ADAPTING MONETARY POLICY TO NEW CHALLENGES AFTER THE TUNISIAN REVOLUTION: IMPLICATIONS FOR ECONOMIC GROWTH

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ABSTRACT

This objective of this paper is to analyze the impact of monetary policy on economic growth in Tunisian. After a revolution or significant political changes, countries may reassess and adjust their economic policies, including monetary policy, to address new challenges and align with the evolving economic and political landscape. Central banks often play a crucial role in maintaining economic stability, and changes in leadership or government can lead to shifts in monetary policy objectives and strategies. Using an ARDL model applied to monthly data over the 2011/2021 period, the results revealed that money supply has a positive long-run impact on economic growth in Tunisian after revolution .On the other hand; other instruments such as the interest rate, exchange rate have a significant negative relationship with economic growth. In fact, when interest rates are high, it becomes more expensive to borrow money, so people and businesses are less likely to invest and spend. Findings also depict that increase in Domestic Credit to Private Sector hurts the economic growth. A negative effect on domestic credit could lead a central bank to consider lowering interest rates or implementing other measures to stimulate credit growth and support economic activity. Besides, inflation was shown to play an indirect role by increasing the impact of economic growth. Due to the effect of the revolution, the political instability and high international food and fuel prices negatively affected the domestic prices; Tunisia reached an inflation rate of 4.8% in 2021. Findings of the study have important implications that may discuss the need to adapt monetary policy to ensure economic stability in the aftermath of the Tunisian revolution. This could involve addressing challenges such as inflation, exchange rate fluctuations, and overall economic uncertainty. There might be recommendations for adjustments to monetary policy tools and strategies. This could include changes in interest rates, currency management, and liquidity measures to support economic recovery and growth. The implications might involve collaboration between monetary authorities and the government to implement coordinated fiscal and monetary policies. This synergy is often necessary to address broader economic challenges and promote sustainable growth.

INTRODUCTION

The monetary policy is a component of economic policy that is implemented by the central bank to influence national economic activity through a set of monetary instruments, such as the money supply, interest rates, and exchange rates. Its objective is to achieve economic growth, full employment, price stability, and external balance by influencing the supply of money. The monetary authority, which is usually the central bank, takes action to achieve these goals.

      Monetary policy continues to play a central role in real economic growth, financial growth, and economic development (Twinoburyo, E.N. and Odhiambo, N.M.

(2018)). It is one of the useful development strategies for developing countries to promote economic growth by influencing the cost and availability of credit, managing inflation, and ensuring payment stability.

Tunisia's major medium-term concerns are to reduce high unemployment, particularly among the youth, and to mitigate regional economic disparities by establishing foundations for higher and more inclusive economic growth, reducing poverty, and achieving price stability. The Tunisian government has been using monetary policy to maintain price stability while keeping in mind the objective of growth because price stability is a necessary precondition for sustainable economic growth.

An analysis of the effects of monetary policy on the economy is necessary for several reasons. The study can address an important problem in the context of Maghreb economies, especially Tunisia. Since the 2011 revolution, the country has faced significant macroeconomic imbalances as authorities focused on political, social, and economic transitions and dealt with monetary and fiscal shocks. As a result, the current account deficit widened substantially to 9.2% of GDP in 2020, debt reached 115.7% of GDP, inflation accelerated significantly to 5.71% in 2021 (up from 5.71% in 2020), weaknesses in the financial sector accumulated, and the unemployment rate reached 18.4% in 2021.

Indeed, several authors have already studied the link between monetary policy and economic growth, including Ufoeze, L.O (2018), Md. Sayemul Islam (2021), Mehar, A. (2018), and Marlene, A and al (2019). In this context, monetary policy has been considered as an important channel towards investment, employment, and production. For Keynesians, monetary policy should not have the sole objective of fighting inflation but should also pursue the objectives of economic growth, production, and employment.

Therefore, the main objective of this article is to examine the relationship between monetary policy and economic growth in Tunisian. For this reason, an econometric approach of the m The Autoregressive Distributed Lag (ARDL) must be considered, which used to analyze the long-run relationship between two or more variables, determine the existence of a co integrating relationship between the variables, which indicates a long-term equilibrium relationship, and analyze the short-run dynamics of the variable. Moreover, this method enables us to test for the presence of causality between the variables, which helps to establish the direction of the relationship. To the best of our knowledge, none of the previous studies has dealt with the problems in Tunisian through the use of the ARDL model.

This analysis provides fresh insights into how Tunisia's monetary policy affects its economic growth. It may have identified new patterns or relationships that were previously unknown, shedding more light on how the country can best manage its monetary policy to achieve sustainable economic growth. The remaining part of this paper is organized as follows. Section one presents a literature review then, section 2discusses the data and methodology and finally, section 3 reports and discusses the empirical results and presents the conclusion.

This analysis offers new evidence on the North African countries. Second, unlike in contrast several other studies, a nonlinear relationship between human capital and economic growth is assumed. The remaining part of this paper is organized as follows: Section one presents the theoretical background of monetary policy. Section 2 discusses the literature review, while section 3 analyzes data and methodology. Finally, section 4 reports and discusses the empirical results and presents the conclusion.

LITERATURE REVIEW

Monetary policy is the process by which a central bank, such as the Federal Reserve in the United States or the European Central Bank in the Euro zone, manages the supply of money and credit in an economy in order to achieve certain economic goals. The primary goals of monetary policy are:

Price stability: One of the most important goals of monetary policy is to maintain price stability, which means keeping inflation under control. Central banks aim to keep inflation at a low and stable rate, typically around 2% per year, in order to ensure that the value of money remains relatively constant and to avoid the negative effects of high inflation on the economy.

Full employment: Another important goal of monetary policy is to promote full employment. Central banks aim to achieve this by stimulating economic activity through low interest rates, which can encourage borrowing and investment, and by increasing the money supply, which can boost consumer spending and business investment.

Economic growth: Central banks also aim to promote economic growth by providing businesses and consumers with access to credit and by maintaining stable prices and a predictable economic environment.

Financial stability: Central banks also have a role in maintaining financial stability, which means ensuring that the financial system is sound and that there are no disruptions that could lead to a financial crisis. Central banks monitor the banking system and take action to prevent or mitigate risks to financial stability.

Monetary policy is one of the key tools of macroeconomics used to influence a country's economy by controlling the amount of money in circulation and affecting interest rates. The theoretical context of monetary policy is based on several key economic theories, including:

- The quantity theory of money: This theory states that the quantity of money in circulation affects the prices of goods and services. If the amount of money in circulation increases, prices tend to increase as well. Monetary policy can therefore be used to control inflation by adjusting the amount of money in circulation.(M. Friedman 1956)

- The Phillips curve: This theory relates inflation and the unemployment rate. According to this theory, when the unemployment rate is high, inflation is low, and vice versa. Monetary policy can therefore be used to influence the unemployment rate and inflation.

- Rational expectations theory: This theory assumes that economic agents have rational expectations about the future (Mankiw, N. G. (2016);Romer, D. (2006)). Therefore, monetary policies can only have a temporary effect on the economy because economic agents anticipate the future effects of the policy and adjust their behavior accordingly.

- The liquidity preference theory: This theory explains how interest rates affect the demand for money. It states that people prefer to hold money rather than assets, but that demand for money decreases as interest rates increase. (Mishkin, F. S. (2018)).

These theories provide a theoretical framework for understanding how monetary policies affect the economy and how central banks can use these policies to achieve their macroeconomic objectives.

The key economic theories that have shaped the theoretical context of monetary policy include the quantity theory of money, Keynesian theory, and

monetarist theory. These theories have influenced how central banks conceptualize and implement their monetary policy.

Furthermore, the literature related to monetary policy includes empirical studies on the effects of monetary policy, analyses of monetary policy frameworks, and comparisons between the monetary policy practices of different central banks around the world. These studies contribute to enlightening policymakers about best practices in monetary policy.

PREVIOUS STUDIES ANALYSIS

Monetary policy is an important tool that governments use to influence the economy. It refers to the actions that central banks take to manage the money supply, interest rates, and credit in the economy to achieve specific economic goals. Economic growth is a key objective of monetary policy, as it is seen as a way to improve living standards and create jobs. Numerous studies have examined the relationship between monetary policy and economic growth. Some of the key findings are summarized below.

One of the most important mechanisms through which monetary policy can affect economic growth is by influencing the level of interest rates. Lower interest rates can encourage borrowing and investment, which can boost economic activity and ultimately lead to higher growth. However, if interest rates are too low for too long, they can also lead to inflation, which can be detrimental to growth.

Jordi Galí and Mark Gertler (1999) , Michael Devereux and Charles Engel (2000) have found that increasing the money supply can lead to higher economic growth in the short term, but in the long term it can lead to inflation and other economic problems. Similarly, Christina D. Romer and David H. Romer (2013), Yongfu Huang (2018) have shown that lower interest rates can stimulate economic growth by making it cheaper for businesses and individuals to borrow money. However, excessively low interest rates can lead to inflation and financial instability.

Furthermore, Jakob de Haan and al (2004), conducted a study about Central Bank Independence and Transparency. They found that when central banks are independent from political influence, they are better able to make decisions that promote economic growth.

The exchange rate is another factor that can influence economic growth. More recently, unday Oluwole Olayiwola and Adesoye A. Bolaji (2017), have analyzed the the relationship between exchange rate, inflation, and economic growth in Nigeria using annual data for the period 1981-2017. The authors find that a weaker currency leads to higher inflation, which in turn negatively affects economic growth. Fidelis O. Ogwumike and Onyinye S. I. Onyekwere (2019). This study investigates the impact of exchange rate on exports and economic growth in Nigeria using quarterly data from 1991 to 2018. they have found that a weaker currency can lead to higher economic growth by making exports cheaper and more competitive. In this context, Rania Al-Mashat and Chahir Zaki (2014) . This study examines the effect of currency depreciation on economic growth in developing countries, using a sample of 38 countries over the period 1980-2010. The authors find that currency depreciation has a positive and significant impact on economic growth, but note that this effect depends on the level of economic development and the degree of openness of the economy. Another important goal of monetary policy is to maintain financial stability. Studies have found that financial instability can have negative effects on economic growth by reducing investment and increasing uncertainty. For example, Hyun Song Shin (2012) explores the relationship between financial instability and economic performance using a theoretical framework. The author argues that financial instability can lead to

lower levels of investment, higher borrowing costs, and increased uncertainty, which can all have negative effects on economic growth. Moreover, Frederic S. Mishkin and Andrew Crockett (1999) argues that financial instability can lead to reduced investment and higher levels of uncertainty, which can in turn slow down economic growth. The authors cite several historical examples of financial crises that have had negative effects on economic growth.

Another way in which monetary policy can affect economic growth is through its impact on financial stability. A study by Kuttner (2001) found that monetary policy can have a significant impact on the likelihood of financial crises. They found that tighter monetary policy can reduce the risk of financial crises, but at the cost of lower economic growth.the literature suggests that monetary policy can have a significant impact on economic growth, but the relationship is complex and depends on a variety of factors. Central banks must carefully balance the short-term benefits of policies that stimulate growth with the potential long-term risks of inflation and financial instability. Overall, the literature suggests that monetary policy can have a significant impact on economic growth, but the magnitude and direction of the effect depend on various factors, such as the specific policy instrument used, the state of the economy, and the transmission mechanism through which monetary policy operates. It is also important to note that monetary policy is just one of many factors that can affect economic growth, and its effectiveness may be limited in the presence of other constraints or structural issues.

A study by Romer and Romer (1989) found that expansionary monetary policy can have a positive effect on output growth in the short run, but the effect fades over time. Another study by Bernanke and Gertler (1995) found that monetary policy can affect the economy through various channels, including the interest rate channel, the exchange rate channel, and the credit channel. They found that the credit channel is particularly important in explaining the link between monetary policy and economic growth.

Additionally, Galindo and Panizza (2002) have examined the relationship between monetary policy and specific aspects of economic growth, such as productivity. They found that monetary policy can affect productivity growth by influencing investment decisions. They found that lower interest rates can stimulate investment, which can lead to higher productivity growth.

One important finding from the literature is that the effectiveness of monetary policy in promoting economic growth depends on a variety of factors, including the structure of the economy, the degree of financial market development, and the institutional framework governing monetary policy (Kofi A. and al 2015, Stephen R. Bond and Frank Windmeijer (2002)) .For example, in economies with well-developed financial markets and institutions, monetary policy may be more effective in promoting economic growth by providing incentives for investment and entrepreneurship. In contrast, in economies with underdeveloped financial systems, changes in interest rates may have limited impact on investment and economic growth.

More recently, Charles Abuka, David Kihangire, and Samuel Njoroge (2021), conducted a study about the causality relationship between monetary policy and economic growth for African. They found that there is a significant causal relationship between monetary policy and economic growth.

Other studies have examined the role of monetary policy in addressing specific economic challenges, such as inflation or financial crises (Cecchetti, S. G., & Schoenholtz, K. L. (2018), .Obstfeld, M. (2015).For example, during periods of high inflation, central banks may use monetary policy tools such as raising interest rates to

slow down the economy and reduce inflationary pressures (Kohn, D. L. (2014), Bernanke, B. S. (2012).

DATA AND METHODOLOGY

Data Source

As mentioned above, the aim of this paper is to investigate the contributions of monetary policy on economic growth in the case of Tunisian, the frequency is monthly data covering the period 2011- 2021. The choice of the period is justified by the period after the 2011 revolution.

Following the revolution, Tunisia embarked on a period of political transition as it worked to establish a democratic government and institutions. This involved drafting a new constitution and holding free and fair elections, which led to the formation of a coalition government. In this period, Tunisia has faced significant economic challenges, including high unemployment rates and inflation.

The used variables were divided into dependent and independent. In fact, the first group includes the GDP per capita as an indicator of economic growth *(Y)*. With regard to the second group, the monetary policy was represented by money supply (M2), interest rate (IR), exchange rate (EXR), inflation (INF) and Domestic Credit to Private Sector (DCPS). Table 1 presents the detailed description of the variables used in this study.

TABLE 1: DTA SOURCE

Variables	Definition	Source
Gross Domestic Product (GDP)	Gross Domestic Product (GDP) is a measure of the total value of goods and services produced within a country's borders during a specific time period, usually a year. It is used to assess a country's economic performance and growth.	The National Institute of Statistics (INS)
Money supply (M2)	Money supply (M2) is a measure of the total amount of money in circulation within an economy, which includes all the physical currency and coins, as well as all the money held in checking and savings accounts, money market accounts, and other similar accounts that are accessible to the public	the Central Bank of Tunisia (BCT)
Interest rate (IR)	Interest rate (IR) refers to the amount of interest charged by a lender on a loan or credit extended to a borrower. It is typically expressed as a percentage of the total amount borrowed or lent and represents the cost of borrowing or the return on investment for the lender.	the Central Bank of Tunisia (BCT)
Exchange rate (EXR)	Exchange rate (EXR) refers to the value of one currency in terms of another currency. It represents the rate	the Central Bank of Tunisia (BCT)

	at which one currency can be exchanged for another currency.	
Inflation (INF)	Inflation refers to the sustained increase in the general price level of goods and services in an economy over a period of time. It means that the purchasing power of a currency decreases, leading to a rise in the cost of living for consumers	The National Institute of Statistics (INS)
Domestic Credit to Private Sector (DCPS).	Domestic Credit to Private Sector (DCPS) refers to the total amount of credit provided by financial institutions, such as banks, to the private sector in a country.	the Central Bank of Tunisia (BCT)

METHODOLOGY

To effectively use the ARDL approach, appropriate lags for each variable in the regression model must be selected. Optimal lag selection criteria are used to achieve the best model outcomes. In this study, the Akaike information criterion was used to choose the optimal lag for each model. Once the ARDL model was run, the presence of a long-run association among the variables was tested using the F-bounds test, as introduced by Pesaran et al. (2001). If the F-statistic is greater than the upper bound I(1) and lower bound I(0) critical values at a 1% significance level, then a long-run relationship exists among the variables. This test was conducted in the study by Shahbaz et al. (2018). In the event that the F-statistic falls below the 1% significance level critical values of I(0) and I(1), it indicates the absence of a long-run relationship. If the F-statistic falls between the critical values of I(0) and I(1) at a 1% significance level, the outcome is considered inconclusive, according to Kapaya (2020). Once the F-bounds approach was applied, the model (1) yielded long-run coefficients. Subsequently, short-run coefficients and error correction terms were obtained by employing the error correction model to examine the long-run coefficients.

The ARDL model considers the impact of independent variables on the dependent variable, but it doesn't provide any indication of the long-term or short-term causality among the variables under investigation. This limitation is resolved by the VECM approach, which incorporates a model that assesses the causality between variables

The empirical model can be specified as follows:

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i}\, \Delta GDP_{t-i} + \sum_{i=1}^{n} \alpha_{2i}\, \Delta LNM2_{t-i} + \sum_{i=1}^{n} \alpha_{3i}\, \Delta LNIR_{t-i} + \sum_{i=1}^{n} \alpha_{4i}\, \Delta LNEXR_{t-i} + \sum_{i=1}^{n} \alpha_{5i}\, \Delta LNINF_{t-i} + \sum_{i=1}^{n} \alpha_{6i}\, \Delta LNDCPS_{t-i} + \beta_1 GDP_{t-1} + \beta_2 LNM2_{t-1} + \beta_3 LNIR_{t-1} + \beta_4 LNEXR_{t-1} + \beta_5 LNINF_{t-1} + \beta_6 LNDCPS_{t-1} + \mu_t$$

here, GDP: Gross Domestic Product growth rate; LNM2: natural log of money supply (M2); LNIR: natural log of interest rate; LNEXR: natural log of exchange rate; LNINF: natural log of inflation; LNDCPS: natural log of Domestic Credit to Private Sector; α0 is the intercept; α1, α2, α3, α4 and α5 denote short-run coefficients; β1, β2, β3, β4, and β5 define the long-run coefficients; μ_t denotes error term.

RESULTS AND DISCUSSIONS

Table 2 provides valuable insights into the nature and attributes of various variables, both independent and dependent. It includes key information such as the mean value, standard deviation (Std. Dev.), minimum (Min), and maximum (Max) of these variables for each country, thus offering a comprehensive overview of the data.

TABLE2 : DESCRIPTIVE STATISTICS

Variables	Mean	Standard Deviation	Minimum	Maximum
Gross Domestic Product	5,41	1,09	7,23	0,09
money supply (M2)	210,65	386, 342	123,568	289,054
interest rate	51,789	19,04	41,567	12,54
exchange rate	76,54	22,60	51,64	15,09
Inflation	6,18	2,80	8,94	14,55
Domestic Credit to Private Sector	8, 54	2,98	6,04	12,95

On average, Tunisia's GDP has been growing at a rate of 5.41% per year since the 2011 revolution. It is worth noting that the mean is a measure of central tendency and represents the average value of the GDP growth rate over a given period of time. In addition, the gross domestic investment (Annual% Growth) has minimum and maximum values therefore, we can say that the volume of this variable in each country significantly varies and depends on a number of factors. In this table, it appears that the mean values (=210,65 , SD= 386, 342) of money supply (M2) are the best determinants since they have the highest mean values compared to other determinants. In addition, we can see that the non-performing loans have the lowest mean values among all the variables with 0.2254% and a standard deviation of 2.63%.

TABLE 3: CORRELATIONS

Variables	Gross Domestic Product	money supply (M2)	interest rate	exchange rate	Inflation	Domestic Credit to Private Sector
Gross Domestic Product	1.000					
money supply (M2)	**0.569*** **(0.002)**	1.000				

interest rate	**-0,559*** (0.002)	**-0.619*** (0.001)	1.000			
exchange rate	**0,854*** (0.011)	**0.489** (0.902)	0.894 (0.215)	1.000		
Inflation	**-** **0,732*** (0.01)	**0.763*** (0.001)	**0.182*** (0.005)	-0. 398 (0.743)	1.000	
Domestic Credit to Private Sector	**0.689** (0.892)	**0.511** (0.762)	0.177 (0.095)	- 0.193 (0.413)	0.494 (0.01)	1.000

A correlation test helps to determine whether there is a linear relationship between two variables, and if so, how strong it is. The objective of a correlation test is to determine the strength and direction of the relationship between two variables. In statistics, correlation refers to the measure of association between two variables, such as the height and weight of individuals or the price and demand of a product.

According to the correlation matrix table, money supply (M2) is positively correlated with economic growth , it suggests that as the amount of money available in the economy increases, businesses and individuals have more funds to spend and invest, which can in turn stimulate economic growth and development. This correlation has been observed in many countries and is often used as a key indicator of economic health and stability. Similarly, the correlation between economic growth and interest rate is positive and significant at 1%. Thus, it is argued that as interest rates increase, economic growth tends to increase as well. This relationship implies that as interest rates rise, people tend to save more, which in turn leads to an increase in investment and economic activity. Conversely, when interest rates decrease, people tend to borrow more, which leads to an increase in spending and economic activity. Accordingly, exchange rate is positively correlated with economic growth, which implies that as the value of a country's currency strengthens relative to other currencies, it can become more expensive for other countries to purchase goods and services from that country, which can boost exports and overall economic activity.(European Central Bank (2019). only inflation is negatively correlated with economic growth . This relationship implies that high inflation can have a negative impact on the economy, as it can reduce the purchasing power of consumers and businesses, which can in turn lead to a decrease in spending, investment, and overall economic activity. On the other hand, all the correlation coefficients between the independent variables are relatively low, which helps to eliminate the possibility of co-linearity between these variables. Multicollinearity can falsely identify the estimation of the regression coefficients at low fluctuations of the data, which makes it unstable and difficult to interpret (Bourbonnais 2009).

TABLE 4: UNIT ROOT TEST FOR STATIONARITY

	ADF test			Phillips–Perron test		
Variables	Level	First difference	Decision	Level	First difference	Decision
Gross Domestic Product	1.67	-13.76***	I(1)	1.89	-12.24**	I(1)
money supply (M2)	-2.43	-3.45***	I(1)	-1.19	-4.73***	I(1)
interest rate	-2.19	-4.76***	I(1)	-2.14	-5.93**	I(1)
exchange rate	-1.81	-3.25**	I(1)	-1.24	-4.74**	I(1)
Inflation	-3.27	-6.87**	I(1)	-2.47	-5.89**	I(1)
Domestic Credit to Private Sector	-2.64	-4.85**	I(1)	-2.84	-4.91**	I(1)

Note(s): *** and ** denote statistically significant at 1 and 5% level of significance respectively

The results presented in Table 4 show that underlying variables are integrated at mixed order of at level and 1st difference. Apart from GDP, all the variables are stationary at 1st difference. As a result, this table show that a set of variables are integrated of order zero I (0) and the other assumes they are integrated of order One, I (1). We can conclude that there is evidence of a long term-run relationship. To consolidate the findings obtained from the ADF test, we further applied the Phillips–Perron test. The outcome goes in line with the result of the ADF test. Hence, we proceeded to run the ARDL model.

The ARDL model is generally used to estimate long-term relationships between economic variables, especially when these variables are non-stationary or integrated. This model is used when the variables exhibit dynamic behavior that can be represented by a linear combination of their past values and lags of the dependent variable.

TABLE 5: BOUNDS TEST

F.stat	Level of significance	Lower Bound	Upper Bound
6.24	10%	1.89	2.67

Table 5 indicates that the F-statistic exceeds the critical value of lower bound and upper bound at a 1% level of significance. This proves that monetary policy and economic growth move together in the long run. In other words, there exists a long-term relationship between monetary policy and economic growth. These results are consistent with previous studies (Romer, D. 1993.Ufoeze, O. R., Udeh, S. N., & Nwosu, C. E. 2018). However, some studies (Bahmani-Oskooee, M., & Aftab, M. 2019. Narayan, P. K., & Narayan, S. 2013) have refuted that monetary policy and economic growth do not move together in the long run. Given that the results of the F-bounds test confirm the existence of a long-term relationship among the research variables, we proceeded to determine the long-run coefficients.

TABLE 6: LONG RUN ESTIMATION RESULTS

Variables	Coefficient	Std.error	t.statistic
money supply (M2)	1.789**	0.789	1.134
interest rate	-2.164*	1.027	-0.654
exchange rate	-1.895**	0.634	-1.564
Inflation	-2.095**	1.712	-1.643
Domestic Credit to Private Sector	-1.678	0.465	-0.874

Table 6 presents the empirical methods for the assessment of the interactions between
economic growth and monetary policy post revolution. In fact, this table indicates that all the variables are statistically significant. The money supply has a positive and significant effect on economic growth. This result indicates that when a central bank effectively manages the money supply, it can have a positive impact on a country's economic growth.

The money supply refers to the amount of money that is in circulation in an economy. When the central bank can effectively manage the money supply, it can control inflation, ensure adequate liquidity in the economy, and promote economic growth. Moreover, if the money supply is managed effectively, it can lead to lower interest rates, which can encourage businesses and individuals to invest and spend more. This increased spending can lead to higher economic activity and contribute to economic growth. This outcome is consistent with several previous studies (e.g. Ji, Y., Liu, B., Sun, X., & Zhang, X. 2021, Ozturk, I., & Acaravci, A. 2019, Mehanna, R. A., & Abdelfattah, A. M. 2020.

On the other hand, interest rate has a negative and significant effect on economic growth. Interest rates are the cost of borrowing money, and they affect the spending behavior of both individuals and businesses. When interest rates are high, it becomes more expensive to borrow money, so people and businesses are less likely to invest and spend. As a result, this can slow down economic growth. In fact, when interest rates are low, it becomes cheaper to borrow money, so people and businesses are more likely to invest and spend, which can stimulate economic growth. This result is consistent with what was presented in the literature, which indicates that the interest rate has a negative effect on economic growth (Abdulai, A. M., & Abdul-Rahim, A. R. 2020; Nwokoye, E. N., & Asongu, S. A. 2020; Osei, K. A., & Mensah, E. A. 2019).

However, the exchange rate, which is statistically and significant, even at a 10% level. The depreciation of the exchange rate can make a country's exports more affordable for foreign buyers, which can boost demand for those exports and help to increase economic growth. However, a depreciation of the exchange rate can also make imports more expensive, which can lead to higher inflation and reduced purchasing power for consumers and businesses.

Overall, the relationship between exchange rates and economic growth is complex, and there are many factors that can influence it. However, a negative and significant effect of exchange rates on economic growth suggests that policymakers may need to consider how to manage currency fluctuations in order to support economic growth.Bahmani-Oskooee, M., & Saha, S. (2016)

Domestic credit, another monetary policy indicator, showed a negative effect. A negative effect in this context typically means that a decrease in the level of domestic credit is associated with a decrease in economic activity or growth. This could occur

because a reduction in credit availability can limit the ability of businesses to invest and expand, which can slow down economic growth. It can also make it more difficult for households to access credit, which can reduce consumption and lower overall demand in the economy. Beck, T., Demirgüç-Kunt, A., & Maksimovic, V. (2005).

In the context of monetary policy, central banks may use domestic credit as an indicator to guide their decisions on interest rates and other policy tools. A negative effect on domestic credit could lead a central bank to consider lowering interest rates or implementing other measures to stimulate credit growth and support economic activity (Geda, A., & Mulugeta, A. 2015). This result is consistent with what was presented in the literature, which indicates that the domestic credit has a negative effect on economic growth (Beck, T., Demirgüç-Kunt, A., & Honohan, P. 2008; Khatun, M., & Islam, M. A. 2014).

TA BLE 7: DIAGNOSTICS TEST

Test ofNormality
Jarque-Bera	1.982109 Probability 0.384

Test of quality
R-squared	0.78910 F-statistic 4.793737
Adjusted R squared	0.711696 Prob(F-statistic) 0.0011

Breusch-Godfrey Serial Correlation LM Test:
F-statistic	2.385560 Prob 0.1084
Obs*R-squared	6.052270 Prob 0.0296

Heteroskedasticity:Breuch Pagan-Godfrey
F-statistic	0.284315 Prob 0.9571
Obs*R-squared	2.343690 Prob 0.9112
Scaled explained SS	2.688912 Prob 0.9943

The diagnostic tests confirm that the chosen specification is generally satisfactory. The Jarque-Bera test does not reject the assumption of normally distributed errors. The conducted tests do not reveal any evidence of heteroscedasticity at the 5% significance level.

Both the coefficient of determination R^2 and the adjusted coefficient of determination R^2 are higher than 60%, indicating that our estimation is appropriate and acceptable. Furthermore, the Fisher probability is less than 5%, indicating that the overall significance of the model is highly satisfactory.

STABILITY OF ARDL MODEL

To audit the stability of our model, we practice the stability tests that are "CUSUM" and "CUSUM square".
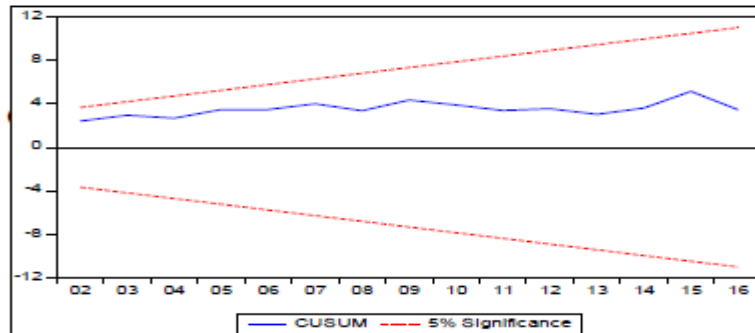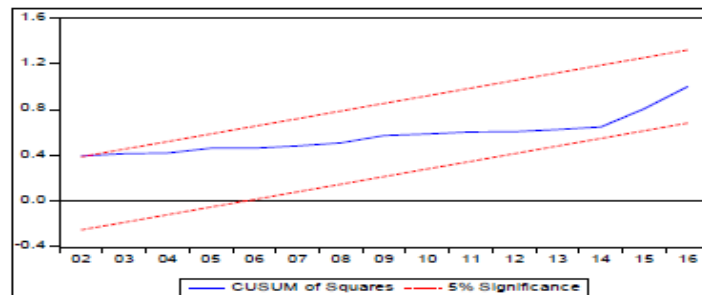
Figure 1 - Test of CUSUM

Figure 2 - Test of CUSUM Square

Findings illustrated the stability of the model and designated that parameters of the model is embedded well inside the 5% critical lines. Hence, we infer that all the coefficients in the ARDL model are stable.

CONCLUDING REMARKS AND POLICY IMPLICATIONS

Monetary policy plays a crucial role in shaping and regulating the overall economic activity of a country. It is a macroeconomic tool used by central banks to control the money supply, interest rates, and credit availability in the economy. The main objective of monetary policy is to achieve price stability, promote sustainable economic growth, and maintain full employment. The objective of this empirical work is to study the effects of monetary policy on economic growth in the case of Tunisian. To achieve our goal, we used monthly data covering the period 2011-2021. In fact, several studies have examined this relationship in these countries, but none of them investigated this interaction in the context of a crisis, such as the 2011 revolution in Tunisia.

The monetary policy plays a crucial role in shaping a country's economic growth. By adjusting interest rates, the money supply, and other tools, monetary authorities can influence levels of investment, consumption, and borrowing, which in turn can either stimulate or restrain economic growth. However, it's important to recognize that the relationship between monetary policy and economic growth is

complex and dependent on the specific economic context of a country. An accommodating monetary policy, characterized by low interest rates and an increase in the money supply, can boost overall demand by encouraging borrowing and spending, thereby promoting short-term economic growth.

The augmented Dickey–Fuller test and the Phillips–Perron test certified that no variable is stationary at 2nd difference. Further, the outcome of the F-bounds test confirmed that a long-run relationship exists among monetary policy variables and economic growth.

The long-term estimation results show that all instrumental variables of monetary policy are significant with economic growth.

Afterward, long-run coefficients from the ARDL model revealed that money supply significantly propels economic growth in Tunisian after revolution .On the other hand, other instruments such as the interest rate, exchange rate Domestic Credit to Private Sector and inflation, have a significant negative relationship with economic growth.

In conclusion, we can say that there is a significant and meaningful connection between the measures taken in monetary policy and a decrease in economic growth in Tunisia following the 2011 revolution. In other words, it suggests that the decisions made in monetary policy after the revolution are linked to a substantial decline in the country's economic growth.

This study comes up with some implications, for example the central bank's monetary policy should focus on maintaining stability and confidence in the financial system. Controlling inflation becomes paramount, as high inflation can erode purchasing power and destabilize the economy. An effective monetary policy framework, combined with transparent communication, can help guide economic agents' expectations and behavior.

The post-revolution period requires careful consideration of economic policies that foster sustainable and robust economic growth. It's crucial to prioritize policies that stimulate investment, create jobs, and promote productive activities. Structural reforms aimed at improving the business environment, encouraging entrepreneurship, and enhancing trade can contribute to long-term economic growth.

In summary, post-revolution Tunisia should adopt a comprehensive approach to economic policy that addresses these implications for economic growth and monetary stability. An integrated strategy that considers these factors can help steer the country toward a path of sustainable and inclusive economic development.

Therefore, future research should focus on How monetary policies have influenced different economic sectors such as industry, services, agriculture, and how these impacts have ultimately affected overall economic growth?

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