The Effect of Monetary Policy Instruments on Inflation Rate in Algeria

تأثير أدوات السياسة النقدية على معدل التضخم في الجزائر

Azzeddine ATTIA, University of Tebessa, azzeddine.attia@univ-tebessa.dz.
Ahmed BAIRECH, University of Djelfa , Ahmed.br17@gmail.com.

Abstract*: In this manuscript, was studied the role of monetary policy instruments in controlling inflation in Algeria. The study adopted interest rate, rediscount rate and cash reserve ratio as proxy for monetary policy instruments and the independent variables. These were regressed against inflation rate, the dependent variable. Secondary time series panel data for the period covering 1994 to 2019 were collected from the Central Bank of Algeria and the World Bank Statistical Bulletins. The study employed multiple regression technique to analyze data obtained on the study variables. The results obtained are shown that interest rate, and cash reserve ratio had no significant influence on inflation, while rediscount rate had significant influence on inflation.*
 keyword: Inflation; interest rate; rediscount rate Cash reserve ratio
JEL classification code : E52, E58

ملخص: سعت هذه الدراسة الى يبان دور أدوات السياسة النقدية في التحكم في معدل التضخم في الجزائر، حيث اعتمدت الدراسة على معدل الفائدة، معدل إعادة الخصم ونسبة الاحتياطي القانوني(المتغيرات المستقلة)، ومعدل التضخم (المتغير التابع)، وتم جمع البيانات للفترة (1994 – 2019) من موقع بنك الجزائر والنشرات الإحصائية للبنك الدولي، واستخدمت الدراسة تقنية الانحدار المتعدد حيث تم اختبار ثلاث فرضيات رئيسية وأظهرت النتائج أن معدل الفائدة ونسبة الاحتياطي القانوني لم يكن لهما تأثير كبير على معدل التضخم، بينما كان لمعدل إعادة الخصم تأثير واضح على معدل التضخم في الجزائر خلال الفترة المدروسة.
الكلمات المفتاحية: التضخم؛ سعر الفائدة؛ معدل إعادة الخصم نسبة الاحتياطي النقدي.
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Corresponding author: ATTIA Azzeddine,
e-mail: azzeddine.attia@univ-tebessa.dz

1. Introduction

Monetary policy plays an effective and distinguished role in achieving high growth rates, economic stability and advancing economic development in the right direction. The monetary policy is an important component of the economic system, which has always been uncertain. And the money's value may be considered a measure of recording, promptly and with great accuracy, the oscillations of a country's economy (Zîna, 2014). It also has an important position in influencing the various economic variables, and this appears through its association with many economic problems, including unemployment, price stability and influence on the value of the currency, reducing inflationary pressures. Monetary policy affects the real economy through the aggregate demand side. The interest rate has always been known as the most prominent channel of influence. An increase in the interest rate leads to an increase in the cost of capital, which limits the demand for loans by families for the purpose of consumption, as well as the demand of investors for loans for the purpose of investment. Thus, the deflationary effects of monetary policy are transferred by influencing the size of families and investors' borrowing (Ridhwan et al., 2010). Monetary policy has traditionally functioned through the banking sector, mainly where lower interest rates lead to an increase in the volume of lending (Tobias and Nellie, 2016).

Many researchers have studied the importance of the supply side and the side effects of monetary policy. An increase in the nominal interest rate may have an outcome primarily through increased production costs, especially across the working capital channel and this may later lead to effects of demand due to price increases (Ridhwan et al., 2010).The central banks use various monetary policy tools to reduce the effects of inflation, by controlling the money supply (Andreas and Gunther, 2011).

Four main arguments have been put forward in favor of the normalization of monetary policy: (Marie-Hélène, 2018).
     1) To prevent extremely high inflation in the future.
     2) To prevent extremely low inflation in the future.
     3) To rebuild the policy arsenal of the inevitable future crisis.
     4) To prevent financial instability.

Empirical studies have shown that the effects of monetary policy are less during recessions, but are greater when there is pressure in the financial system (low liquidity and increased interest rates) (Adam and Bert, 2017).

Monetary policy design can have important implications for financial stability. Central banks are the immediate liquidity provider and are responsible for the smooth functioning of the payment system and the transfer mechanism system. The central bank is also responsible for price stability, and sometimes output stability, both of which are linked to financial stability.

The objectives and strategies of monetary policy are the main tools in which the Central Bank must perform its functions, and therefore will necessarily affect financial stability, directly or indirectly. Indeed, if the design of the central bank leads to a very permissive monetary policy, inflation will tend to be more volatile (Alicia Garcia and Pedro, 2003).

Over the past two decades, keeping inflation low, prices have stabilized. It is the main focus of central banks around the world. Meanwhile, the view has emerged that monetary policy is more appropriate than fiscal policy for purposes of short-term stability (Svensson, 2003).

2. Theoretical framework

Many researchers have defined a concept of inflation, based on previous data about their economies, and they defined inflation as the continuous increase in the overall level of prices and services over time (Blanchard, 2000). It is also known as a rapid, continuous and unacceptable rise in the general price level in the economy leading to a general loss of strength (Ujuju and Etale, 2016).

There is general consensus on the fact that inflation is harmful to growth in any economy. Inflation is one of the main terms in the macroeconomics (Enke & Mehdiyev 2014). High inflation leads to a decline in the purchasing power of the national currency, affects economic growth because investment projects become more dangerous, distorts consumption and savings decisions, causes unequal income distribution and also leads to difficulties in financial intervention (Hurtado et al. 2013).

On the other hand, price stability prevents arbitrary wealth and the redistribution of income (Sardoni et al. 2005).

One of the most important factors that assist central banks in controlling their trends is predicting future rates of inflation in the future and determining accurate indicators, and this comes from continuous monitoring and analysis of price developments (Mcnelis and Mcadam, 2004). Hence, decision-makers reaching their goals in need to have accurate data and a forward look at the possible future path of inflation (Buelens, 2012).

Given the importance of monetary policy in economic life, and until decision makers control inflation, the central bank exercises the role of oversight of commercial banks quantitatively by influencing the amount of credit and how to influence the type of credit.

One of the most important tools for qualitative monitoring is the discount rate policy, which is the effect on the size of credit to reduce the money supply. The central bank's reduction of the discount rate is a directive for commercial banks to expand loans, so the money supply increases, and vice versa if the discount rate is raised, it is a credit restriction.

It is also considered that changing the legal reserve ratio is one of the modern tools used by central banks, to effectively influence the policy of commercial and credit banks, as raising the legal reserve ratio limits the ability of commercial banks to grant credit, so the money supply decreases and inflation rates decrease and vice versa.

In this article, we will focus on these three tools and how effective they are in influencing inflation rates in Algeria from 1994 to 2019.

3. Review of empirical literature

Ujuju and Etale, 2016 investigated the role that monetary policy instruments play in controlling inflation in Nigeria. It adopted interest rate, minimum rediscount rate, liquidity ratio, and cash reserve ratio as proxy for monetary policy instruments and the independent variables. The research concluded that interest rate, minimum rediscount rate, liquidity ration and cash reserve ratio had no significant influence on inflation. The researchers recommended that Nigeria shift from being a consumption driven (import) economy to production based (export) economy for the impacts of these policies to achieve desired results.

Nyoni, 2019 about this study the researcher uses annual time series data on inflation rates in Algeria from 1970 to 2017, to model and forecast inflation using ARIMA models. The diagnostic tests further imply that

the presented optimal ARIMA (1, 1, 1) model is stable and acceptable for predicting inflation in Algeria. The results show that A will ranging between 4.9% and 5.2% over the out-of-sample period. Monetary authorities in Algeria are expected to tighten Algeri's monetary policy in order to maintain price stability.

Alicia Garcia and Pedro, 2003 the researchers focused on the existing empirical literature on the factors behind financial stability, stressing the role of monetary policy design. The study analyzes a sample of 79 countries in the period 1970 to 1999 to evaluate the effect of the choice of the central bank objectives and the monetary policy strategy on the occurrence of banking crises. The study concluded that focusing the central bank objectives on price stability reduces the likelihood of a banking crisis. This result is generally robust to several model specifications and groups of countries. For a few model specifications, particularly for the group of countries in transition, the choice of an exchange rate-based strategy appears to reduce the likelihood of a banking crisis. Finally, a large degree of independence of the central bank and locating regulatory and supervisory responsibilities at the central bank seem to reduce the likelihood of a banking crisis.

Sardoni and Wray, (2005) Discussing monetary policy strategies on both sides of the Atlantic, it is almost a commonplace to compare the Fed and the ECB by insisting on the former's flexibility and capacity to adjust rigidity, and the latter's extreme caution, and obsession with low inflation. Investigating the foundations of the two banks' strategies, however, the study does not find differences that can provide a simple explanation for their divergent behavior, nor for the very different economic performance in the U.S. and Euroland in recent years. Both central banks share the same conviction that money is neutral in the long period, and sharing similar short-term policies principles. The two policy approaches really are different only in terms of implementation, timing, competence, etc. The study concluded that monetary policy cannot stand as a significant variable in the explanation of the different economic performances of Euroland and U.S. The two economic areas' differences must be explained by considering other factors among which the most important is fiscal policy.

4. Methodology

This part presents the methodology adopted for this study. The study examined the role of interest rate, rediscount rate, and cash reserve ratio in inflation rate in Algeria. The study adopted *ex-post facto* research design. This is because *ex-post facto* research design is the one in which the research does not have the ability to manipulate the data and study variables. Secondary data for the period 1994 to 2019 was collected from the Central Bank of Algeria (Statistical Bulletin, 2007, 2011, 2019), and from the World Bank data (https://data.worldbank.org). These sources of data are considered very reliable and dependable. Availability of relevant required data was a justification for choosing the period 1994 to 2019; which was considered long enough to establish a long-run linearity relationship among the variables.

4.1 Data analysis:

The Four main variables identified for the study are inflation rate (INF), used as proxy for inflation management and the dependent variable; while interest rate (INT), rediscount rate (RR) and cash reserve ratio (CRR) are used as proxy for monetary policy instruments and the independent variables. Data collected for the study was tested using multiple regression analysis based the computer software E-views 10.

4.2 Model specification:

Here, the researchers prefer to view the primary study elements as interrelated set of variables for the fundamental fact that they are inherent in the financial decisions of the authorities. Consequently, the functional regression model adopted for the study is presented as follows:

INF = f (INT, RR, CRR)

Where: INF = Inflationary rate

INR = Interest rates

RR = Rediscount rate

CRR = Credit reserve ratio

For the purpose of estimation, we therefore, re-write model in the form of equation as;

$INF = \beta_0 + \beta_1 INR + \beta_2 RR + + \beta_3 CRR + ei$

Where: INF = inflationary rate

β_0 = Constant term

β_1, β_2, β_3 = the coefficients of interest rate, rediscount rate, and cash reserve ratio to be determined.

ei = error or stochastic term.

β_1, β_2, β_3 > 0 = the apriority expectation is positive values

5. Data Presentation

Table 1 shows the direction of the movement of the inflation rate, the interest rate, the statutory reserve ratio, and the discount rate of the Central Bank of Algeria from 1994 to 2019.

According to the data of the table, it seems that inflation rates reached their peak in the years 1994, 1995 and 1996, registering rates of 29.04, 29.78 and 18.67, respectively, which can be classified as the highest rate recorded by the Algerian economy due to the economic crisis that was going through the 1990s. As for the lowest rate of inflation, it was recorded in the year 2000 at a rate of 0.339 due to the recovery of the economy and the improvement of overall indicators.

As for the rest of the years, the inflation rate ranges between 1,382 in 2005 and 8,891 in 2012, up and down, depending on the state of the Algerian economy based on oil rents and the instability of macro indicators in general.

The data of the table also shows the continuous change in the statutory reserve rate, the discount rate and the interest rate by the central bank to affect the changing inflation rate from year to year.

Table 1: Annual rates and ratios of the study variables (1994 – 2019).

Year	Cash Reserve Ratio	Rediscount Rate	Interest Rate %	**Inflation Rate %**
1994	2.5	15	4.667-	29.048
1995	2.5	14	1.833	29.78
1996	2.5	13	4.5	18.679
1997	2.5	11	3.104	5.734

1998	2.5	9.5	2.375	4.95
1999	2.5	8.5	2.5	2.646
2000	5	6	2.5	0.339
2001	3	6	3.25	4.226
2002	4.25	5.5	3.25	1.418
2003	6.25	4.5	2.875	4.269
2004	6.5	4	4.354	3.962
2005	6.5	4	6.063	1.382
2006	6.5	4	6.25	2.311
2007	6.5	4	6.25	3.679
2008	8	4	6.25	4.859
2009	8	4	6.25	5.737
2010	9	4	6.25	3.911
2011	9	4	6.25	4.524
2012	11	4	6.25	8.891
2013	12	4	6.25	3.254
2014	12	4	6.25	2.977
2015	12	4	6.25	4.784
2016	8	3.5	6.25	6.398
2017	4	3.75	6.25	5.591
2018	8	3.75	6.25	4.27
2019	12	3.75	6.25	1.952

Source: Central Bank of Algeria Statistical Bulletin, 2007, 2011, 2019, and (https://data.worldbank.org)

The results of this study indicate a positive relationship between cash reserve ratio (CRR), rediscount rate (RR) and inflation rate (INF) which leaves more to desire in the theoretical sense. In the same vein, the negative relationship observed between interest rate (INR) and inflation rate (INF) indicate a mutually exclusive characteristics. The results in Table 2 shows that, the strength of the combined relationship between all the employed explanatory variables and inflation as indicated by the coefficient of the multiple correlations R is 0.708 i.e. a 70 percent, while the extent to which changes in inflation are explained

by changes in the combined variables as portrayed by the values of the coefficient of determination R2 is as low as 0.688 which is 68 percent.

The combined relationship between the independent and dependent variables as given by the value of the coefficient of regression R is evaluated. The significance of R is verified by means of F-test at 0.05 level of significance as a decision rule, given its degree of freedom. Consequently, the associated result of F-value = 17.785 with corresponding level of significance of 0.000 equivalent to 100 percent confidence level. As a decision rule, since the level of significance of 0.000 and or 100 percent confidence level are below the acceptable 0.05 level of significance, Through the above we accept this model, and upon it, we reject the null hypothesis and accept the alternative hypothesis that there is a significance relationship between inflation and a combination of interest rate, cash reserve rate and rediscount rate.

On the other hand, examining the changes in the explanatory variable are relevant in predicting the changes in inflation rate, therefore the beta t-value by means of a t-test at 5 percent level of significance was considered. The results of E-views10 gave 0.893, 0.051 for interest rate, and cash reserve ratio respectively. Being below 5 per cent level of significance, we accept the null hypothesis and reject the alternative that changes in none of these variables are important in predicting changes in the inflationary rate. But it gave 0.000 for rediscount rate, this is makes us we reject the null hypothesis and accept the alternative that any changes in the rediscount rates lead to changes in inflation rates.

The multiple correlation equation can be formulated as follows;

$$INF = -11.507 - 0.079 \times INR + 2.210 \times RR + 0.776 \times CRR$$

Table 2: Regression Estimation Results (Dependent Variable - Inflation Rate)

Variable	Coefficient	Std. Error	t-Statistic	Sig
INR	-0.079	0.586	-0.136	0.893
RR	2.210	0.440	5.023	0.000
CRR	0.776	0.377	2.059	0.051
R-squared	0.708	Adjusted R-squared		0.668
F-statistic	17.785	Sig (F-statistic)		0.000

Data Output10Source: E-views

6. CONCLUSION

This study examined the role of monetary policy instruments such as interest rate, rediscount rate, and cash reserve ratio in combating inflation in Algeria. Relevant data on the study variables were obtained from Bank of ALGERIA Statistical Bulletin and data world bank, and analyzed using multiple regression technique based on E-view 10 computer software. The resultant evidence from this study indicates that:

- Inflationary trend and growth were significantly related to the combined monetary policy instruments such as interest rate, rediscount rate, and cash reserve ratio.

- That, changes in some monetary policy instruments adopted in the study (interest rate, and cash reserve ratio) were also not measures in determining changes in the rate of inflation.

- Changes in the rediscount rate had a statistically significant effect on the changes in the inflation rate.

Finally, it can be said that high inflation rates are still a concern that plagues all economies of the world, which made all countries try to activate all monetary policy tools to control inflation and avoid its negative effects on the economy.

And Algeria, Tried to activate monetary policy tools, especially after the orientation towards a market economy in the 1990s, as well as immediately after the various economic recovery programs and growth support programs and the resulting injection of liquidity into the economy and the high level of the monetary mass without real production.

Although, changing the rediscount rate had a clear effect on inflation rates in Algeria during the study period, coordination between the various monetary policy tools remains of great importance for controlling inflation rates efficiently and effectively.

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