

The effectiveness of Bank of Algeria in controlling the excess liquidity during the period (2001-2015)

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Abstract: This study aimed to investigate the effectiveness of bank of Algeria in controlling the excess liquidity, in order to determine whether this bank kept a good coordination between the value of foreign exchange reserves and the amount of its monetary reserves. In fact, the study used correlation and multiple regression analysis as statistical tools. These tools are very important to verify whether the monetary reserves participated in reducing the excess liquidity. The study concluded that the local and the foreign monetary reserves available at the bank of Algeria were among the main factors affecting the excess of liquidity and the inflation. Also, they constitute a financial resource, for the Algerian government, to finance its public expenditure in the near future.

Keywords: Bank of Algeria, Excess Liquidity, Foreign Exchange Reserve, Inflation.

Jel Classification Codes : G22, E52.

I- Introduction:

The world economy has known during the first and the beginning of the second decade of the current century huge developments in terms of technology, production, global demand, international trade..., etc. These developments have left major consequences on oil prices, which have known, in turn, an ascending wave in the international market. So, the oil producing countries have got an outstanding opportunity to enhance their income and enlarge their public expenditure.

As the Algeria economy is one of the most economics depend on oil prices, the global domestic product has recorded, during the same period, an unprecedented increase simultaneously with the rise of oil incomes. In fact, the bank of Algeria has intervened many times to remove the excess liquidity, resulting from the accumulation of foreign exchange reserves, through several tools such as: rediscount rate, legal reserves, and open market operations. The bank of Algeria has used these tools in order to cut down the inflation recorded in the country.

Nowadays, the oil prices recorded in the international market have affected negatively the Algerian economy, which is facing, at present, and may continue to face in the future a great problem to finance its expenditure. Knowing that the Algerian government may go back again toward the liquidity available in the bank of Algeria in order to cover its public expenditure. As a result, the excess liquidity which will be probably put in the economy may increase again the inflation.

The current study aimed to determine how the Algerian central bank can intervene in the monetary market to reduce the access liquidity, and cut down the amount of inflation. For this reason, the study included a set of variables determining inflation such as : global domestic product, monetary supply, exportation and importation to understand how they have affected the inflation, and to determine whether the bank of Algeria has been efficient in controlling them.

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I-1-Problematic of the study:

The study tried to answer the following question :

- is there an impact between the main factors influencing inflation and the value of net foreign assets divided on the value of net local assets, adjusted by the bank of Algeria in order to reduce the access liquidity over the period 2001-2015?

I-2-Importance of the study:

The importance of the study issues from the role of understanding the pattern of inflation, resulting from the accumulation of foreign reserve exchange. So, the monetary authority in Algeria can determine how to manage its monetary supply, so as to cut down the negative impact of the current crisis of hydrocarbon, using the liquidity deposited in the central bank. This impact should be isolated without passing the amount of the deficit recorded in the balance of payment because, in such cases, the amount of foreign exchange reserves used in financing the deficit in balance of payment, can remove the surplus liquidity from the economy.

I-3-Previous studies:

Many studies aimed to investigate the role of central banks, the impact of monetary policy and the related topics in Algeria and around the world. Among them are the following studies :

- **(Hamedani & Pedram, 2013)**: this study aimed to investigate the optimal monetary policy strategy for the economy of Iran by focusing on the impact of oil price shock. The results illustrated that domestic inflation targeting rules can be taken as the optimal monetary policy in terms of stabilization performance and welfare cost. The study concluded also that the addition of exchange rate to domestic inflation targeting rules was unsuccessful to enhance the welfare measure and stabilization in comparison to domestic inflation targeting rule.¹

- **(Emerenini & Eke, 2014)**: the main purpose of this study was to investigate the impact of policy rate on inflation in Nigeria, using a monthly data from January 2007 to August 2014. The study focused on the ordinary least square (OLS), which was adopted as statistical method because of its best linear unbiased estimator property. The findings showed that expected inflation, exchange rate and monetary supply influenced inflation, while annual Treasury bill rate and monetary policy rate did not influence inflation in Nigeria over the targeted period.²

- **(Precious & Palesa, 2014)**: this study showed the role of monetary policy in promoting economic growth in South Africa during the period 2000-2010. The study used the Johansen co-integration and the error correction mechanism. The study concluded mainly that money supply, Repo-rate and exchange rate were insignificant monetary policy instruments that conduct growth in South Africa whilst inflation was significant. The study recommended that it is critical to use monetary policy to make an encouraging investment climate for both domestic and foreign investors. The study illustrated the importance to increase government spending on the productive sectors in order to support economic growth in South Africa.³

- **(Tiba, 2014)**: the study aimed to determine the effectiveness of the bank of Algeria in sterilizing the accumulation of foreign exchange reserves in Algeria during the period 2000-2011. The study showed that the traditional tools of monetary policy were insufficient

to reduce the access liquidity of money. So, the study concluded that the new tools such as : liquidity restoration and permanent incentives used by the bank of Algeria have contributed, mainly, in the absorption of access liquidity.⁴

- **(Yashino & Hesary, 2014):** the study illustrated the effectiveness of the easing of monetary policy in the Japanese economy during 1994-2014. It included the impact of energy prices on inflation because oil became expansive as a result of the depreciated japans yen and its direct impact on inflation. The study showed that quantitative easing may not have stimulated the economy of Japan. It concluded that aggregate demand containing private investment did not increase significantly in Japan with lower interest rate. In fact, the study suggested that the Japanese government should not focus on monetary policy, because the remedy for the economy of Japan is to take a set of structural changes and growth strategies.⁵

- **(Allegret & Benkhodja, 2015):** this study targeted mainly to investigate the dynamic effect of external shocks on Algerian economy (as oil exporting economy) during 1990-2010. The study used Bayesian approach and a DSGE model based on the characteristics of the targeting economy. The impulse response functions of external shocks according to alternative monetary rules were analysed. The finding showed that core inflation monetary rule was proved to be a very important way, so as to stabilize inflation and enhance social welfare.⁶

- **(Si Mohamed & others; 2015):** a non-linearity model in the real exchange rate in Algeria during 1994-2015 was targeted by the study, an application of logistic smooth transition autoregressive (LSTAR), and exponential smooth autoregressive (ESTAR) were used by the researchers. The results rejected linearity null hypothesis in favour of nonlinearity alternative hypothesis. This study suggested, mainly, what the Algerian policy makers could take into consideration in order to adopt an efficient forecasting method.⁷

- **(Bokreta & Benanaya, 2016):** the study aimed to examine the relative effectiveness of monetary and fiscal policy in Algeria. The study based on technique of co-integration and vector error correlation in order to analyse policy inferences. The findings showed that contrary to the negative effect of taxes on growth, the impact of government expenditure was positive in the long run. Moreover, the study proved that the inflation rate had a small effect on GDP, while the exchange rate was insignificant. In fact, the study accepted fiscal policy to be more powerful then monetary policy in enhancing GDP in Algeria.⁸

- **(Lacheheb & Sirag, 2016):** the study aimed to examine, statistically, the relationship between oil price changes and inflation rate recorded in Algeria during the period 1970-2014. The method employed in the study is nonlinear autoregressive distributed lags (NARDL). The findings showed a significant relation between oil price increases and inflation rate. However, the study did not prove such significant relation between oil price reduction and the inflation. In fact, the study concluded to the existence of nonlinear effect of oil price on inflation.⁹

II- Methods:

II-1- Sample and data :

The study has covered the monetary situation of Algeria during 2001-2015, because the amount of foreign exchange reserves owned by the Algerian central bank has known a huge increase since 2001, owing to the increase of oil prices in the international market. In

the same period, the monetary supply has risen many times simultaneously with the increase of foreign exchange reserves.

Also, the researcher has collected the study data from some Algerian central bank reports, covering the period of the study and available in its website. As well as, the researcher has gathered some other information especially those concerning 2015 from the website of the World Bank and the Algerian financial ministry.

II-2-Variables of the study:

In order to calculate the main variables of the study, 06 other general variables have been chosen by the researcher. The last ones have a direct relation with inflation and can explain how to reduce the inflation by affecting their different values. These variables are as follows:

- **Global domestic product:** this element is very important in determining inflation value because if it gets an ascending trend, the curve of inflation gets a descending trend.

- **Monetary supply:** This variable has a direct relation with the precedent variable because, in general, if monetary supply increases more than global domestic product, the inflation recorded in the same period cut down. In fact, it is impossible to take an idea about inflation without taking into account the equivalent level of global domestic product.

- **Exportation:** goods and services produced in the country may be reduced by exportation. This reduction can cause a certain inflation value because in this case an excess liquidity can be recorded, compared to the level calculated by using only the value of global domestic product.

- **Importation:** importation can increase the available quantity of merchandises and services and may create, in the same time, a need to increase monetary supply necessary to face the added quantity of goods, entering from other countries.

- **Net foreign assets:** according to the characteristics of the Algerian economy, the foreign assets owned by the Algerian central bank have increased, during the last decade, thanks to the increase of foreign exchange reserve. This increase has affected widely the monetary supply, which has known huge values during the same period.

- **Net local assets (except for other net assets):** from net local assets, other net assets owned by the bank of Algeria have been removed, so as to focus on the amount of liquidity which has been retaken from the economy to the central bank.

The previous elements have been taken to calculate the following ratios (their values are available in table 01):

- **R1 (monetary supply/ global domestic product):** this ratio is considered as a measure for monetary equilibrium, which consists of measuring whether monetary authorities has realized the best coordination between the value of monetary supply and the value of global domestic product.

- **R2 (exportation/ global domestic product):** this ratio measures the value of production directed to the outside of the country, compared to the value of global domestic product.

- **R3 (importation/ monetary supply):** contrary to exportation, importation should be divided by monetary supply because if the importation increases, the monetary supply can be supported without causing any inflation.

- **R4 (Net foreign assets/ Net local assets):** increasing the value of net foreign assets by raising the value of foreign exchange reserve is a main factor to increase the amount of monetary supply. This increase imposes upon monetary authorities to reduce the net local

assets by absorbing the excess liquidity using many tools such as: rediscount rate, legal reserve and open market operation.

- **R5 (inflation rate):** this rate has been taken as intermediate variable of the study because the excess liquidity, that should be removed from the economy by the central bank, depends on the inflation rate recorded in the same period, which can be affected in turn by monetary supply, importation, exportation and global domestic product.

II-3-Model design:

The study has taken R1, R2 and R3 as independent variables in order to investigate the effectiveness of the monetary policy used by the bank of Algeria. These variables are crucial because their value determines how much the bank should intervene to reduce the excess liquidity, issued from the accumulation of foreign exchange reserves by cutting down its net local assets. In fact, the study has used R4 as dependent variable and R5 as intermediate variable to determine whether the reduction of net local assets was, really, a result of the inflation wave recorded in the same period or not (look at figure 1).

II-4- tools of the study :

The study has used its statistical tools to investigate the relationship cited previously at 0,05 as significant level. The main statistical method of the study was multiple regression analysis to determine whether there is significant level between the variables of the model. But, before using this technical, "Partial" and "Bivariate" correlation (Person coefficient) have been used, so as to determine the impact of the intermediate variable of the study by comparing the results before and after neutralizing inflation.

II-5- Model and data validation :

Before using multiple regression analysis, the researcher has carried out test for normality to determine whether the model and the data were useful to investigate the relationship of the study. The findings showed (figure 2) that regression standardized residuals followed normative distribution.

In addition, the researcher has calculated Variance Inflation Factor (VIF) in order to determine whether the variables have been rightly chosen. The results show that all VIF values are under 5, which means that the variables altogether have been really apt to be used in the study.

III-Results and Discussion:

The findings in table (2), concerning Person correlation used in the study, show that the correlation between inflation rate (INFRATE) and R1, R2, R3, R4, is not sufficiently strong. In addition, the correlation between R4 and R1, R3 is weak a little bit. These findings have made the researcher think that the monetary policy, used by the bank of Algeria in order to reduce inflation, has participated in cutting down the negative effects of monetary supply on inflation. A strong correlation recorded between R4 and R2 has supported this idea, because the researcher has calculated R2 by (exportation/ global domestic product) and without taking into accounts the value of monetary supply.

On the other hand, since the study has used inflation as intermediate variable, the researcher has used partial correlation as well to neutralize the impact of inflation. Through this kind of correlation, researchers may determine whether correlation degrees increase or not after neutralizing the impact of inflation. The results (table 3) proved that the values of correlation coefficient have been improved a little bit but, without great amounts. In fact,

the results provided evidenced that the policy used by the bank of Algeria remains insufficient.

Table (04) illustrates that the relationship between R_4 and R_1 , R_2 , R_3 has 0.032 (under 0.005) as significant level. This amount means that there is a relationship between R_4 (net foreign assets/ net local assets) and the most important variables, which are theoretical considered as the main factors determining inflation values. Moreover, the researcher has established an equation between these variables and R_4 to estimate the value of the last ratio that should be kept to reduce inflation. The equation has taken, using the coefficients available in table (05), the following shape:

$$R_4 = -11.553 R_1 - 25.404 R_2 + 0.102 R_3 + 19.999$$

This equation shows that the bank of Algeria can not only control the excess liquidity, using the estimated value of the variables included in the equation, but also it can change the value of net local assets to allow the government to finance its public expenditures, when the value of foreign exchange rate cuts down again.

The researcher has given some reserves to the precedent equation because as any statistical equation, the reliability of such equation depends on the reliability of the data used in the model. The statistical relationship between the inflation rate, recorded during the period of the study, and the other variables was not sufficiently strong. The cause of this situation goes back, as it has accepted before, to the impact of the monetary policy adopted by the bank of Algeria. However, this idea depends on the reliability of the data provided mainly by this bank.

IV- Conclusion:

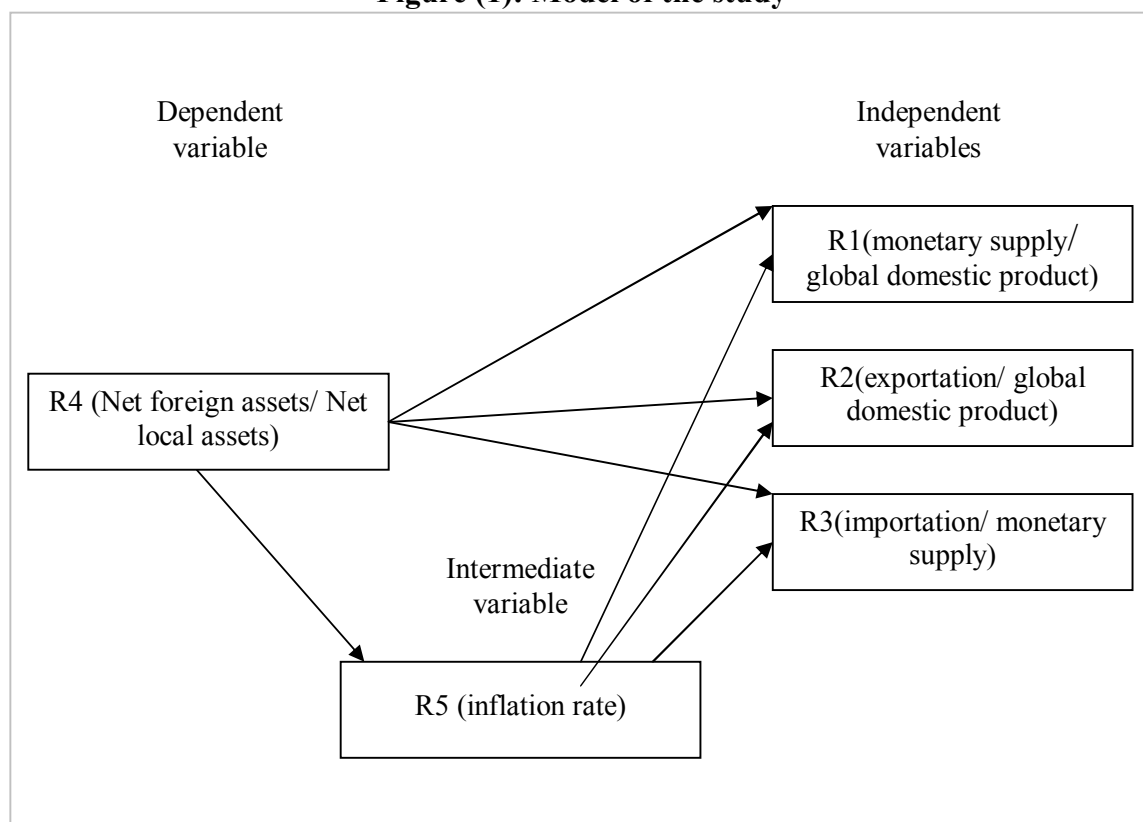
This paper showed that the Algerian monetary policy tried to cut down the excess liquidity, resulting from the accumulation of foreign exchange rate in the bank of Algeria. This bank used actually some tools of monetary policy in order to reduce its net local assets. In this context, this study proved that a statistical relationship between the ratio of foreign exchange rate on net local assets and the main factors determining inflation was significant during the period of the study. In addition, the study proved that the inflation is one of the most important variables influencing the optimal ratio of foreign exchange rate on net local assets. In fact, the Algerian government can use again a determined amount of its deposits at the central bank to finance its public expenditure, in parallel with the reduction of its foreign exchange reserve. This amount should not pass the value of the estimated deficit in balance of payment, so as to keep the global equilibrium by removing the excess liquidity through the value of foreign exchange reserve, which will be used probably to finance that deficit.

- Appendices :**Table (1): data and variables of the study**

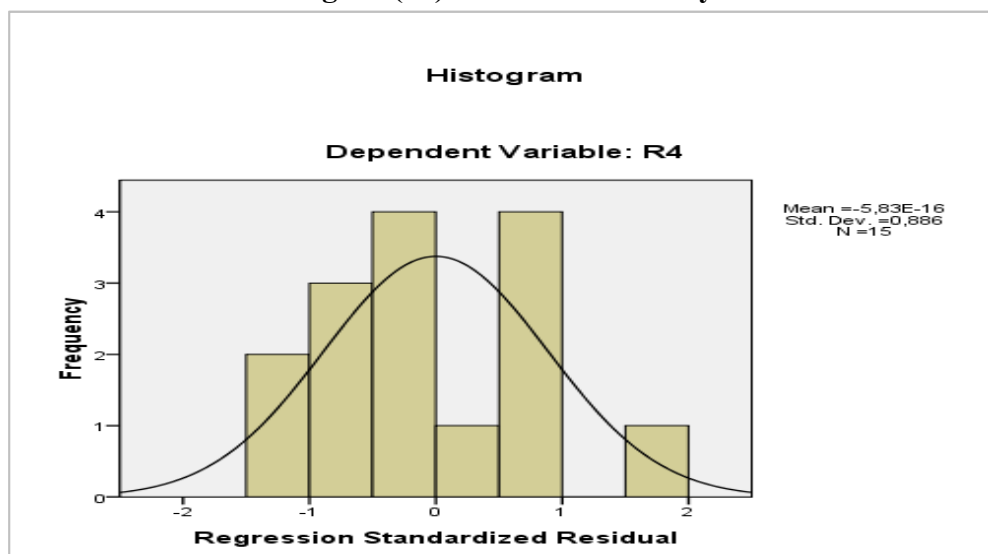
| INFRATE | R1 | R2 | R3 | R4 |
|---------|------|------|------|------|
| 3.5 | 0.58 | 0.35 | 3.38 | 4.77 |
| 2.2 | 0.64 | 0.33 | 3.03 | 5.73 |
| 3.5 | 0.64 | 0.36 | 3.25 | 5.02 |
| 4.6 | 0.61 | 0.38 | 2.89 | 3.40 |
| 1.9 | 0.55 | 0.45 | 2.85 | 2.09 |
| 1.8 | 0.58 | 0.47 | 3.28 | 2.20 |
| 3.9 | 0.64 | 0.45 | 3.28 | 2.24 |
| 4.4 | 0.63 | 0.45 | 2.84 | 2.34 |
| 6.1 | 0.71 | 0.33 | 2.64 | 2.47 |
| 4.1 | 0.69 | 0.35 | 2.86 | 2.44 |
| 5.7 | 0.68 | 0.36 | 2.9 | 2.54 |
| 9.7 | 0.68 | 0.34 | 2.75 | 2.62 |
| 4.15 | 0.72 | 0.31 | 2.74 | 2.70 |
| 3.8 | 0.79 | 0.28 | 2.86 | 3.53 |
| 4.8 | 0.82 | 0.23 | 2.14 | 7.20 |

Source : prepared by the researcher using :

- Rapport annuels, banque d'Algérie, 2001-2014.
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Figure (1): Model of the study

Source: prepared by the researcher

Figure (02): Test for normality

Source: from SPSS using table 01

Table (02): Bivariate Correlations

| | | INFRATE | R1 | R2 | R3 | R4 |
|---------|---------------------|---------|------|---------|-------|-------|
| INFRATE | Pearson Correlation | 1 | ,393 | -,319 | -,414 | -,137 |
| | Sig. (2-tailed) | | ,148 | ,247 | ,125 | ,627 |
| | N | 15 | 15 | 15 | 15 | 15 |
| | Sig. (2-tailed) | | ,125 | ,003 | ,022 | ,389 |
| | N | 15 | 15 | 15 | 15 | 15 |
| R4 | Pearson Correlation | -,137 | ,344 | -,652** | -,240 | 1 |
| | Sig. (2-tailed) | ,627 | ,209 | ,008 | ,389 | |
| | N | 15 | 15 | 15 | 15 | 15 |

Source: from SPSS using table 01

Table (03): Partial Correlation

| Control Variables | | | R1 | R2 | R3 | R4 |
|-------------------|----|-------------------------|------|-------|-------|-------|
| INFRATE | R4 | Correlation | ,437 | -,741 | -,329 | 1,000 |
| | | Significance (2-tailed) | ,118 | ,002 | ,251 | . |
| | | Df | 12 | 12 | 12 | 0 |

Source: from SPSS using table 01

Table (04): ANOVA

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|-------|------------|----------------|----|-------------|-------|-------|
| 1 | Regression | 17,981 | 3 | 5,994 | 4,223 | ,032a |
| | Residual | 15,613 | 11 | 1,419 | | |
| | Total | 33,594 | 14 | | | |

Source: from SPSS using table 01

Table (05): Coefficients

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Collinearity Statistics | |
|-------|------------|-----------------------------|------------|---------------------------|--------|------|-------------------------|-------|
| | | B | Std. Error | Beta | | | Tolerance | VIF |
| 1 | (Constant) | 19,999 | 10,145 | | 1,971 | ,074 | | |
| | R1 | -11,553 | 8,397 | -,565 | -1,376 | ,196 | ,251 | 3,984 |
| | R2 | -25,404 | 8,089 | -1,127 | -3,140 | ,009 | ,328 | 3,046 |
| | R3 | ,102 | 1,442 | ,021 | ,071 | ,945 | ,503 | 1,986 |

Source: from SPSS using table 01

- References:

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