

## A MONETARY CONDITIONS INDEX FOR ALBANIA

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*ABSTRACT: The goal of the construction of a Monetary Conditions Index (MCI) is to analyze both the interest rate channel and the exchange rate channel. The construction is based on standard open economy macroeconomic models. MCI is the weighted sum of the change in short-term interest rate and the exchange rate with the base period, with weights that are usually taken from empirical econometric models and that reflect the estimated impact of these variables to the product or to inflation. MCI change, gives in a single number the degree of narrowing or release (expansion) of monetary conditions. In this paper is proposed a MCI for Albania. Based in the calculations done by the author and after the comparison of this type of MCI with the type of MCI calculated from Bank of Albania, the author recommends to Bank of Albania the use of the MCI calculated in this paper. The reason of this recommendation is the more accurate description and explanation of monetary policy stance obtained from the use of MCI calculated in this paper.*

*Key words: monetary policy, interest rate, exchange rate, Monetary Conditions Index, real effective exchange rate*

*JEL Codes: E 52, E 58*

### **Introduction**

Price stability is the main objective of the central bank in most of the countries. For achieving its objective, the central bank should follow a careful monetary policy based in the analysis done to the current structure of the economy, to the factors outside the country that affect the domestic economy and to the factors inside the country. Also, the central bank should be careful in the interest rate decision making process and also it should monitor the fluctuations of the exchange rate. Albania is one of the countries that aims to change its monetary regime, from monetary targeting regime to the inflation targeting regime. In order to do this change it is necessary to fulfill some requirements. One of the requirements is the strengthening of forecasting capacities of central bank. This is important because it gives to Bank of Albania the possibility to evaluate all the equations and the indicators necessary to make good monetary policy decisions. One of the indicators (among the others) that help the central bank to better understand the situation and to take the proper decision is the Monetary Conditions Index (MCI). The purpose of using MCI is to provide some measurement instrument that has to do with the stance of monetary policy. This paper will provide a methodology review which describes the different methodologies used to build it and then proposes the calculation of MCI for Albania based in the methodology that uses the inflation equation to derive the weights necessary to calculate MCI. As mentioned above, the evaluation of a reasonable and good MCI helps Bank of Albania to make better decisions about the monetary policy. The objective of the paper is to introduce a more appropriate methodology of

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calculation of MCI and to explain why this methodology is better than the methodology used from Bank of Albania.

### **Literature Review and Methodology of construction of MCI**

Many central banks have adapted MCI as a useful indicator of overall monetary conditions. Economists have tried to evaluate MCI, based on the characteristics of their countries. Patra and Pattanaik (1998) calculated for India a reduced form of money demand equation including the exchange rate impact. The weights of the exchange rate and of the interest rate were calculated from the coefficients derived from this equation. Hataiseree (1998) tried to evaluate the MCI for Thailand. His conclusion was that for small open economies it is very important to focus on the exchange rate and on the interest rate. Hataiseree (2000) calculated the MCI using the inflation equation. Thus weights for exchange rate and inflation rate were 3.3 and 1. Kocaker and Kesriyeli (1999) derived the weights from an assessment of the price equation and not from the equation of aggregate demand curve because it is believed that the exchange rate in Turkey is the leading force of the process of price adjustment. The paper stressed that the levels of price increases and output growth should not be interpreted as the result of monetary policy implemented by central banks. Peng and Leung (2005) assessed the MCI for the mainland of China for the purpose of the assessment of its monetary and financial conditions, expanding conventional MCI - a sum of weighted real interest rates and real effective exchange rate - to capture the effect of the availability of credit, because the bank credit channel was an important channel through which the monetary policy was implemented in China. Hyder and Khan (2006) built a MCI for Pakistan using the Johansen cointegration techniques. The paper noted that the purpose of using the index as operational view is limited. It would be a good indicator of monetary policy stance. Kodra (2009) calculated MCI for Albania. Weights for the exchange rate and interest rate came 3.8 and 1.

MCI can be constructed by taking the effects of changes in interest rates and exchange rates as in "aggregate demand" or "prices" (Freedman, 1994). MCIs are built taking into account the standard open economy macroeconomic framework. This model represents the aggregate demand as a function of, among other variables, the real interest rate and real exchange rate. In terms of aggregate supply, the price equation usually includes non-tradable goods prices adjusted with inflation expectations, the output gap (or unemployment gap), tradable goods prices determined by world prices and the exchange rate. According to the theory, a change in monetary policy changes the real interest rate. This has a direct impact on the level of spending that directly depends on the interest rate. When other indicators are unchanged, a monetary policy change will also change the exchange rate because the change of expected returns from short-term domestic assets causes movement of capital. For this reason, there are at least two channels through which monetary policy affects the aggregate demand. Originally MCI was meant to be a measure of the degree of release or tightening of monetary conditions, always being compared to a base period. In this way, MCI captured the effect of monetary policy on the economy through interest rate as well as through the exchange rate. MCI is a combination of variables and it helps countries to manage liquidity in the overall scheme of monetary policy.

Weights defined in econometric models reflect the importance of the respective variables in terms of the impact that they have in the targeted macroeconomic variable. In most formulations, coefficients close to the terms of interest rate and exchange rate in aggregate demand function are the weights of MCI. Such equation can be:

$$y = -\alpha r - \beta e + \text{other variables} \quad \alpha \text{ and } \beta > 0 \quad (1)$$

where  $y$  is the output,  $r$  is the real interest rate and  $e$  is the real exchange rate and the other variables have meanings very clear. The size of the parameters  $\alpha$  and  $\beta$  gives the relative effect of the real interest rate channel and exchange rate channel to aggregate demand. The parameters  $\alpha$  and  $\beta$  determine precisely the weights to be used for MCI that can be defined in the following equation:

$$MCI \equiv (r_t - r_0) + \beta/\alpha (e_t - e_0) + 100 \quad (2)$$

MCI at time  $t$  is a weighted sum of real interest rate change and the change of the real exchange rate (which is given as the logarithm) compared to the base period. These rates are given in percentage and the exchange rate is an index which is equal to 100 in its base period. From the way it is estimated, the equation shows that 1 percentage point change in the MCI is equivalent, in terms of the effect on aggregate demand, with 1 percentage change in interest rates. The absolute value of MCI has no real meaning because there is no absolute sense of 'coercion' or 'losing', only depending on other points in time. All variables included in the MCI are given in real terms. An increase (decrease) in the index indicates that monetary conditions are tight (ease). The key parameter in this MCI is the ratio  $\beta / \alpha$ .

In theory there are cases when the parameters are taken out of the equation coefficients that explain the behavior of inflation which is generally of the form:

$$\pi_t = \beta_0 + \beta_1 \Delta r_t + \beta_2 \Delta e_t + \beta_{i,j} Z_j + \mu_t \quad (3)$$

where  $\beta_1 < 0$  and  $\beta_2 < 0$ ,  $\Delta$  is the difference operator,  $\pi$  is the inflation rate,  $r$  is the interest rate and  $e$  the nominal effective exchange rate,  $Z$  is a group of very important variables and  $\mu$  is the error term that follows the process of "white noise". So, the equation that gives the behavior of inflation is based on an eclectic view of the various theories of inflation determination. Preference for this type of specification is not an arbitrary choice because it is based on the economic structure of the country, and in many aspects, it may look different from one country to another. It is very important to note that the weight of the interest rate ( $w_r$ ) and the weight of the exchange rate ( $w_e$ ) can be calculated from the coefficients of equation (3) and are equal to:

$$w_r = |\beta_1| / (|\beta_1| + |\beta_2|) \quad w_e = |\beta_2| / (|\beta_1| + |\beta_2|)$$

Firstly, a MCI will be as good as the model from which are derived the weights. Eika (1996) stated that the weights are based on the estimated coefficients; they have a level of uncertainty that there are times that it is very important. This is an issue that is important for all empiric estimates of analytical concepts that are usually used by economists, and not only in the calculation of MCI. All these concepts are useful and important, and are at the center of macroeconomic policy-making. In the case of MCI there is not much value to focus on point estimates of the coefficients. Empirical studies show that the confidence interval of the empirical evaluation of the main parameters, from which are derived the weights, is very broad and often includes the value 0 as a possible evaluation.

### Construction of MCI for Albania

Monetary conditions index is built to be an indicator of monetary policy stance. It helps to assess the situation and the stance of monetary policy. MCI is considered as the movement of two important variables of the economy, the interest rate and the exchange rate compared to the value of the base period. For example, MCI for inflation is given in the form:

$$IKM(\pi) = w_r (r_t - r_b) + w_e (e_t - e_b)$$

Where  $r_t$  is the interest rate at time  $t$ ,  $r_b$  is the interest rate in the base period,  $e_t$  is the exchange rate at time  $t$ ,  $e_b$  is the exchange rate in the base period,  $w_r$  is the weight of the interest rate and  $w_e$  is the weight of the exchange rate. It is assumed that the sum of the weights of the interest rate and the exchange rate is equal to 1 and the definition of these weights is very important to build a good MCI. These weights contain the information about the relative importance of the interest rate channel and exchange rate channel in the determination of the economic activity or of the inflation rate. These weights can be obtained from existing econometric models or from econometric models calculated from the interested researchers.

The main objective of the Bank of Albania is the achievement of price stability; more specifically the annual inflation rate target should be  $3\% \pm 1\%$ . For this reason, the behavior of the inflation rate can be explained by the relation of the form:

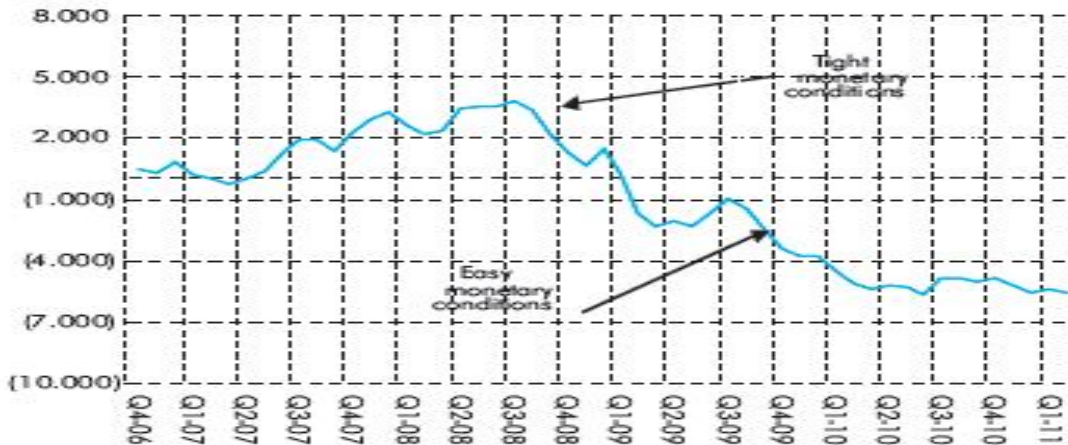
$$\pi_t = \beta_0 + \beta_1 r_t + \beta_2 e_t + \varepsilon_t$$

where  $\pi_t$  is the inflation rate,  $r_t$  is the interest rate of money and  $e_t$  is the monthly nominal exchange rate and  $\varepsilon_t$  is the behavior error term.

In Albania, there was an attempt by the Bank of Albania to calculate the MCI when Kodra (2009) has calculated the MCI for Albania. The form of the equation from which are derived the weights is:

$$Y_t = b_0 + b_1 r_t + b_2 e_t + v_t.$$

This equation is estimated for real effective exchange rate and three types of interest rate 3 month REPO, 6 month REPO and 1 year REPO. Output gap is the dependent variable. Then is computed a simple arithmetic average of the coefficients that are close to the interest rate and exchange rate. The calculated ratio with this method is equal to 3.8, which means that the effect of a depreciation of the real effective exchange rate (REER) by 3.8 percentage points can be neutralized by 1 percent increase in real interest rates. In the Monetary Policy Report for the first quarter of 2011 is presented the trend of Monetary Conditions Index, calculated according to the methodology used in 2009. Let's look at the chart below:



**Figure no.1. - MCI calculated from Bank of Albania**

Source: Monetary Policy Report for the first quarter of 2011, Bank of Albania

From this graph it is clear that monetary conditions are constantly improving since Q1 2008. This conclusion is not completely accurate because the author should consider the effects of the crisis in 2009. This is very important because the Bank of Albania bases the calculation of MCI in

an equation that gives Output GAP depending on other variables. For more, Kodra (2009) draw the conclusion that the above period is characterized by a deterioration of monetary conditions.

The literature advises that the coefficients used to calculate the MCI, should be taken from a macroeconomic model built to show the link between the key macroeconomic variables. *Also in this study* the base year is 1996. The latest opinion of researchers is that the determination of the base period is highly subjective and makes suspicious the validity of the Monetary Conditions Index. For this reason it is suggested to use long-term equilibrium values (set by the central bank) for both the interest rate and the exchange rate. In this way the numerical value of MCI is more valuable and makes sense to interpret. Kodra (2009) has not used these values. For this reason, in the calculation of MCI according to the methodology proposed in this paper, there is no base year, but is used the arithmetic average of all periods taken into analysis for both the interest rate and the inflation rate. Then is calculated the difference of the exchange rate and the interest rate values at time t with the respective arithmetic average.

MCI will be calculated taking into account the real rate of REPO and the real effective exchange rate. This forecast will serve as an indicator for the monetary policy in the long run. The methodology is based on an OLS estimation and considers quarterly data for the period Q1<sup>2</sup> 1999 - Q4 2011<sup>3</sup>. The model used is logarithmic and is chosen because it reduces heteroscedasticity. For the logarithmic form of the equation is recommended the use of time series characterized by constant average and variance. For more, the logarithmic model facilitates the evaluation of elasticity. The new calculated ratio is equal to 2.77, which means that the effect of a depreciation of the real effective exchange rate (REER) by 2.77 percentage points can be neutralized by 1 percentage point increase in real interest rates.

The data used to estimate MCI rate are: REER (LnREER), the real effective exchange rate of the local currency; real interest rates 3-month Treasury bills (RepoReal); Inflation (CPI3muj); Output Gap (GAP) as a percentage deviation of real GDP from potential GDP and Consumption (LnC).

Because all the data except interest rates are expressed as natural logs, the parameters show the inflation elasticity related to the explanatory variables.

An equation for quarterly bills is build, and the dependent variable is inflation. *This choice was made considering the primary objective of the Bank of Albania that is the price stability.* In this equation, Adjusted R-squared has a high value and it shows that a high percentage of explained model of considered variables; as well as F-statistic has high value which confirms the statistical importance of the model. Subsequently were performed diagnostic tests for residuals and coefficients stability. Once it is verified that the model used does not present problems, it was calculated the ratio of coefficients of the equation.

Table no.1.

Unit Root Test for the variables							
Variables	Methodology	Integration	Prob	C	T	TL	DW

<sup>2</sup> In Chart 2, Q1 is equal to T1, Q2 is equal to T2, Q3 is equal to T3 and Q4 is equal to T4

<sup>3</sup> The sources of the data used for the calculations are INSTAT and Bank of Albania.

<b>LnREER</b>	ADF	I(1)	0.0597	✓	-	0	2.9920
<b>GAP</b>	ADF	I(1)	0.3506	✓	-	3	1.8482
<b>CPI3Muj</b>	ADF	I(1)	0.2363	✓	-	0	2.1256
<b>RepoReal</b>	ADF	I(1)	0.1054	✓	-	0	3.1694
<b>LnC</b>	ADF	I(1)	0.5165	✓	-	3	2.1223

[ADF calculated in EViews 7.0;

Test: H<sub>0</sub>: exist a unit root; Critical value: 5 and 1 percent (p=0.05 and p=0.01) to reject H<sub>0</sub>

If p>0.05, accept H<sub>0</sub>

Methodology: ADF (Augmented Dickey-Fuller);

C-constant; T-trend; Dw –Durbin-Watson autocorrelation test;

Period: 1999:-2011;

TL (Time Lag): Number of time lags is chosen from the criteria of information in EViews 7.0

SIC – Schwartz Information Criteria;

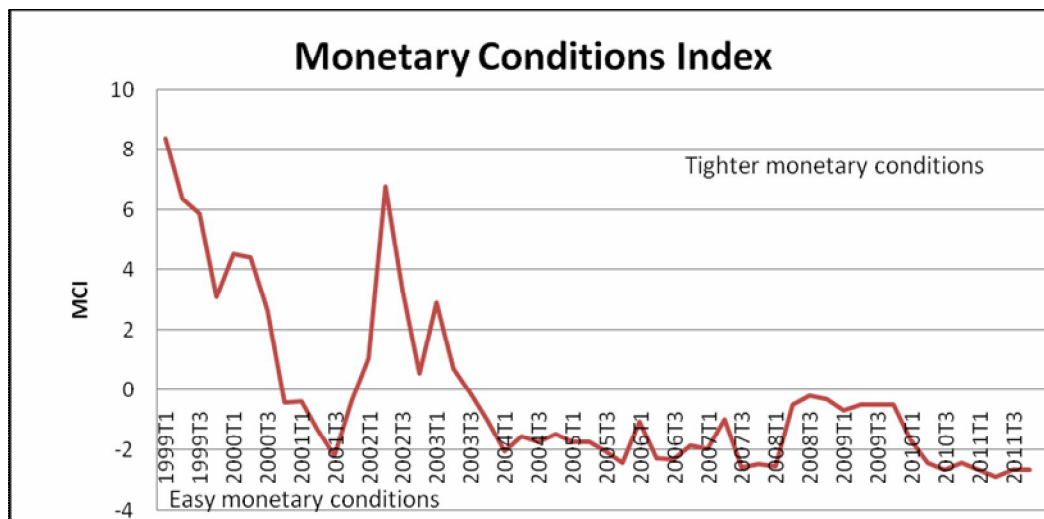
The estimated value of the ratio used to calculate the MCI is equal to -2.77. Since an increase in REER indicates a depreciation of lek, then this value will be multiplied by (-1), reaching the conclusion that the new report of Monetary Conditions Index is equal to 2.77.

To build the Monetary Conditions Index for Albania are used quarterly data and the period analyzed is January 1999 - December 2011. The base period of the evaluation, as explained above, is not considered like in standard cases but is calculated as an arithmetic average of the data for each of the variables.

$$MCI = (R - R (b)) * 2.77 + (\log(REER) - \log(REER)(b)) + 100$$

where: R is the average real interest rate of treasury bonds; R (b) is the real interest rate of treasury bonds in the base period (the average of all the values); REER is the real effective exchange rate; (REER)(b) is the real effective exchange rate in the base period (the average of all the values).

A Monetary Conditions Index increase indicates a deterioration (tightening) of monetary stance meanwhile a decrease of this index suggests an easing of the monetary conditions of the economy. The chart below gives the MCI for the period January 1999 - December 2011.



**Figure no. 2. - Monetary Conditions Index**

Source: Calculations of author

This graph shows that the calculated index reflects the crises in Albania. Thus the period 1999 - 2000 shows that Albania has had tight monetary conditions. This came as a result of the Kosova war, which brought about a great inflow of foreign currency into the country, causing an artificial strengthening of national currency (lek). Also it is clear that even in 2002 the same thing happened. This is due to deposits crisis that came as a result of the banking panic. After 2003 the graph shows a stabilized financial activity and it can be said that generally in the Albanian economy there have been easing monetary conditions. Monetary activity during 2007 until the third quarter of 2008, unlike the average terms of 15 years, has shown significant improvements. These improvements have come about as a result of the depreciation of the exchange rate, which translates into eased economic conditions and mainly due to the slight reduction of real interest rates. The beginning of the financial crisis is characterized by tight monetary conditions, mainly due to rising real interest rate of treasury bills. The first months of 2010 are characterized by improved monetary conditions, but since March this index shows a tightening of monetary conditions; this deterioration comes as an effect of further growth of Treasury bond interest rates in real terms; while domestic currency continues to be characterized by a further depreciation. MCI can be used, though with many reservations, as a forecasting tool to study different options of economy reaction. In order for Albania to be in optimal conditions, if the expected exchange rate increased by 1 percentage point, and this change will be sustainable, the Bank of Albania should counteract and neutralize this change with an increase of about 2.77 percentage points of interest rate.

### Conclusions

MCI is an indicator that helps BoA to better understand the stance of monetary policy. According to the different methodologies used to calculate this indicator, the conclusion is that there are different ways of calculation. Different economists have calculated it based in the equation that has the dependent variable the output gap. The most important thing is that in the equation, among the other variables should be even the real exchange rate and the interest rate. Other economists calculate MCI based in the equation that explains the behavior of inflation rate. The most important part is the practical use of this index. If the equation is not evaluated in the right way, then the weights that are calculated using the coefficients near interest rate and exchange rate will not give us the possibility to draw out good conclusions.

Inflation equation is calculated by using OLS estimation. The MCI ratio, calculated using the coefficients derived from the estimated inflation equation, is 2.77. The MCI ratio is different from the MCI ratio equal to 3.8, calculated from Kodra (2009). Generally, the coefficients used to calculate the MCI, are taken from a macroeconomic model built to show the link between the key macroeconomic variables. *Kodra (2009) has set 1996 as a base year.* The latest opinion of researchers is that the determination of the base period is highly subjective and makes suspicious the validity of the Monetary Conditions Index. For this reason, in the calculation of MCI done in this paper, there is no base year, but is used the arithmetic average of all periods taken into analysis for both the interest rate and the inflation rate.

MCI can be used, though with many reservations, as a forecasting tool to study different options of economy reaction. In order for us to be in optimal conditions, if the expected exchange rate increased by 1 percentage point, and this change will be sustainable, the Bank of Albania should counteract and neutralize this change with an increase of about 2.77 percentage points of interest rate. The calculated MCI confirms all the internal or external shocks affecting Albanian economy and there is no contradiction even for problematic years like 2002 (liquidity panic) or 2009 (financial crises) were there were tight monetary conditions. After the fourth quarter of 2009, it is observed an ease of monetary conditions, mainly due to the stability of the exchange rate and the slight decrease of the interest rate.

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