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MONETARY POLICY AND ECONOMIC GROWTH: EVIDENCE FROM TUNISIA USING ARDL BOUND TESTING APPROACH

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Abstract *This study aims to assess the effectiveness of monetary policy in Tunisia by trying to identify the monetary policy effect on the economic growth rate, and for this purpose, ARDL approaches were used from annual data from the period 1987-2019. It appears from this study that the velocity of money (LV) and the interest rate (IR) at period zero (current period) had a significant and positive effect on growth in Tunisia, while net assets in currencies (LNAC) had an insignificant and positive effect on growth in Tunisia. Similarly, the results showed that the inflation rate (LINF) and the interest rate (IR) at a lag of two years (t-2) have a negative and significant effect on growth in Tunisia. Therefore, price stability is not conducive to the development of economic activity, but it simply allows the economy to maintain itself.*

Keywords: *Monetary Policy, Economic Growth, Interest Rate, ARDL Approach.*
JEL Classification : *E1, E43, E51, E52*

Introduction

Monetary policy is the action by which the monetary authority acts on the money supply to stabilize prices. Its objective is to ensure the stability of the national currency, either internal stability, measured by the general level of prices, or external stability, measured by the exchange rate of the national currency into foreign currencies. It also seeks to achieve other economic policy objectives such as growth, full employment and external balance.

From a theoretical point of view, the classic model is based on the law of markets: “supply creates its own demand”. It is based on the notion of full employment, emphasizing the level of prices and the control of inflation (Udude, 2014).

However, Keynesian theory is based on price stickiness and underemployment equilibrium. The main transmission mechanism of monetary policy is the interest rate which influences investment decisions and output through the multiplier process (Udude, 2014).

However, monetarists emphasized that the money supply was the determining factor for the well-being of the economy. Thus, in order to promote a stable growth rate, the money supply

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should grow at a fixed rate, instead of being regulated and modified by the monetary authority (Udude, 2014).

The objective of any monetary policy is to control the monetary variables by using intermediate objectives such as the control of the exchange rate, the interest rate and the money supply.

In Tunisia, the monetary policy has undergone a significant evolution since the Structural Adjustment Program in 1986 and the choice of the liberalization of the economy. Consequently, the objectives and instruments of monetary policy have been modified and revised so that they are in line with the new monetary strategy and financial[2].

One of the main objectives of monetary policy in Tunisia is the stabilization of prices and therefore the revival of economic growth. The Tunisian authorities have adopted various monetary policies through the Central Bank of Tunisia over the years to achieve economic growth. Despite the growing emphasis on manipulating monetary policy in Tunisia, however, the problem of its economic growth persists. These problems include high unemployment rate, low investment rate, moderate inflation rate and unstable exchange rate. It is claimed that these perceived problems have caused a rapid decline in economic growth in Tunisia. It becomes necessary to highlight the monetary policy in Tunisia and examine to what extent it has effectively contributed to the growth of the economy.

This leads us to ask the following question: To what extent has monetary policy affected economic growth in Tunisia?

To answer this question, the study is organized as follows: Monetary policy instruments are summarized in section 1. Methodology and data sources are reported in section 2. Empirical analyzes and interpretations of the results are developed in section 3. The conclusion and recommendations of the study are reported in the last section.

1. Monetary policy instruments

The techniques by which monetary policy pursues its objectives are categorized into the following approaches: market control approach and portfolio control approach.

1.1. Market control approach

It is an indirect or traditional approach to monetary control. It includes open market operations and the Central Bank discount rate.

1.1.1. open market operations

Open-market operations consist of the Central Bank intervening on the money market to buy or sell securities against central currency. Through this procedure, the Central Bank seeks to modify, downwards or upwards, the money market rate.

[2] Law n°2016-35 of April 25, 2016, determining the status of the Central Bank of Tunisia.

The open market influences bank liquidity through a price effect and a quantity effect. The quantity effect is direct: by buying securities, the Central Bank puts its currency into circulation. By selling them, she withdraws her change. The price effect, for its part, is indirect: when the Central Bank buys securities, their prices rise and interest rates fall and the banks can refinance themselves at a low price or cost. On the other hand, when the Central Bank sells securities, interest rates increase, which creates tension in the market.

1.1.2. The Central Bank discount rate

This operation measures the price charged by the Central Bank for the financial assistance made available to the banking sector in the event of a probable lack of liquidity (Chowdhry, 1986). In other words, it is the interest rate that the Central Bank charges commercial banks on funds lent to them as collateral. The term also applies to the activity of discounting Central Bank bills when commercial banks run out of funds. They can acquire them from the Central Bank by discounting drafts such as treasury bills, treasury certificates, commercial paper and short-term payment promissory notes from the Central Bank. Commercial bank lending rates are closely related, therefore, to the discount rate. Manipulation of the discount rate helps to control the volume of money in circulation. For example, if the economy is under inflationary pressure, the Central Bank raises the discount rate, which makes it very expensive for commercial banks to obtain funds from the Central Bank.

As a result, commercial banks, in turn, increase their lending rates. The increase in the lending rate of commercial banks has the effect of reducing the demand for borrowing. Indeed, this will lead to a contraction in investment and the level of employment and consequently incomes and the general level of prices will see a decrease.

1.2. Portfolio control approach

The portfolio control approach is a direct or non-traditional approach to monetary control. It works through the instrument of portfolio constraints, including reserve requirements, special deposits with the Central Bank, selective credit controls and moral suasion. In reserve requirements, commercial banks are required to keep certain reserves with the Central Bank. By increasing or decreasing the reserve requirements of banks, the Central Bank affects their ability to lend money to the public.

Special deposits with the Central Bank are additional deposits going beyond the minimum legal reserve requirements that commercial banks are required to deposit with the Central Bank. Mandatory special deposits are an important measure to reduce the deposit that banks can lend to their customers. Although they appear on the asset side of the bank's balance sheet, they cannot be used as a reserve base. Similarly, selective credit control is a measure used by the Central Bank to control the flow of bank credit to different sectors of the economy. The Central Bank can ask the banking sector to grant more loans to the privileged sector of the economy, the productive sector, while granting little or no credit to less privileged sectors such as the service or consumer sector. By using selective credit control, monetary policy influences the volume of money in circulation as well as the allocation of resources.

2. Empirical study

This study examines the impact of monetary policy on Tunisia's economic growth for the period 1987-2019 using the unit root test and the ARDL (Auto Regressive Distributed Lag) model.

Unit testing, through the application of Augmented Dickey-Fuller (ADF) unit root testing, is used to determine the level of integration among the series used. Similarly, the ARDL model is used to examine the coefficients of the long-term and short-term estimated variables in the study. The variables adopted in the modeling of the study are: economic growth (Y), money circulation velocity (V), interest rates (IR), exchange rates (REER), external reserves (ER) and the inflation rate (INF). The data for these variables comes from the statistical bulletin of the Central Bank of Tunisia and the World Bank.

2.1. Descriptive analysis of indicators

2.1.1. Economic growth rate

From 1987 until 2019, Tunisia's economic growth rate went through four phases:

- **1987 to 1995 (structural adjustment plan):** the growth rate of gross domestic product per capita was 1.77% on average. It was influenced, on the one hand, by the devaluation of the Tunisian dinar in 1986, the reduction of the public finance deficit thanks to a series of austerity measures and the postponement of certain investments, as well as the strengthening of the selective control of the credit, this financial orthodoxy following a standby agreement with the IMF which impacted the economic growth rate in Tunisia on the one hand and on the other hand, there is the recession of the European economy and in particular France as being the main economic and commercial partner of Tunisia.
- **1996-2004 (free trade agreement with the European Union):** despite the unfavorable regional context, the country recorded growth of around 3.81% on average.
- **2005-2010 (global financial crisis):** slowdown in economic activity following the contraction of agricultural production due to bad weather conditions and the indirect effects (considerable drop in exports and a decline in manufacturing production) of the crisis financial year 2008-2009.
- **2011-2019 (post-revolution transitional phase):** it is characterized by social demands, the deterioration of the business environment, political instability as well as a vulnerable external environment which has led to a drop-in investment and of productivity. Such circumstances have led to a drop-in demand for tourism services, disruption of economic activity and a reduction in domestic and foreign investment.

Figure 1: Evolution of the growth rate of real GDP per capita

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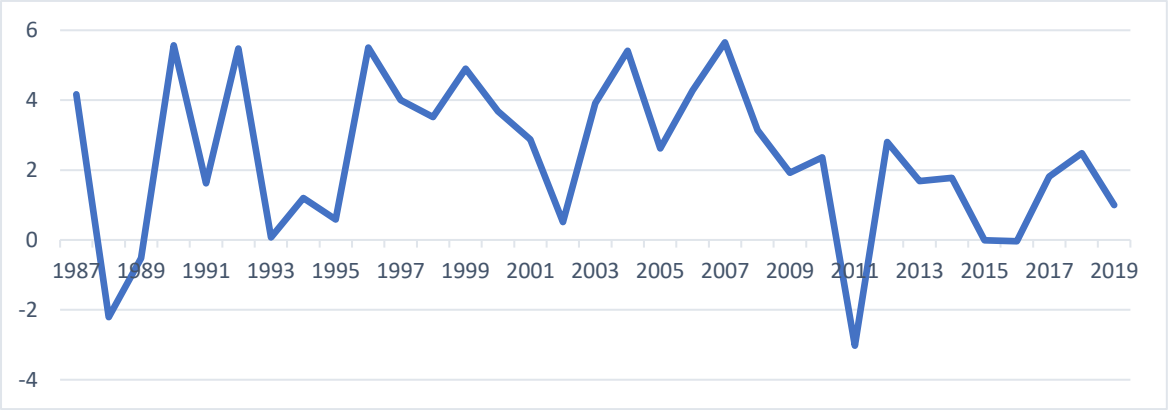


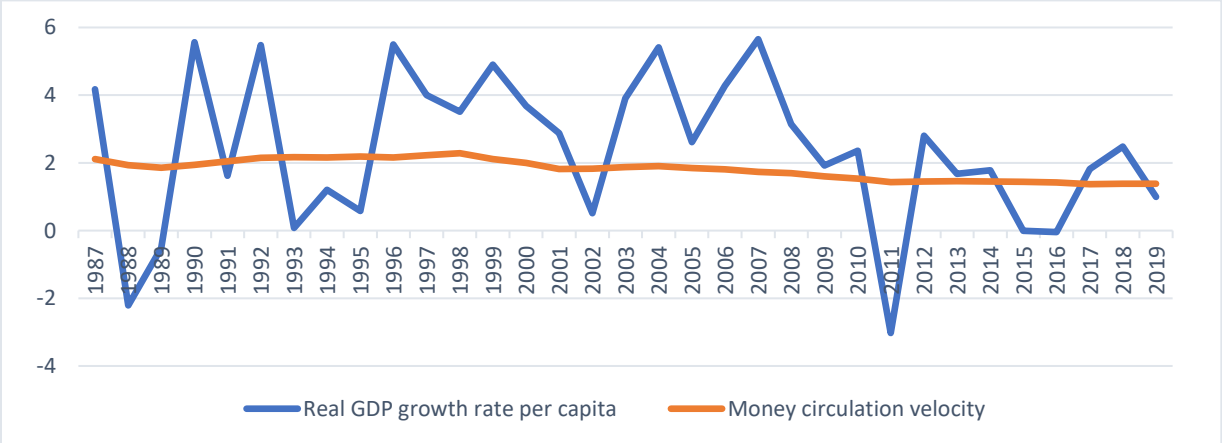
Source: World Bank indicators (2019)

2.1.2. Money circulation speed

The money circulation velocity has a double interest. First, as a short-term indicator: economic growth is usually associated with an increase in the money circulation velocity (V). Secondly, as a structural indicator: its trend evolution reflects the profound changes in the payment habits of non-financial agents. Indeed, the country which has a low velocity of circulation, has a low inflation and a better price stability.

The money circulation velocity has experienced a continuous decline during the period (1987-2019). During the decade (1990-2001), the speed of circulation of money was around 2.13 following the improvement of the economic situation through the budgetary revival and the consolidation of the balance of payments which have led to a gradual revival of the rate of progression of M2. From 2002 to 2011, a continuous decline in the speed of circulation of money followed by stability after the post-revolution period of around 1.4 units.

Figure 2: Money circulation velocity and rate of economic growth



Source: Central Bank of Tunisia (2019)

2.1.3. Inflation rate, money market rate and real interest rate

Tunisia has not experienced major internal inflationary pressures over the past two decades. The inflationary peak in 1991 can be explained by the Gulf War and by inflationary pressures in trading partner countries.

During the 1990-2000 decade, Tunisia did not record high inflation (4.7% on average). This can be explained on the one hand, by the absence of significant shocks and on the other hand, by a prudent mixed policy (fiscal and monetary) associated with more or less significant price rigidity (the rate of price liberalization reached 50% of all goods and services at the end of 1992)[3].

However, since 2011, Tunisia has experienced significant inflationary pressures from declining productivity, rising wages, and political and social instability which has amplified the size of the parallel market. In this context, several analyzes have shown that inflation in Tunisia is explained by monetary factors (money supply, payroll, interest rate and effective exchange rate) and external factors (price variation global energy and food markets).

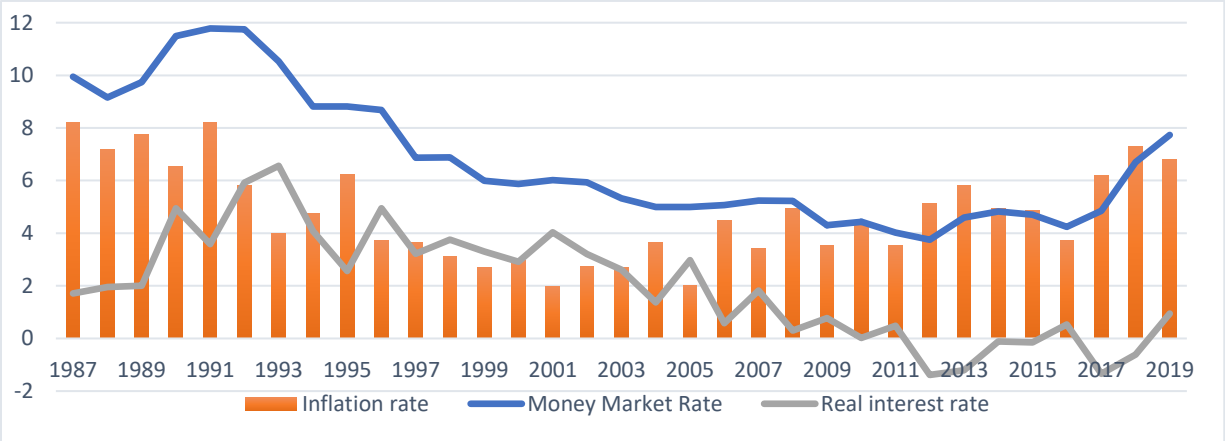
The examination of the evolution of the money market rate (MMR) lets deduce that in nominal terms, this rate remained stable around 5% between 2003-2008, to be registered, thereafter, with the fall until to 2012 (3.75% against 5.22% in 2008) with the aim of supporting private investment and alleviating the financial burdens of companies strongly affected by an unfavorable national and international situation. In real terms, the evolution of the MMR was more volatile with a general downward trend, going from 4.1% in 2001 to -0.14% in 2015. It should be noted that the fall in the real MMR was significant in 2012 (-1.81% against 0.5% in 2011) under the effect of the reduction it experienced in nominal terms in addition to the high level of the inflation rate during this year. From 2013, this rate rose continuously to stand at -0.14% in 2015.

Negative or too low real interest rates reflecting a fairly high inflation rate. This pushes the BCT to use the rate instrument to fight inflation (increase the real interest rate). The BCT key rate was around 6.75%, still below the inflation rate of 7.7% (year-on-year for the months of April and May 2018).

The MMR is the main reference rate on which the remuneration of deposits and loans is based. It fell from 5.23% in December 2017 to 6.39% in May 2018 before rising to a level of 7.24% in January 2019. The rise in BCT rates aims to curb demand by discouraging loans to consumption but also investments.

Figure 3: Evolution of the inflation rate, the money market rate and the real interest rate

[3] Central Bank of Tunisia, 34th activity report, 1992, p. 79.



Source: Central Bank of Tunisia (2019)

2.1.4. Real effective exchange rate

From the point of view of export behavior, the real depreciation of the dinar between 1995 and 1997 can be explained by the drop-in oil prices and by the drop in European demand, which pushed Tunisian exporters to lower their prices. Indeed, going through a difficult period and wishing to maintain their market share, exporting companies had opted for a compression of their margins. The second phase of real depreciation of the Dinar began in 2000 following the continuous nominal depreciation of the national currency.

The evolution of the real exchange rate vis-à-vis the main currencies for the settlement of trade and debts (dollar, euro) underlines that over the period 2000-2019, Tunisia opted for an exchange policy favoring the competitiveness of exports.

In this regard, the assessment of the Tunisian dinar exchange rate inappropriately is accompanied by:

- A poorly controlled inflation rate of 7.5% in December 2018.

- A deterioration in tourist receipts in recent years (2011-2019).

- A continuous decline in the GDP growth rate in recent years.

Figure 4: Evolution of the real effective exchange rate index and the economic growth rate

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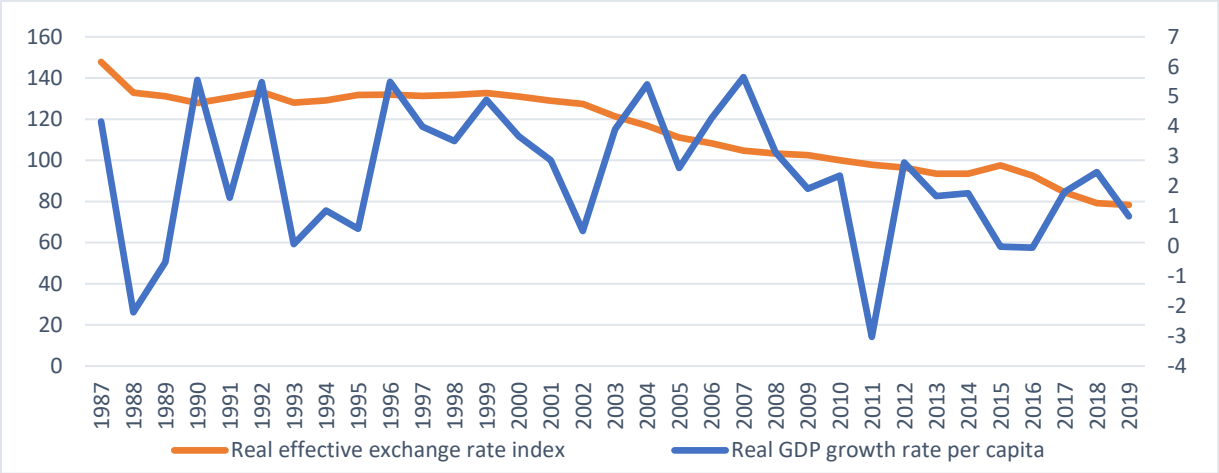


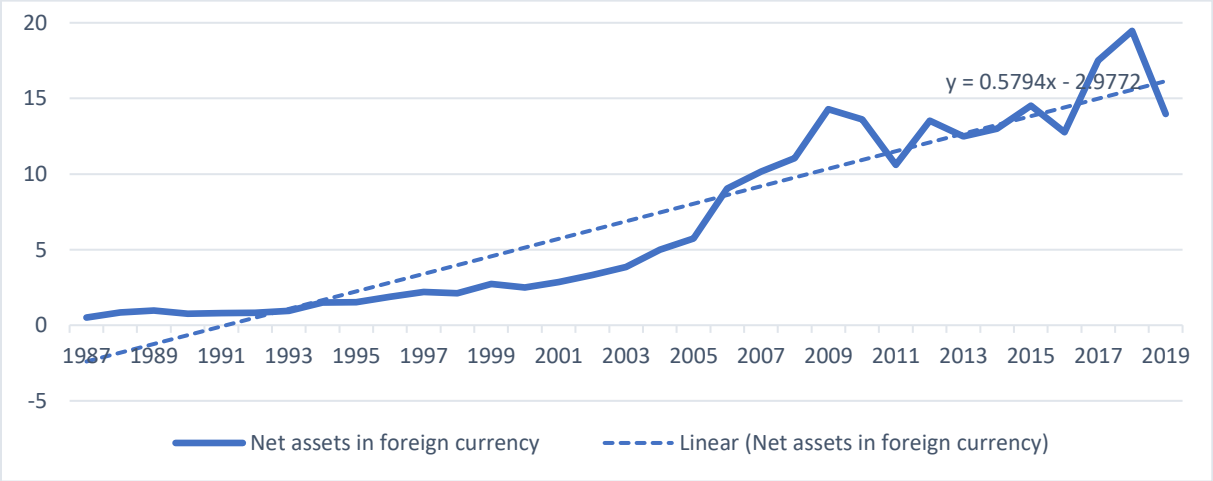
Source: World Bank indicators (2019)

2.1.5. Net assets in foreign currency

The graph below shows that since 1987, foreign exchange reserves have steadily increased in Tunisia, reaching their maximum level in 2009 with a total of 14.3 billion dinars.

Nevertheless, the net flows of external capital made it possible to consolidate the level of net assets in foreign currencies which reached a level of 19.665 billion dinars in 2019. During the period 1987-2019, net assets in foreign currencies are characterized by a tendency to upwards (the slope of the trend line is positive 0.579). This increase is explained by structural factors (the increase in tourist arrivals and the relative improvement in the export of mining and petroleum products) and cyclical factors (borrowing which allows additional inflows of foreign currency).

Figure 5: Evolution of net assets in foreign currencies



Source: Central Bank of Tunisia (2019)

2.2. Model Specification

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The analytical framework is inspired by the classical money demand equation (MV= PY), i.e. Log(Y) = Log(M) + Log(V) - Log(P), hence y = m + v - p with v: the relative variation in the speed of circulation of money, y: the volume of transactions and p: the rate of inflation, m: the money supply. The stability of the velocity would depend on the existence of a stable relationship between nominal income and money supply. Thus, fluctuations in velocity disrupt the relationship between money and prices, limiting the effectiveness of monetary policy in regulating cyclical inflation, as shown by the equation p = (m + v) - y.

As indicated in the literature review, the specificity of our model lies in the introduction of international competitiveness variables as scale variables in the money demand function.

It is then enough to specify the money demand function while considering the specificities of the economy, to arrive at the functional form:

$$Y_t = \alpha_0 + \alpha_1 LV_t + \alpha_2 IR_t + \alpha_3 LREER_t + \alpha_4 LNAC_t + \alpha_5 LINF_t + \varepsilon_t \quad (1)$$

Where; Y is the dependent variable while LV, IR, LREER, LNAC and LINF are the independent variables and ε is the error term; α0 is the constant term and αt are the parameters of the regression equation. The logarithmic function is used because the normality test carried out indicates a non-normal distribution of the time series, thus, it is estimated that this function makes it possible to obtain a normal distribution of the series used in the modelling. In this case, Y and IR are not logarithmically transformed in the model because the transformation condition indicates that negative variables are not affected.

- The variable to be explained, which is economic growth, the indicator of which is the annual growth rate of gross domestic product (GDP).

The following explanatory variables:

- The money circulation velocity (V): this variable allows the Central Bank to guarantee the internal stability of the currency.

- The exchange rate (REER): this variable allows the Central Bank to guarantee the external stability of the currency.

- The inflation rate (INF): this variable allows the Central Bank to guarantee the “credibility” aspect of monetary policy.

- The net assets of currencies (NAC): the holding of additional reserves allows banks to grant less credit and consequently to slow down the mechanism of economic growth.

- The interest rate (IR): this variable makes it possible to capture the impulses of monetary policy on economic activity through the channel of the interest rate since it depends on the key rate of the Central Bank.

3. Analysis and interpretation of results

3.1. Unit root test result

The study was interested in looking for the presence of unit root of the variables used in this model using the Augmented Dickey-Fuller (ADF) test with constant and trend. The results are shown in Table 1 below.

Table 1: ADF unit root test

Variables	Level		First difference		Conclusion	Integration Order
	ADF Statistic	Critical value of 5%	ADF Statistic	Critical value of 5%		
Y	-5.019255	-3.557759	-	-	Stationnaire	I(0)
LV	-3.838201	-3.568379	-	-	Stationnaire	I(0)
IR	-3.917042	-3.557759	-	-	Stationnaire	I(0)
LERER	-1.893039	-3.562882	-4.114372	-3.568379	Stationnaire	I(1)
LNAC	-1.495552	-3.574244	-3.697358	-3.580622	Stationnaire	I(1)
LINF	-1.154121	-3.562882	-10.38123	-3.562882	Stationnaire	I(1)

Source: author compilation by EViews 9.5

Table 1 above presents the results of the stationarity test of the ADF on the variables of monetary policy and economic growth. In this case, the results indicate that the variables were stationary at level and in first difference. Thus, the ARDL model can be applied regardless of whether the individual effects are integrated of order I (0) or I (1), regardless of stationarity.

3.2. Selecting the number of delays

The optimal number of lags to retain for a variable is the one that minimizes these criteria. The Akaike Information Criterion (AIC) was used to select the optimal delay number based on the information provided during the test.

Table 2: Criteria for selecting the lag number

Endogenous variable : Y Exogenous variables : C LV IR LNAC LINF LREER						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-46.74245	NA*	2.934425	3.906848	4.194812*	3.992475
1	-46.00403	1.093946	3.005540	3.926225	4.262182	4.026122
2	-44.17746	2.570737	2.844639*	3.864997*	4.248948	3.979166*
3	-43.86186	0.420791	3.017103	3.915694	4.347639	4.044134
4	-43.51809	0.432899	3.200765	3.964303	4.444243	4.107014
5	-43.50577	0.014607	3.489539	4.037464	4.565398	4.194446
6	-43.28702	0.243048	3.758728	4.095335	4.671262	4.266588

* indicates lag order selected by the criterion LR: sequential modified LR test statistic (each test at 5% level) FPE: Final prediction error AIC: Akaike information criterion SC: Schwarz information criterion HQ: Hannan-Quinn information criterion

Source: author compilation by EViews 9.5

The result presented in Table 2 revealed that two lags are suitable for the analysis out of a maximum of six lags selected according to the three criteria: final prediction error (FPE), Akaike information criteria (AIC) and criterion d Hannan-Quinn information (HQ). The results of the ARDL limits testing approach are also shown in Table 3.

3.3. Cointegration approach: ARDL Bound test

The Bound test cointegration approach aims to confirm whether there is a long-term relationship between the model variables. This is done by testing whether their coefficients are equal to zero in our estimated model or not. The F-statistic value of the Bound test and the bounds of the critical value are presented in the table below.

Table 3: Result of ARDL Bounds test

Variables	**F-statistic**	
F(Y/LV, IR, LNAC, LINF, LREER)	8.058852	
Critical value	Lower bound	Upper bound
10%	2.407	3.517
5%	2.91	4.193
1%	4.134	5.761

Source: author compilation by EViews 9.5

The output of ARDL bound test shown in Table 3, effectively shows that the result confirms the presence of a long-term relationship between the variables for the period considered in Tunisia. Indeed, the calculated F-statistic 8.06 was greater than the critical values above the significance level of 1%, 5% and 10%, therefore, inferring that there is a cointegrating relationship between the time series in the form level, regardless of whether they are I(0) or I(1). In other words, the null hypothesis of no cointegration can be rejected at the 1%, 5% and 10% significance levels because the F-statistic is greater than the critical upper bound value I(1) .

3.4. Long-term estimated model

Here, the long-term coefficient is estimated using the ARDL model and the result is shown in the table below.

Table 4: Long-term coefficients estimated using the ARDL approach

long-term coefficients of ARDL(1, 0, 2, 2, 2, 1) selected based on Akaike's information criterion (AIC)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
Y(-1)	-0.260901	0.186059	-1.402250	0.1788
LV	28.79109	7.532850	3.822071	0.0014
IR	1.470129	0.536073	2.742403	0.0139
IR(-1)	-0.945540	0.631770	-1.496653	0.1528
IR(-2)	-0.951609	0.502008	-1.895604	0.0751
LNAC	4.298739	2.105666	2.041511	0.0570
LNAC(-1)	-3.743322	2.599570	-1.439977	0.1680
LNAC(-2)	3.281358	1.819396	1.803542	0.0891
LINF	6.840445	2.219215	3.082371	0.0068
LINF(-1)	-1.565877	2.472502	-0.633316	0.5350
LINF(-2)	-4.163615	2.173984	-1.915201	0.0724
LREER	-13.70993	11.49620	-1.192562	0.2494
LREER(-1)	24.01088	15.66965	1.532318	0.1438
C	-68.41649	59.96477	-1.140945	0.2697
R-squared	0.750560	Adjusted R-squared		0.559811
S.E. of regression	1.405067	Durbin-Watson stat		2.849050
F-statistic	3.934816	Prob(F-statistic)		0.004795
Diagnostics Tests				
A. Autocorrelation χ^2_{auto} = 2.968245 (0.0713)				
B. Functional Form (Ramsey Reset) χ^2_{reset} = 2.067311 (0.1611)				
C. Normality χ^2_{norm} = 1.388720 (0.4994)				
D. Heteroscedasticity χ^2_{het} = 1.315095 (0.2937)				

Source: author compilation by EViews 9.5

The result presented in Table 4 shows that the results are consistent with the theory of monetarists on the demand for money which postulated that the quantity of money in circulation would determine the volume of goods and services exchanged in an economy. Therefore, it would have a positive relationship with the country's position in international trade, market economy thereby leading to strong self-adjustment tendencies.

Empirically, the results are consistent with the findings of Anowor and Okorie (2016), Alavinasab (2016), Precious (2014), Fernald, Spiegel and Swanson (2014), Fasanya, Onakoya and Agboluaje (2013), Gul, Mughal and Rahim (2012) and Bollard and Hunt (1960), who studied the effect of monetary policy on economic growth in various countries and found a positive relationship between monetary policy and economic growth. However, the results contradict the findings of Babatunde and Shuaibu (2011), Ho and Yeh (2010) and Khabo and Harmse (2005) who conducted the same research on monetary policy with respect to its effect on economic growth and found established a negative relationship between the two variables.

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JSEG
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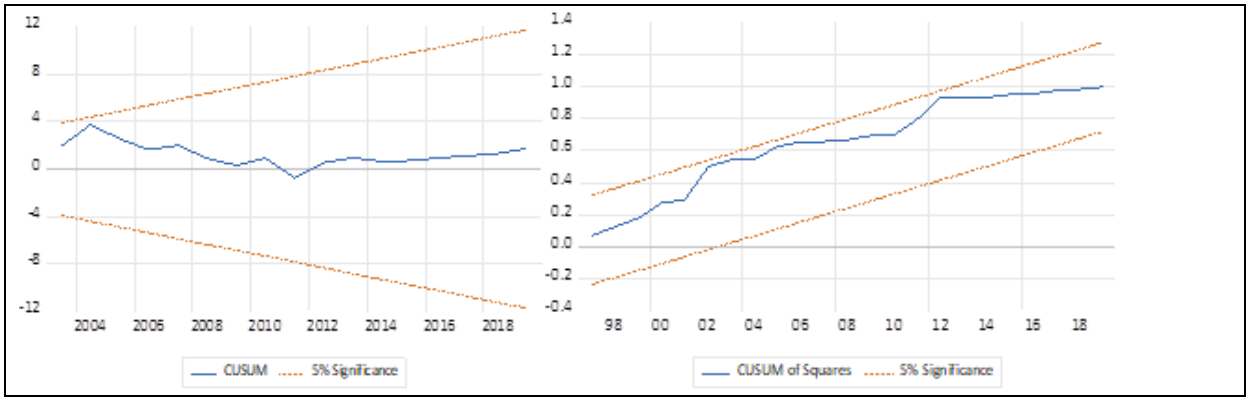
In the same line, the coefficient of determination (R^2) shows that 75% of the variations in economic growth (Y) can be explained by the explanatory variables and that, even considering the degree of freedom, the adjusted coefficient of determination (Adjusted R^2) still shows that the explanatory variables explain the 54% variation in economic growth (Y). The F-statistic 3.93 (0.0047) confirmed the adequacy of the coefficient of determination and showed an overall significant level of the explanatory variables to jointly explain economic growth (Y).

In addition, the results of this result were tested using diagnostic tests, such as, the Breusch-Godfrey serial type correlation test, the Ramsey RESET test, the Jarque-Bera normality test and the heteroscedasticity test. The results of these tests, shown in Table 4, show that the model passed all of the diagnostic tests. The diagnostic tests used in the model indicate that there is no serial correlation or heteroscedasticity in the model, while the RESET test confirmed a well-specified model and again the normality test result has showed that the residuals are normally distributed. The Durbin Watson (DW) statistic is used to verify the absence of autocorrelation of errors, i.e. the independence of each deviation from the previous one. In our case, this statistic equal to 2.85 is greater than 2. We can therefore conclude that the errors are independent.

We also examined the stability of the model using the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) of the recursive residual test for structural stability. The graphs of CUSUM and CUSUMSQ showed that the regression equation is stable since neither the statistics of the CUSUM test nor those of the CUSUMSQ test exceed the 5% limit of the significance level.

Figure 6: Stability test (CUSUM and CUSUMSQ statistics)



Source: author compilation by EViews 9.5

3.5. Short-term dynamics: ARDL-ECM representation

After confirming the existence of a long-term relationship between the study variables, it is relevant to estimate both the form of the error-correction model mechanism and its long-term form. The error correction model was first used by Sargan (1964) and later popularized by Engle and Granger (1987).

Table 5: Estimated short-term dynamics and error correction

Short-term dynamics and ARDL (1, 0, 2, 2, 2, 1) error correction model selected according to Akaike's information criterion (AIC)				
Dependent Variable : Y				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(IR)	1.470129	0.327823	4.484523	0.0003
D(IR(-1))	0.951609	0.382618	2.487097	0.0236
D(LNAC)	4.298739	1.407645	3.053852	0.0072
D(LNAC(-1))	-3.281358	1.225238	-2.678138	0.0159
D(LINF)	6.840445	1.235687	5.535742	0.0000
D(LINF(-1))	4.163615	1.671458	2.491007	0.0234
D(LREER)	-13.70993	8.050379	-1.703017	0.1068
CointEq(-1)*	-1.260901	0.144330	-8.736250	0.0000
Cointeq = Y - (22.7267*LV - 0.3469*IR + 1.8437*LNAC - 1.1058*LINF -1.9808*LREER - 1.5702)				

Source: author compilation by EViews 9.5

The results highlighted short-term relationships between the study variables. This is indicated by the ECM p-value of 0.0000, which is below the critical value of 5%. The ECM result indicates that the relationship between the variables met a priori expectations and satisfied the stability condition necessary to conduct research of this nature. This also implies that the estimation results had the required signs for each of the parameters. The ECM coefficient is significant, fractional and negative. The latter is equal to -1.26 with a p-value of 0.0000, which indicates that the speed of adjustment from a short-term imbalance to a long-term equilibrium relationship is 126% per year.

4. Conclusion and recommendations

This study aimed to analyze the effects of monetary policy on economic growth in Tunisia through an econometric study. For this purpose, the ARDL (Autoregressive Distributed Lag) technique was used in the analysis. The estimation results revealed the existence of both long-term and short-term relationships between the variables. It appears from this study that the velocity of money (LV) and the interest rate (IR) at period zero (current period) had a significant and positive effect on growth in Tunisia, while net assets in currencies (LNAC) had an insignificant and positive effect on growth in Tunisia. Similarly, the results showed that the inflation rate (LINF) and the interest rate (IR) at a lag of two years (t-2) have a negative and significant effect on growth in Tunisia. Therefore, price stability is not conducive to the development of economic activity but it simply allows the economy to maintain itself.

With regard to the negative effect of the appreciation of the exchange rate on economic growth in Tunisia and which means a low price-competitiveness of exports in the short term, which can justify according to economic theory the relevance of a devaluation decision to stimulate exports and therefore contribute positively to economic growth, moreover the devaluations undertaken during the period of the structural adjustment plan in 1986 testify to the short-term success of devaluations in the Tunisian context.

Overall, the results of the impact of monetary policy on economic growth in Tunisia can be explained by the nature of the financial structure, characterized by a low level of development, a domination of the financial sector by the banking and an oligopolistic nature of the banking sector. Based on these findings, the study recommends the government to design export-led investment growth policies to boost the country's economic growth. The government should also further promote the public and private investments that will be put in place to stimulate economic growth. This is how an adequate and sound monetary policy will in turn lead to high and more appropriate economic growth.

For monetary policy to have the desired impact on the real economy and on inflation, which is the fundamental objective of monetary policy, it is essential that changes in the short-term market interest rate are transformed into ultimately by changing other interest rates in the economy (i.e. changes in interest rates are passed through to loan and deposit interest rates), which then influence the overall level of economic activity.

It is necessary that in seeking to promote economic growth, Tunisian banks commit to assuming the mission of price stability and improving regulatory and supervisory frameworks in order to guarantee a sound financial sector for effective intermediation.

Based on the findings made during this study, the recommendations are suggested below:

- ✓ For monetary authorities to be able to meet economic growth needs from cash balances without causing price inflation, they must monitor the demand for money and direct the money supply to meet or approach the request for cash balances,
- ✓ The need for coordination and synergy between the Central Bank as the body responsible for implementing monetary policy objectives and other government bodies responsible for developing and implementing other policies (fiscal policy and trade policy), and which always requires interaction with an effective financial stability policy.
- ✓ With the renewal of the new status of the Central Bank of Tunisia (Law 35-2016), Tunisia must further strengthen the independence of its issuing bank vis-à-vis political power, and try to avoid as much as possible the financial and instrumental dependence,
- ✓ The study further recommends sufficient attention that should be given to reducing inflation to a reasonable level, (inflation targeting) by the monetary authority of the country to avoid its disastrous consequences on economic growth in Tunisia.
- ✓ The government should direct its efforts towards improving the level of development of the money market and the capital market. Indeed, a well-developed monetary and financial market, with a wide range of short and long-term financing is necessary for the efficiency of

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