FACTOR ANALYSIS OF THE MECHANISM OF MONEY CREATION IN THE BANKING SYSTEM OF THE REPUBLIC OF MOLDOVA

VICTORIA COCIUG
Academy of Economic Studies
Chişinău, Republic of Moldova
v_cociug@mail.ru

OLGA TIMOFEI
National Institute for Economic Research
Chişinău, Republic of Moldova
o_timofei@yahoo.com

Abstract
Money creation is one of the essential functions performed by commercial banks in the economy. The knowledge of the influencing factors can offer major opportunities for effectively linking of the central bank's monetary policy and its response from the real sector. It is certain that monetary policy signals are often distorted by commercial banks, which should further promote them in the economy, which means that the ability of commercial banks to create money is not influenced only by the central bank, but also by other non-monetary factors. The central purpose of this article is the determination of these factors and the correlation between them and the amount of money.
Key-words: *Money creation, monetary policy, the ability of banks to make money, money supply*
JEL Classification: G21, G28

1. INTRODUCTION

The ability of creation money by commercial banks is influenced by a number of monetary policy factors which differ from country to country and can present contrary incidents according to the analyzed periods.

The efficiency of monetary policy, which consists of a number of methods and measures through which monetary authorities try to influence the macroeconomic conditions by changing the money supply in economy, is determined by the way of compensating this offer by the demand for money coming from real economy in order to maintain an optimum balance for the foreseen inflation. In this respect, monetary authorities have three essential

ways of influencing the market: to increase the money supply for printing banknotes used only in emergency situations; to control directly the amount of money from the monetary sector and open-market transactions. The second option in solving this problem aims at the capacity of subordinate banks to the central bank, to issue currency through specific methods of financial mediation.

Commercial banks, due to their ability to create money, have an indispensable role in the modern economy sustainable growth by supplying it with necessary financial resources. In fact, these are the only institutions which establish the interconnection between monetary authorities and the real economy through monetary policy impulses transmission, interconnection which dependents on banks' ability to respond to the demand for money received from the real sector and stimulating influences or restrictive monetary authorities. Thus, when the monetary policy pursued by the monetary authorities does not lead to expected effects, the failures can be sought not only in the provisions of the policy itself, but also in the rate of correlation of the banking and monetary policy.

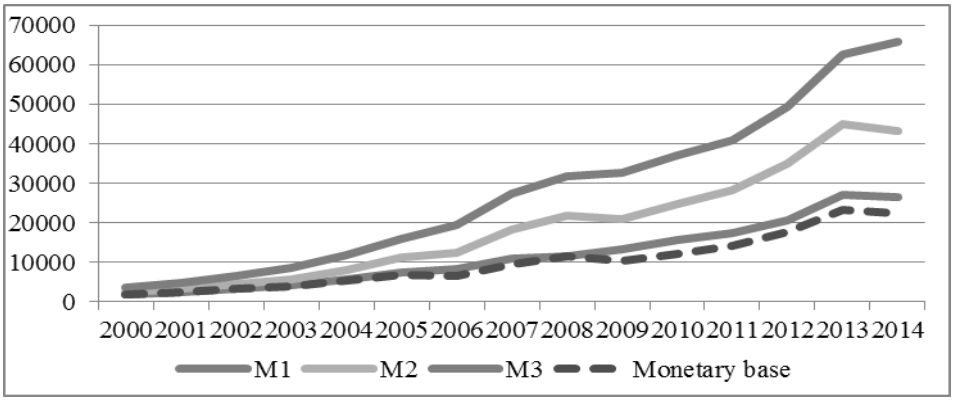
So far, the mechanisms of optimizing the relationship between monetary and prudential policy promoted by the authorities and banks' ability to create money have not been identified. The knowledge of the factors that have the greatest impact on activity of the banking creation leading to destabilization of the monetary system, banking system's ability to return to a steady state after any external influence, to preserve the characteristics of the issuer of the currency account in current circumstances is very important and vital to the economy. A viable banking system and responsive to the needs of the real economy, contributes greatly to the maintaining of an effective monetary system by reducing management costs of financial stability.

2. THE SITUATION IN THE REPUBLIC OF MOLDOVA

In order to make a factor analysis of the incidence of micro and macroeconomic factors on the ability of money creation by commercial banks we should observe the influence of monetary policy instruments that have been made in recent years.

The increase of the money supply in the Republic of Moldova (fig. 1) was influenced by monetary policy instruments, which in fact had one goal - to keep inflation within a target area from 3.5 to 6.5%. The promotion of this objective has led to the implementation of some monetary policy instruments that have not had the expected response on the money supply, and this because in the banks' ability to create currency factors are identified and non-monetary policy factors which are based on banks' desire to get a certain rate of return on money created.

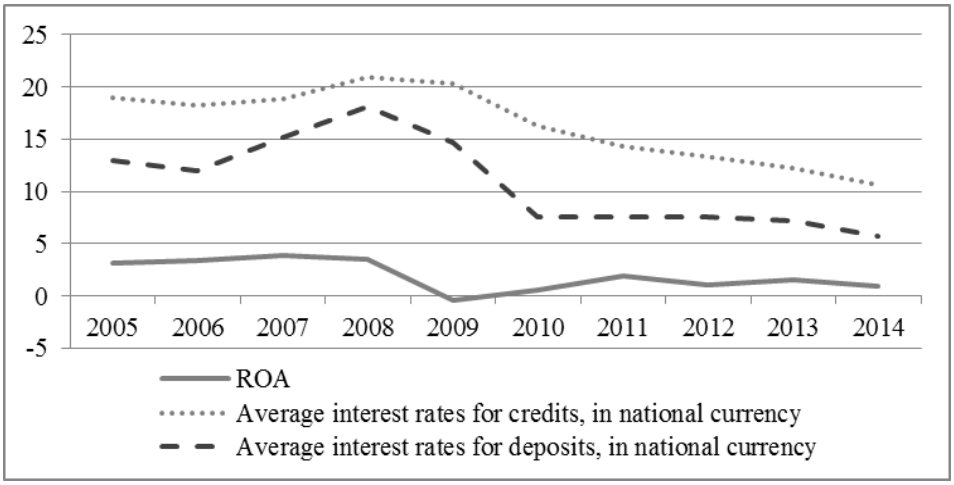
Figure 1. The evolution of monetary aggregates in the Republic of Moldova, mil. MDL



(Source: National Bank of Moldova, 2015)

Although the money rate is growing, and this is due in large part to its accumulated deposits from remittances, the growth rate of new loans is decreasing (fig. 2), leading to lower profitability and banking.

Figure 2. The evolution of profitability of bank assets and average annual interest rates on loans and deposits in the Republic of Moldova



(Source: National Bank of Moldova, 2015)

The relationship between the interests of commercial bank in getting profit and the interest of the central bank in creating money supply comes out in a certain contradiction. Namely, on the one hand there is a sufficient supply of cheap money, and on the other, the demand for loans is limited due to the inability of the real economy to ensure the solvency required to obtain these

loans by the potential debtors of these banks. Thus, the risk premium built into interest that is quite high - equivalent to the capacity of banks to finance credit risk makes the interest rate to be unattractive.

All this brings us to the idea of compiling two types of factors: macroeconomic (monetary policy) and meso-economic factors (stakeholders banking system) in a separate analysis of the evolution of the money supply in Moldova.

3. THE FACTORIAL ANALYSIS OF MONETARY CREATION IN THE REPUBLIC OF MOLDOVA

3.1 Literature review and method

The most cases in the literature that studies the modeling of monetary expansion is analyzed the correlation between the volume of monetary and macroeconomic indicators, being analyzed the effect of money supply – the economic growth. In order to identify the transmission mechanism of monetary policy on the real economy is used the descriptive approach and the vector autoregression method (VAR) proposed by the scientist Sims in 1980, which identifies exogenous central bank actions that can not be associated with monetary policy objectives (Sims, 1980).

In general, using descriptive method for identifying the transmission mechanisms of monetary policy can be seen as a way of preliminary analysis of the data used in the construction of econometric models. This method is less objective than vector autoregression and panel data analysis can have only an illustrative character.

One of the main features of the VAR method is that it captures the dynamic structure of several variables simultaneously, and impulse-response functions capture the propagation of a shock to the system dependent variables (Greene, 2003). *In order to achieve the purpose of this paper, we propose to use this type of analysis for determining the impact of response elements of the real economy on money supply, since this issue is less studied but has quantitative and qualitative effects on the economic growth.*

This method is used to simulate different situations with the advantage of not requiring forecasts of variables outside the system, being also useful to analyze the impact of some random disturbances (shocks) on the variables of the system. Each variable is expressed depending on how is has manifested in the previous period. The general form of a VAR process of order p is given by the following vector equation (Helmult, 2005; I Gusti, 2009; Brooks, 2014):

$$Y_t = C + A_1 Y_{t-1} + A_2 Y_{t-2} + \ldots + A_p Y_{t-p} + u_t$$

in which: *Yt* is the vector of dependent variables*; t = 1, ..., T* is the length of time series; *n* - the number of endogenous variables; *C = (c1, c2, ..., cn)* - a vector of constants; *A1, A2, ..., Ap* - the matrix of coefficient lag and the size

(nxn); *ut* is the size (*nX1*) and is a vector of uncorrelated errors with mean zero (white noise).

In order to estimate the coefficient is used the method of least squares for each equation in part, without loss of efficiency (Maddala,1992; Dimitrios & Aristeidis, 2007).

For econometric analysis of monetary incidence in Moldova were selected the following factors, being considered responsible for monetary policy developments:

- Money in local currency (M2) - variable incidence;
- Interest rate on deposits done in MDL (RDDN)
- Unemployment rate (rs);
- Inflation rate (RI);
- Financial result of activity of commercial banks (z-score);
- Non-performing loans in the banking system (CN);
- Total bank assets (TA).

In order to do this research were used statistical information of the National Bank of Moldova and the National Bureau of Statistics, beginning with the first quarter of 2003 and ending up with the fourth quarter of 2014, a total of 48 quarters.

For a more realistic illustration of macro and meso incidence of economic factors on money supply was used the pair correlation coefficient because the statistical method of covariance does not automatically assume that the variable is determined or caused by the other one.

It was necessary to transform mobile series into stationary series in order to identify correlations pairs of variables, since the first case showed a strong linear relationship, which showed that the classical correlation analysis results were false (Granger & Newbold,1974).

We obtained some logical results explained in economic theory after transforming the data into stationary series (table 1).

Table 1. Correlation coefficients matrix pairs (stationary series)

Covariance Analysis: Ordinary
Balanced sample (list wise missing value deletion)

Correlation	DM2	DRDDN	DRS	DRI	DZ_SCORE	DTA	DCN
DM2	1.000000						
DRDDN	-0.039247	1.000000					
DRS	-0.266840	0.187906	1.000000				
DRI	0.271290	-0.009433	0.307709	1.000000			
DZ_SCORE	0.059642	0.213325	0.232626	-0.041231	1.000000		
DTA	0.317974	0.228442	-0.072051	0.330617	0.092935	1.000000	
DCN	-0.030466	-0.260345	-0.169891	-0.377035	-0.162639	-0.147678	1.00 0000

(Source: performed by the author with Eviews 7.0)

3.2 Interpretation of results

The next step of the typical VAR modeling application is the analysis of causality between variables. To identify causal relationships from the selected factors was used Granger test and the following variable correlations were identified as valid for the Republic of Moldova:

- The interest rate on new attracted deposits influences the money supply in the short term; it is explained by the reaction of short-term interest rate increase on the desire of people to deposit money in banks. Finally, in the Republic of Moldova the depositor's decision to keep money in the bank is not determined by the profitability of deposits but by the lack of other investment instruments available to the public. This is the main reason of the growth during the whole period of analysis of the volume of deposits, their rate being in decrease.

- Changes in the volume of money supply have a large impact on interest rates on deposits, because with the increase of the money supply on the market at a rigid demand, the price of deposits will decrease and vice versa.

- The unemployment rate turned out to have little and undetermined impact on money supply. A reaction response to changes in the money supply of the population occupation level appears late 3 consecutive quarters, and only for a short period of time. Normally the impact of unemployment on the money supply would have been much more pronounced and longer duration in time, because changing the degree of occupation of the population leads to change in the amount of their revenue and respectively in the volume of savings, which influences broad money. The lack of logical relations between them in the Republic of Moldova proves hidden unemployment rate in the country that can not be taken into account in the analysis of its impact on economic variables. In the circumstances when the unemployment rate increases and the money supply remains indifferent to these changes, it appears that household income and their propensity to savings remain unchanged, demonstrating the existence of other forms of income besides their salaries. Given the weak investment activities characteristic to the Republic of Moldova, other forms of income remain remittances, the existence of which diminishes the impact of unemployment on money supply.

- The relationship between inflation and money supply was found to be unidirectional. For a long time period there was not recorded an impact of rate changes on monetary inflation, which shows the character of inflationary monetary changes in RM. But the changes in the money supply turned out to have a direct, immediate and long-term (9 consecutive quarters) impact on inflation, which also shows the existence of massive injections of liquidity into the economy of the country, not based on the needs of the real sector development.

- The interdependence between Z-score indicator (the financial result of activity of commercial banks) and money is also unidirectional. Financial modification changes obtained by Moldavian banks have no impact on monetary dynamics, which also actually contradicts theoretical arguments of the

banking activity, according to which only when there are clear benefits, banks are interested in participating in the issue of money, otherwise they remain neutral. The lack of impact of z-score indicator on monetary amount, demonstrates the weak interdependence between financial-banking sector activity and the real sector needs, thus the low level of bank intermediation. Even in terms of obtaining higher incomes, banks are not interested in boosting economic growth by providing financing to the real rector.

- But the changes in the volume of money supply in circulation have a direct, immediate and long-term impact on the financial results of the banking system. This also shows that the more money the banks have, the more profitable is their work and vice versa.

- The correlation between bank assets and money is very faint and indefinite. Instead the correlation between money and non-performing loans as part of bank assets influence each other immediately on a short term (two quarters). Thus, any increase in NPL leads to short-term increase in money supply. This is explained by the need to maintain an adequate level of money supply in the economy, which decreases with the emergence of a significant amount of non-performing loans in the banking system, as these are actually certain assets of bank liquidity. These non-performing loans, which turn at a time into bank assets, dehydrate economy, which also requires the central bank to inject additional money into the economy in order to cover the monetary gap created, which also eventually increases the money supply for a long term, after a response period, after which commercial banks assimilate this new amount of money supply this interdependence disappears.

- The increase of money supply in circulation influences dramatically the non-performing loans, it appears immediately in the short term (2 quarters) and then a delayed response reaction in the interval between the 6th and 8th quarters. The increase of the amount of money supply makes commercial banks to ease lending conditions to some extent, which also leads eventually to increased non-performing loans.

- The interest rate on new deposits and inflation rate. These two variables showed a mutual interdependence, the response of interest rates to changes in inflation is immediate and lasts for six consecutive quarters, but inflation and interest rate changes reaction occur with a delay of half a year and lasts for seven quarters.

- Financial result of commercial banks and the interest rate on new attracted deposits have unilateral correlation, with interest rate as exogenous and financial result - endogenous factor. It is a logical correlation, demonstrating the influence of interest rates on the result of banking activity. At the same time the financial results of banks also have a strong impact in the short term (1 year) on unemployment rate.

- The relationship between the financial results of banks and inflation rate is mutual and more evident. The increase of financial bank results encourages immediately the growth of a higher inflation rate in the short term (2

consecutive quarters). However, under the influence of inflationary increases, the financial results of banks in the Republic of Moldova change with a delay of one quarter and last up to 12 consecutive quarters.

- The correlation between total bank assets and the interest rate turned out to be one-sided, where only the total banking assets have an impact on the interest rate but not the opposite. The lack of an impact of interest rates on bank assets shows that the banks from the Republic of Moldova do not increase their assets on account of the increase of more attractive deposits but from the lack of other opportunities of investing money in economy. Thus, regardless of the rate proposed by the banks, people will deposit their money in these banks in the absence of other methods of recovery and deposition of money.

- Non-performing loans and the interest rate on deposits showed a mutual correlation with a different response time. The increase in non-profit loans has an immediate impact and for a period of one year on the cost of new attracted deposits. When the bank records losses, the only possibility to improve the situation is to attract more financial resources by increasing the attractiveness of its deposits and cash compensation fixed in non-performing loans. The reverse correlation, the increase of the rate of loans leads to the appearance of non-performing loans in the 7th quarter during a long period. This result is a logical one, because the increase of the attractiveness of deposits increases the growth of available bank resources for propulsion of them in the economy, the increase the amount of loans involves additional risks and can lead to the appearance of non-performing loans.

- The inflation and unemployment rate affect each other. The increase in inflation causes almost immediately changes in the unemployment rate over a period of four consecutive quarters. The impact of unemployment rate on inflation occurs with a delay of two quarters and takes a longer period of time (10 consecutive quarters).

- The relationship between total bank assets and the unemployment rate is less evident. A weak and short-term effect only with changes in bank assets on the unemployment rate, the existence of a reverse interdependence was not proved.

- Non-performing loans and unemployment - completely missing dependencies.

- Changes in bank assets generate a significant influence on inflation with a lead time of 2 years. And the impact of inflation on bank assets is less significant, appears with a delay of 2 quarters and lasts two consecutive quarters.

- No mutual interdependence between inflation rate and non-performing loans has been recorded.

- The total assets of banks and their financial results have outlined a unilateral interdependence. The change of bank assets having an immediate impact on a period of 5 quarters on the financial results, but the financial results do not influence banks' total assets. This proves once more that banks in the

Republic of Moldova increase the volume of their assets not from the results of their work but from other resources.

- A mutual correlation between non-performing loans and financial result of the banking activity was observed only for a short period of time. They influence each other immediately and for a period of two quarters.

- Non-performing loans and bank assets show a mutual interdependence, but in different time periods. The influence of non-performing loans on bank assets is strong but a short-term one and is manifested in the 2nd, the 5th-6th and the 12th-16th quarters. The change of bank assets has an immediate impact on non-performing loans, but a short period, felt again after a delay of a year and a half.

4. CONCLUSIONS

Thus, the factor analysis performed shows the peculiarities of the Moldovan economy. Repealing some postulates of interdependence of macroeconomic variables and their impact on inflation and monetary default. The weak correlation between unemployment and inflation rate, the undetermined incident of unemployment on other indicators of monetary procreation (Philips curve) is explained by the financing of monetary growth from remittances (about 30% to GDP). In addition to monetary policy decisions, the Central Bank should take into consideration the interests of the banks from the commercial segment and the results of their activities, which usually settles as non-performing loans. The creation of a delayed money supply is conditioned by the lowering rates on deposits, although the amount of these deposits (which finances the total banking assets) has no effect on the money supply. A brief but fast response on the ability of banks to create money in the Republic of Moldova have: the increase of the interest rate on new attracted deposits (for a short period), the amount of non-performing loans (for a short period) and the inflation rate, which is understandable because the inflation rate makes the implementation of monetary policies which have a direct impact on money supply.

However monetary shocks, affect practically all the indicators used in addition to bank assets, namely:

- The interest rate on new attracted deposits (medium, with a delay of 2 quarters);
- Unemployment rate (short-term);
- Inflation rate (long-term);
- The financial results of banking activity (long term);
- Non-performing loans (short and medium term)

The feebleness of Moldovan banking system, the low ability to create money and assign it to the real sector of economy is determined by the weak and uncertain development of Moldovan economy. A close relationship between the financial results of banks and non-performing loans and a lack of correlation between the volume of money and the same financial results

demonstrate the fear of the banks to push money into the economy in order not have bad final results because of these loans. In such circumstances the issue of currency by the Cenral Bank of the country has no effect, banks are rather willing to keep its money into their accounts than to credit economy, thus compromised their money creation function. This situation will improve only if the direction of development of the Moldovan economy becomes a certain one, giving confidence to the banking system. Any other actions of monetary policy to stimulate the economy, which are now accepted in Europe and the USA, will only lead in our country to the growth of inflation, the real sector being deprived of the access to this money. Thus, the role of commercial banks in money creation is not just a major one, but it is indispensable from the economic growth.

References

[1] Brooks, C. (2014). *Introductory Econometrics for Finance*. Cambridge: University Printing House, Cambridge CB2 8BS.
[2] Dimitrios, A. & Aristeidis S. (2007). *Applied Econometrics: A Modern Approach with Eviews and Microfit.* Stephen G. Hall.
[3] Granger, N. (1974). Spurious regressions in econometrics. *Journal of Econometrics*, vol. 2, 111-120.
[4] Greene, W. H. (2003). *Econometric Analysis*, 5th edition. New Jersey: Prentice Hall
[5] Gusti Ngurah Agung, I. (2009). *Time Series Data Analysis Using Eviews*. Singapore: John Wiley & Sons (Asia) Pte Ltd, 2 Clementi Loop.
[6] Helmut, L. (2005). *New introduction to multiple time series analysis (Econometrics)*. Springer-Verlag Berlin Heidelberg.
[7] Maddala, G. S. (1992). *Introduction to econometrics*, 2nd edn. New York: Macmillan.
[8] National Bank of Moldova. Retrieved from www.bnm.md
[9] Sims, C.A. (1980). Macroeconomics and reality. *Econometrica*, vol. 48, 1-48.