

ECONOMETRIC ASSESMENT OF THE EFFECTIVENESS OF MONETARY POLICY RATE ON PRICE STABILITY

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Abstract. *The purpose of this research is to investigate theoretically and empirically the effectiveness of the monetary policy rate in the mechanism of transmitting monetary impulses to the real economy. The decision-making factor associated with the level of the monetary policy rate and the appropriate time of application of this instrument is the basis for an optimal monetary policy from the perspective of ensuring and maintaining price stability. The methodological and empirical aspect is based on the estimation of an error correction model (VECM) by applying the Johansen cointegration test in order to determining the presence of cointegration relationship. The model and the variables included in the model, such as economic growth, inflation and monetary policy rate were associated with the Republic of Moldova. The results of the research highlight the validity of the generated model, and the results of the Johansen cointegration test indicate the presence of long-term cointegrated relationships between variables. Thus suggesting that the NBM base rate is the significant monetary policy instrument applied by the National Bank of Moldova with repercussions on the evolution of the inflationary process, highlighting the persistence of the interest rate channel in reaching the inflation target.*

Key words: central bank, inflation, monetary policy rate, VECM model.

JEL CLASSIFICATION : C52 ; E31 ; E43 ; E52

INTRODUCTION

The importance of the researched topic resides in investigating of the effectiveness of monetary policy current approach associated with the inflation-targeting framework, which uses the monetary policy rate as the main tool for managing, controlling and stabilizing inflation and creating an environment for sustainable economic growth. The recognition that the monetary policy results in keeping the inflationary process under control depend on the appropriateness of the monetary policy rate applying, taking as a benchmark the interest rate channel priority specific to the inflation-targeting framework in the monetary policy decision-making transmission mechanism, suggests the performing of background analysis with empirical evidence associated with the situation from the Republic of Moldova. This in turn gives the study topicality and the importance of the researched subject.

The main purpose of the study is to identify the relationship between the main instrument of monetary policy – the base rate and the fundamental objective of the National Bank of Moldova related to ensuring and maintaining the price stability, as well as finalizing the effectiveness of this rate in controlling and managing inflation, along with ensuring economic growth. In order to achieve the proposed goal, the following *hypotheses* were formulated, which we set out to demonstrate and confirm during this research:

1. In the Republic of Moldova, there is a cointegration relationship between the monetary policy rate, economic growth and inflation, which can be quantified by performing the Johansen test.

2. The long-term causal relationship between inflation, economic growth, and the monetary policy rate is elastic and can be identified by estimating the VECM econometric model.
3. In an economy with a developing financial market, the interest rate channel remains the important one in transmitting monetary policy impulses.

MATERIALS AND METHODS

The bibliographic sources analysis. The theoretical and practical aspects related to the monetary policy instruments and actions, the transmission mechanism of monetary policy decision, the relationship between the short-term monetary policy rate and inflation, as well as the methodology for identifying the long-term relationships between variables have been researched mainly in the studies of economists and scientists, such as Bernanke, Johansen, Mishkin, Taylor, Swank. The studies and researches of the above-mentioned authors present a pronounced theoretical and practical value and have significantly contributed to the systematization of the concepts and findings formulated by the author.

The used research methods focus on both theoretical and practical procedures with reference to empirical and econometric estimates. The theoretical ones are reduced to the deductive, comparative and analysis methods. From the perspective of the research character, the research method is mainly applied, interdisciplinary, descriptive and causal.

RESULTS AND DISCUSSIONS

The review of the monetary policy literature highlights the importance and benefits of choosing the monetary policy rate as the basic instrument of monetary policy in order to ensure price stability and sustaining the durable economic growth. Thus, Taylor [8, p.2] considers that the problem of monetary policy is to find a good procedure to use in order to establish the effective instrument of monetary policy, able to ensure the achievement of the proposed objective (price stability) - usually the short-term interest rate. At the same time, Taylor [7] argues that there is strong empirical evidence associated with the effects of interest rates on consumption and investment, concluding that the monetary transmission channel of interest rates is strong. Swank and others [9] conducted an empirical study on the relationship between short-term interest rate and monetary policy regimes, concluding that the central banks with the direct inflation-targeting regime and eclectic ones pursuing the inflation target objective tend to have a strict control over the one-month rate. This in turn suggests that the short-term rate plays a more important role in the monetary transmission process in countries that promote monetary policy according to these strategies than in countries with a monetary aggregate targeting or exchange rate targeting regime.

In order to clarify explicitly how monetary policy can explain the economy, Mishkin [5] investigates the channels through which the monetary policy decisions are transmitted to the real economy. Thus, Mishkin [5] mentioned that the interest rate channel involves the use of the nominal short-term interest rate by central banks in the matter of the monetary policy decision-maker in order to influence the cost of capital and, consequently, thus supporting the investment process and economic growth.

The structure of the transmission mechanism consists of transmission channels, represented by the links of macroeconomic variables and through which the change impulse is generated, which occurred as a result of the application of monetary policy instruments available to the central bank.

In the economic literature there is no unanimous opinion regarding the structure of the transmission mechanism and the principle of combining transmission channels, these being dependent on the economic, financial and social potential of the country, as well as the implemented monetary policy framework and the operational, intermediate and final monetary policy objectives.

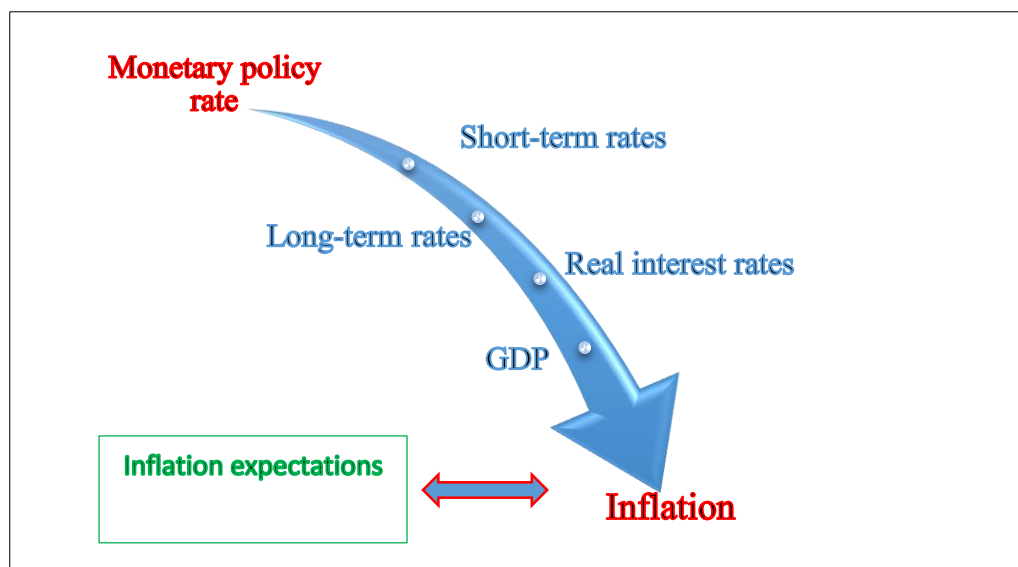


Figure 1. The transmission mechanism of monetary policy decisions based on the interest rate channel

Source: elaborated by the author based on the synthesis of the specialized literature

Interest rate channel - is the traditional channel and is often considered the main channel of monetary transmission, which reflects the impact of monetary policy on the real economy through interest rate fluctuations. Following the reduction of inflation, the central bank will increase the monetary policy rate, which will directly reflect on short-term interest rates, affecting long-term ones in the upward direction. As a result, the interest rates in real terms will rise in the conditions of assumption of sticky prices on the short run, which is reflected in declining of the aggregate demand in the short term and, respectively, decreasing the level of economic growth, generating disinflationary pressures on the inflationary process.

METHODOLOGY AND DATA

The methodological approach of the research was based on the theoretical aspects and principles of functioning of the monetary policy decision transmission mechanism, highlighting the opportunity to determine the relationship between inflation, monetary policy rate and economic growth. Starting from the theoretical approaches of the determinants of the inflationary process, we consider that the consumer price index is a function of the monetary policy rate and economic growth.

$$\text{CPI} = f(\text{mpr}, \text{rgdp}) \quad (1.1)$$

In order to identify the relationship between these variables in the Republic of Moldova, it was applied the VECM econometric model. In the research were used the quarterly data of inflation time series based on the consumer price index. The seasonally adjusted data on gross domestic product in the average prices of 2010 were used for the economic growth and, respectively, the monetary policy

rate is the NBM base rate. The time series were logarithmic in order to facilitate the interpretation of the coefficients obtained from the regression, considering them elasticities.

The use of the NBM base rate is based on the fact that, with the implementation of the direct inflation-targeting regime in 2010, it has become the main indicator for the short-term interbank money market, able to drive the conditions on money market and in the foreground to achieve the inflation target [10]. For these reasons, the period under study is the first quarter of 2010 - the fourth quarter of 2019 in order to identify and analyse the performance of the monetary policy rate in achieving the central bank's objective of price stability. It is necessary to mention that, the monetary authority of the Republic of Moldova, aligning itself with the inflation-targeting framework, set an inflation target of 5.0 percent \pm 1.5 percentage points.

The NBM monetary policy strategy for the period 2010-2012 [10] highlights the main operational determinants of monetary policy promotion and reflects the transition period to the direct inflation-targeting regime in which were created the favourable conditions for the de facto implementation of the regime itself on January 2013, then the Medium-term monetary policy strategy enters into force.

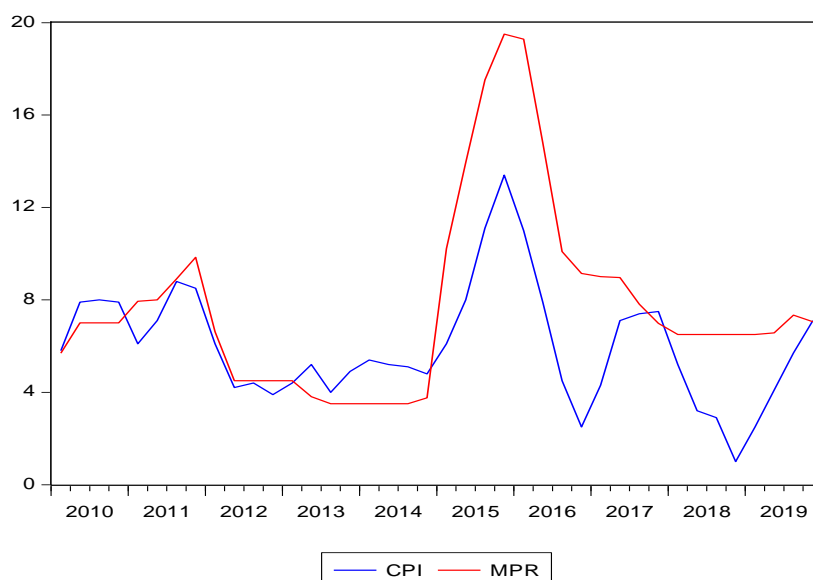


Figure 2. Inflation and base rate evolution in the period 2010-2019

Source: developed by the author based on the official websites of the National Bank of Moldova and the National Bureau of Statistics of the Republic of Moldova

From figure 2 we mention that the inflationary process attenuated in the period 2012-2014, registering the inflation growth rates in the vicinity of the inflation target value of 5.0 percent. At the same time, we notice that the inflationary process in the Republic of Moldova increased mainly during the crisis in the banking system associated with the liquidation of the three banks. Thus, from March 2015, the annual inflation rate records an upward trend until December 2015, after which the inflationary process moderates and in August 2016 is positioned within the range of variation of the target. During this period, we notice that the NBM reacts to the inflation values associated with price instability by applying the main indicator on the interbank money market, thus preferring the base rate.

In order to follow the research objective, we studied the theoretical aspects of performing the Johansen cointegration test, along with the functionality principles that underlie this test. The following concept was considered essential "The purpose of fitting the VAR model and determining the cointegration rank is that one gets the opportunity to formulate and test interesting hypotheses

about the cointegrating relations and their adjustment coefficients.” [4, p.1556]. This in turn reflects that if there are cointegration vectors between variables, we should be very careful and consider this cointegration relationship, because running the VAR model under those conditions is incorrectly specified due to the omission of the error correction term, thus not giving the model representativeness. In the circumstances of the presence of cointegration between variables, the appearance of the error correction model (ECM) is welcome. At the same time, the presence of cointegration between series suggests the existence of a long-term equilibrium relationship between the researched variables [3]. Johansen's methodology is practically based on the idea of estimating the rank of cointegration, providing information about the existence of cointegration and, respectively, the number of these cointegration relations. Three dimensions of the rank (μ) of cointegration are mentioned [3, p.170]:

1. Rank $\mu = 0 \Rightarrow$ there is no cointegration;
2. Rank $\mu = n$ (the total number of researched variables) \Rightarrow all variables are stationary and there is no cointegration between non-stationary variables, respectively. In that case, the VAR estimation is welcome;
3. $0 < \mu < n \Rightarrow$ reflects the existence of cointegration between variables and suggests running the VECM model.

Thus, in order to achieve the proposed goal and demonstrate the assumed hypothesis, we set out to complete the following steps:

1. The application of the unit root test to determine the stationarity of the variables, and this being one of the conditions for the application of the Johansen cointegration test [4];
2. Defining an optimal lag j by running the VAR model;
3. Carrying out the Johansen cointegration test with j lags and respectively, identifying the cointegration vectors;
4. Estimation of the VECM model with $j-1$ lag. The regression equation associated with the VECM model is as follows:

$$\Delta x_t = \alpha_0 + \sum_{i=1}^n \alpha_i \Delta x_{t-i} + \sum_{i=0}^n \alpha \beta_i \Delta y_{t-i} + \delta z_{t-1} + \varepsilon_t \quad (1.2)$$

In order to identify the cointegration between the variables in accordance with Johansen's concept [4], we initially set out to test the stationary conditions of the variables under study. It was used the Augmented Dickey-Fuller test [2], in order to verify the stationarity of the time series \log_cpi , \log_rgdp , \log_mpr . The test results are presented in Table 1.

Table 1. Stationarity test of analysed time series

	t-Statistic	P-value	Application of 1 st difference	t-Statistic	P-value
Augmented Dickey-Fuller test statistic for <i>inflation (log_cpi)</i>	-2.399777	0.1493	Augmented Dickey-Fuller test statistic	-3.490778	0.0146
Test critical values:	1% level -3.639407		Test critical values:	1% level -3.646342	
	5% level -2.951125			5% level -2.954021	
	10% level -2.614300			10% level -2.615817	
	t-Statistic	P-value	Application of 1 st difference	t-Statistic	P-value
Augmented Dickey-Fuller test statistic for <i>real GDP (log_rgdp)</i>	-0.204027	0.9279	Augmented Dickey-Fuller test statistic	-3.706290	0.0090
Test critical values:	1% level -3.661661		Test critical values:	1% level -3.661661	
	5% level -2.960411			5% level -2.960411	
	10% level -2.619160			10% level -2.619160	
	t-Statistic	P-value	Application of 1 st difference	t-Statistic	P-value
Augmented Dickey-Fuller test statistic for <i>short-term monetary policy rate - NBM base rate (log_mpr)</i>	-2.237669	0.1969	Augmented Dickey-Fuller test statistic	-4.169630	0.0023
Test critical values:	1% level -3.615588		Test critical values:	1% level -3.615588	
	5% level -2.941145			5% level -2.941145	
	10% level -2.609066			10% level -2.609066	

Source: developed by the author through data processing in EViews

The test results reflect that the variables associated with inflation, monetary policy rate and economic growth are stationary when applying the first difference I(1). This suggests testing the cointegration between the variables involved in the study using Johansen's cointegration test, in order to identify the long-term relationships between variables.

Generating VAR in levels, the results indicate that the lag 2 is the optimal selected by the all information criterions, such as sequential modified LR test statistic (each test at 5% level), final prediction error, Schwarz, Akaike and Hannan-Quinn information criterions (Table 2).

Table 2. VAR Lag order selection criteria

Endogenous variables: LOG_CPI LOG_MPR LOG_RGDP

Exogenous variables: C

Sample: 2010Q1 2019Q4

Included observations: 36

Lag	LogL	LR	FPE	AIC	SC	HQ
0	103.8456	NA	7.40e-07	-5.602532	-5.470573	-5.556475
1	206.9015	183.2105	3.99e-09	-10.82786	-10.30002	-10.64363
2	225.6891	30.26892*	2.35e-09*	-11.37162*	-10.44790*	-11.04921*
3	230.6976	7.234549	3.02e-09	-11.14987	-9.830270	-10.68929
4	236.1612	6.981217	3.89e-09	-10.95340	-9.237921	-10.35465

Source: developed by the author through data processing in EViews

model indicated that the increase of the gross domestic product by 1% determines the increase of the consumer price index by 0.066% and, respectively, the increase of the NBM monetary policy rate by 1% contributes to inflation attenuation by 0.025%. This in turn highlights the active nature of the interest rate channel, along with the effectiveness of the monetary policy rate application in reaching the inflation target, while emphasizing the correctness of monetary policy decisions taken by the NBM during the research period.

The conducted researches in the context of this study highlights the opportunity to take into account the monetary policy rate in substantiating the broader econometric model along with other deterministic variables of the inflationary process in the Republic of Moldova, which directly presents the subject for further research.

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