. (Siyasanga & Hlalefang, 2017, p. 08)

The ARDL model Specification of the relationship between public expenditures, inflation rate and money supply as expressed by Equation are: (Yakubu, Umar, & Aminu Bello, 2014, p. 124)

$$\Delta LM2 = a_0 + \beta_1 LM2_{I-1} + \beta_2 LINF_{I-1} + \beta_3 LGE_{I-1} + \sum_{i=1}^{K} \delta_{1i}\, \Delta LM2_{t-i} + \sum_{i=1}^{K} \delta_{1i}\, \Delta LM2_{t-i} + \sum_{i=1}^{K} \delta_{1i}\, \Delta LM2_{t-i} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where:

LM2 = Log of money supply

K = lag length for the unrestricted error-correction model (UECM)

Δ = first differencing operator

ε = white noise disturbance error terms

The bound test approach for the long-run relationship between the money supply and government revenue is based on the Wald test (F statistic), by imposing restrictions on the long-run estimated coefficients of one period lagged level of the money supply and revenues to be equal to zero, that is,

$$H_0 = \beta_1 = \beta_2 = \beta_3 = 0$$

Then the calculated F-statistic is compared to the tabulated critical value in (Pesaran, 2001). The explanatory variables are assumed to be integrated of order zero, or I(0) for values of the lower bound, while the upper bound values assumed that they are integrated of order one, or

I(1). Therefore, the decision rule is that if computed F-statistic falls below the lower bound value, I(0), the null hypothesis (no co-integration) cannot be rejected. Contrarily, if the computed F-statistic exceeds the upper bound value, I(1) then it can be concluded that public expenditures, inflation rate and money supply are co-integrated.

The long-run and short-run parameters were then estimated once a cointegration relationship had been established. The cointegrating long-run relationship was estimated using the following specifications:

$$LM2 = a_0 + \beta_1 LM2_{I-1} + \beta_2 LINF_{I-1} + \beta_3 LGE_{I-1} + \varepsilon_t \ldots\ldots\ldots\ldots (2)$$

However, to restore equilibrium immediately may not be possible because of the speed of adjustment. This could be caused by the lags and adjustment process used to capture changes in any of the factors affecting money supply. Hence, the error correction model was used to capture the speed of adjustment of money supply model model. These models are expressed below as:

$$\Delta LM2 = a_0 + \sum_{i=1}^{K} \delta_{1i} \Delta LM2_{t-i} + \sum_{i=1}^{K} \delta_{1i} \Delta LM2_{t-i} + \sum_{i=1}^{K} \delta_{1i} \Delta LM2_{t-i} + \delta_3 \varepsilon ct_{i-1} + \varepsilon_t \ldots\ldots\ldots\ldots (3)$$

Where:

εct_{i-1} = the error correction term lagged for one period

δ = the coefficients for measuring speed of adjustment

Secondly: Study results analysis

After familiarizing ourselves with the methodology of the Auto-Regressive Distribution lag model, we will go through all of the stages that assist us in estimating this model to determine the nature of the relationship between public expenditures and money supply in Algeria in the short and long term.

1. **Unit root test results**

The following table displays the results of the time series stability test, which applies the PP and ADF tests at the level and first difference, which we will use to validate the stability of the time series that we will use in our study

Table N°01: Unit root test results

Variables		Test ADF		Test PP		Degree of integration
		Level	1st difference	Level	1st difference	
LM2	Intercept	0.6792	0.0003	0.6027	0.0003	I(1)
	Trend and Intercept	0.8731	0.0017	0.8731	0.0021	
	None	0.7954	0.0000	0.7824	0.0000	
LINF	Intercept	0.1064	0.0000	0.1107	0.0000	I(1)
	Trend and Intercept	0.1250	0.0000	0.1110	0.0000	
	None	0.1470	0.0000	0.1820	0.0000	
LGE	Intercept	0.3255	0.0000	0.2937	0.0000	I(1)
	Trend and Intercept	0.6666	0.0004	0.6717	0.0000	
	None	0.7360	0.0000	0.7561	0.0000	

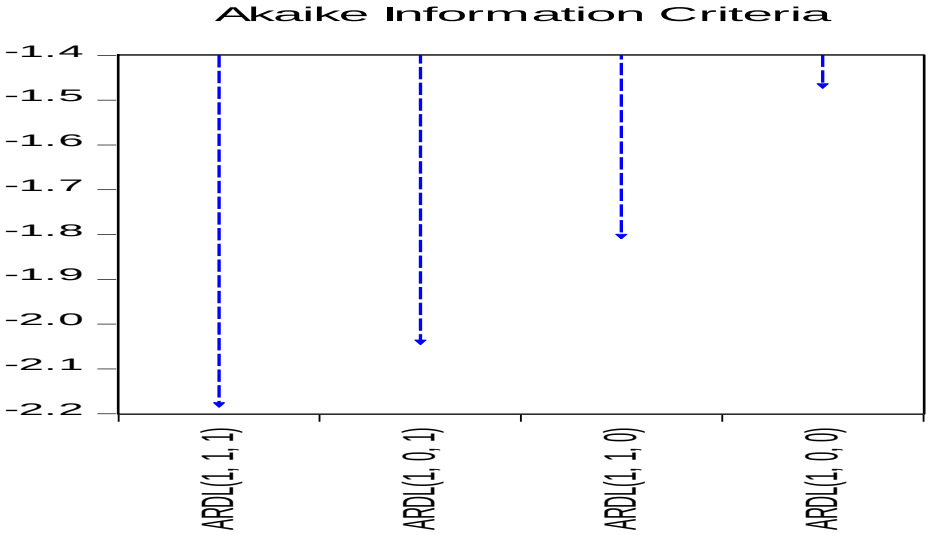
Source: Eviews 10

The results of the ADF and PP tests show that the probability values are more than the crucial value of 5%, which leads us to accept the null hypothesis that the time series is unstable at the 5% significance level. We shall next proceed to investigate the stability of the time series at the initial difference. The table shows that the probability values are smaller than the critical value of 1%. Therefore, we reject the null hypothesis that the time series is unstable and accept the alternative hypothesis that the time series is stable at the first difference in the 1% level of significance. Accordingly, an auto-regressive distribution lag model can be estimated.

2. Determine the optimal delay times

After confirming the stability of the variables time series, we will proceed to automatically determine the optimal lag periods for the ARDL model provided by Eviews 10 for the dependent variable (lm2) and the independent variables (LINF and LGE), based on the criterion (AIC) where we will choose the lowest value. and the following figure The ideal amount of delay is shown below:

Figure N°01: The results of Determine the optimal delay times



Source: Eviews 10

From the above figure we can choose the degree of hysteresis at ARDL(1,1,1) that corresponds to the lowest value of the AIC standard.

3. ARDL model estimation results

After detecting the existence of a long-term integrative relationship between the study variables, it is necessary to estimate the ARDL Auto-Regressive Distribution lag model to analyze and diagnose the relationship between the variables in the short term.

Table N°02: ARDL model estimation results

Variable	Coefficient	Std. Error	t-Statistic	Prob
LM2(-1)	0.834666	0.059101	14.12272	0.0000
LINF	-0.023977	0.019061	-1.257896	0.2170
LINF(-1)	-0.055295	0.020716	-2.669140	0.0116
LGE	1.067859	0.203952	5.235832	0.0000
LGE(-1)	-0.870412	0.204737	-4.251375	0.0002
C	-0.070910	0.598174	-0.118544	0.9063
R-squared	0.928714	Mean dependent var		4.123242
Adjusted R-squared	0.918230	S.D. dependent var		0.265623
S.E. of regression	0.075956	Akaike info criterion		-2.179843
Sum squared resid	0.196157	Schwarz criterion		-1.926511
Log likelihood	49.59686	Hannan-Quinn criter.		-2.088246
F-statistic	88.58993	Durbin-Watson stat		1.783154
Prob(F-statistic)	0.000000			

Source: Eviews 10

Through the results of estimating the ARDL model, we notice a coefficient of determination equal to 0.928714, and this means that the independent variables explain the changes that occur in the money supply at a rate of 92.87% and the remaining 7.13% falls within the margin of error, and the DW statistic is greater than R2 and this indicates that the regression is not false and the model has A very strong competitive ability. In addition, we note the significance of the model through the statistical F value and the majority of the parameters constituting the model are significant at 5% and their sign is consistent with economic expectations.

We also note that the logarithm of the inflation rate has an insignificant effect on the money supply in Algeria in the short term, while the logarithm of both the inflation rate and public expenditures delayed by one year has a significant negative impact on the money supply in Algeria, as the rise in the logarithm of public expenditures and the logarithm of a rate The two recent inflations by one year by 1% reduce the level of the money supply by 87.04% and 5.53%, respectively, to arrive at a direct relationship between the logarithm of public expenditures and the logarithm of money supply in the short term.

4. Model Validity Study

We note from Table 03 the probability values are greater than the critical value 10%, and this makes us accept the null hypothesis which states that the model is free from standard problems, that is, the errors are distributed normally, and the Auto-Regressive Distribution lag model does not suffer from the problem of autocorrelation of errors, The problem of the instability of the contrast.

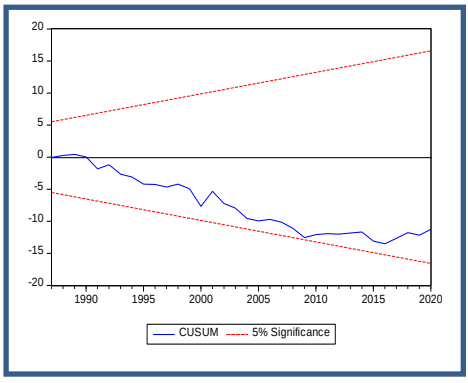
Table N°03: Standard problems detection results

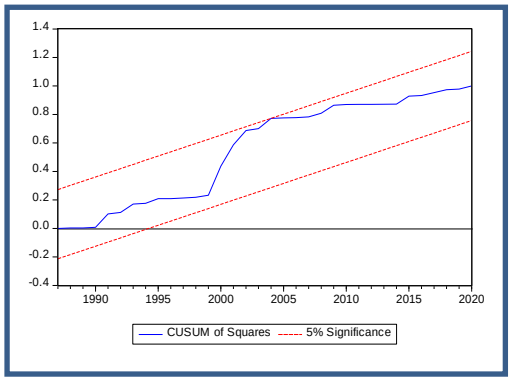
Test	Pointer	Coefficient	Prob	the decision
The normal distribution of residuals	Jarque bera	0.431693	0.805859	H_0 accepted
Autocorrelation	LM test	1.146073	0.3306	H_0 accepted
Homoscedasticity	Test: ARCH	1.010031	0.3214	H_0 accepted

Source: Eviews 10

In order to ensure that the data used in this study is free of any structural changes in it, one of the appropriate tests must be used, such as: the cumulative sum of recurring residuals (CUSUM) as well as the cumulative sum of squares of recurring residuals (CUSUM of squares). These two tests are among the most important tests in This field because it clarifies two important things, namely, the presence of any structural change in the data, and the stability and consistency of long-term parameters with short-term parameters.

Figure N°02: CUSUM test results and CUSUM test results of squares





Source: Eviews 10

We note that the test of the cumulative sum of the residual residuals for this model, it crosses a linear mean within the limits of the critical region, indicating a kind of stability in the model at significant limits of 5%. The same is true for the test of the cumulative sum of the squares of the recurring residuals. It is clear from these two tests that there is stability and consistency in the model between the long-term results and the short-term results.

5. Co-integration test results

After we have determined the optimal lag periods for the ARDL model, we pass the co-integration test of the logarithms of Algeria's public expenditures, inflation rate, and money supply using the bounds test.

Table N°04: Co-integration test results

Test Statistic	**Value**	**K**
F-statistic	7.065774	2
Critical Value Bounds		
Significance	**I(0) Bound**	**I(1) Bound**
10%	2.63	3.35
5%	3.1	3.87
2.5%	3.55	4.38
1%	4.13	5

Source: Eviews 10

The above table shows that: The value of (F) was greater than the upper bound of the critical values in the model (values suggested by Pesaran et al 2001) at significant levels of 1%, 5% and 2.5%, 10%, and therefore we reject the null hypothesis and accept the hypothesis The alternative that confirms the existence of an integrative relationship in the long term between the variables of the study in Algeria.

6. Estimation of the long-term relationship according to the ARDL model

After we analyzed the relationship in the short term and it was confirmed that there is a long-term relationship between the variables of

the study, we will estimate the parameters of the ARDL model in the long run and diagnose the coefficient of the speed of adjustment of the relationship, as this coefficient confirms the existence of a co-integration relationship between the variables if two basic conditions are met negative and significant for this coefficient. The following table shows us the results of estimating the relationship between the study variables in the long term according to the previously specified slowdown periods.

Table N°05: Estimation of the long-term relationship according to the ARDL model

Error correction factor				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob**
CointEq(-1)*	-0.165334	0.029812	-5.545890	0.0000
R^2		0.624133		
Estimation of long-term parameters				
LINF	-0.479463	0.161943	-2.960684	0.0056
LGE	1.194226	0.789928	1.511816	0.1398
C	-0.428890	3.580321	-0.119791	0.9054

Source: Eviews 10

Through the above table, we note that the error correction coefficient is negative and significant at 1%, as the probability value of the error correction parameter is estimated to be 0.0000, and therefore it can be judged that the error correction limit has fulfilled the two basic conditions of being negative and significant, i.e. statistically significant, as the displayed behavior When any shock occurs, it will take about 1/(0.165334)= 6.05 years to reach the equilibrium position in the long run. As for the speed of adjustment, it can be said that 16.53% of the short-term imbalances in the money supply are adjusted annually. Also, the explanatory power of the model was high, through the value of the coefficient of determination that refers to 62.41%, which means that the independent variables explain a large percentage of the changes that

occur in the dependent variable, and the rest is due to errors or to other variables that were not included in the model.

We also note that in the long run there is a positive insignificant effect of the logarithm of public expenditures on the money supply in Algeria at a level of significance of 5%, while the logarithm of the inflation rate has a negative significant effect on the money supply in Algeria in the long run, as the increase in the logarithm of the rate Inflation by 1% reduces the level of the money supply by 47.95% in the long term due to the presence of interventions by monetary policy makers.

Fourthly: Discuss the results

In the short term, the study concluded that an inverse relationship exists between the inflation rate and the money supply in Algeria. Therefore, the increase in the inflation rate leads to a decrease in the size of the money supply. That is due to the monetary entities' intervention in controlling the money supply when the inflation rate rises. It seems to be apparent now since the Central Bank has announced that the main objective of monetary policy is to achieve price stability by following the legislative laws that came in Order No. 10-04 amending Order No. 11-03 related to money and credit. Hence, This result was obtained by a study (Akinbobola, 2012).

The results also showed that public expenditures have an inverse relationship with the money supply. The result has been explained by relying on the fact that when the state expands its public expenditures, it leads to a rise in the money supply and thus an increase in the inflation rate, so the central bank follows a contractionary monetary policy, and the size of the money supply decreases. This result was obtained by a study, (Georgantopoulos & Tsamis , 2012), (Iya & Aminu, 2014), (Narayan, Narayan, & Prasad , 2019). However, study (MOHSIN & FARHANI, 2021) found a Positive relationship between public expenditures and the money supply in Iraq, which means that the evidence of the ineffectiveness of monetary policy in controlling the money supply and the rate of inflation.

The findings show in the long term that public expenditures have no effect on the money supply, and this is consistent with monetary theories. It also confirmed the existence of an inverse relationship

between inflation and the money supply, which is evidence of the monetary authorities' intervention in controlling it when they notice the increase in the size of the money supply.

Conclusion

This study aims to address the problem of the nature of the relationship between public expenditures and money supply in Algeria, from the period (1980–2020). It determines the nature of the relationship in the short and long term, and on this basis, we will initially present the results of our study and then pass to test the study hypotheses to conclude this research with a set of suggestions and ideas that help open the way for other research and studies on this subject, which remains a vast space To search, enrich and discuss the results.

1. Results

- ✓ The results of the stability of the time series confirmed that all the variables are stable at the first difference;
- ✓ The results of the bounds test demonstrated the existence of a long-term equilibrium relationship between the study variables;
- ✓ The results showed a negative statistically significant relationship in the short and long term between the inflation rate and the money supply, while public expenditures have a significant negative impact on the money supply in the short term only.
- ✓ Finally, the results of the standard analysis proved that the structural stability of the model's parameters is achieved in the short and long terms using the (CUSUM) test and the (CUSUM of squares) test, and the model does not suffer from standard problems.

2. Hypothesis testing

In our study, we relied on three main hypotheses, and we tested their validity on the ground, and the results were as follows:

- ✓ **First Hypothesis**: Through the results of the bounds test, which reveals the integration relationship between the study variables, we concluded through the standard study that there is a joint integration relationship between the study variables, and this result proves to us the validity of the first hypothesis which states that there is a long-term equilibrium relationship between public expenditures, inflation rate, and money supply;
- ✓ **The second hypothesis**: the results of the pilot study confirmed the existence of a negative significant effect of public expenditures on the money supply in the short term in Algeria,

and this confirms the validity of the second hypothesis;

- ✓ **The third hypothesis:** The results of the study proved in the long run that public expenditures do not affect the money supply and that the latter is affected by the inflation rate only, and this result confirms the validity of the third hypothesis.

3. Study prospects

Through our research on the subject of the study, we discovered many new ideas with advanced standard models that the researcher could not use in one study. On this basis, the following horizons can be proposed:

- ✓ The economic researcher can use quarterly data for recent years while respecting the condition of the number of observations, which must be completely greater than 30 views;
- ✓ Non-linear standard models can be applied to this topic and compared with the results of research that used linear models;
- ✓ Overhead expenses can be separated into operating and equipment expenses, and their relationship to money supply can be studied.

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