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ESTIMATION OF WEIGHTS FOR THE MONETARY CONDITIONS INDEX IN ALBANIA

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The views expressed herein do not necessarily represent those views of the Bank of Albania.

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ABSTRACT

Monetary Conditions Index is used as an indicator of the orientation of monetary policy. Monetary conditions represent the combined effect of interest rates and the exchange rate on the economy. This study aims at assessing the relative weights of the real interest rates and the real exchange rate in the case of Albania. The methodology is based on OLS estimation and considers quarterly data for the period 1998Q1–2008Q4. The new ratio derived from these weights is equal to 3.8, which implies that the effect of an appreciation of the real exchange rate by 3.8 percentage points may be neutralized by a 1 percentage point increase in the real interest rate.

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Keywords: Monetary Conditions Index, Exchange Rate, Interest Rate, OLS.

1. INTRODUCTION

Monetary Conditions Index (MCI) was first introduced by the Central Bank of Canada [Freedman (1995)] and then many banks and international institutes used this index as a mechanism to interpret the orientation of monetary policy and the effect it has on the economy. MCI is calculated as the linear combination of the variables which represent the main channels of monetary policy transmission in an open economy: the real interest rate and the real effective exchange rate where the coefficients represent their relative effects on aggregate demand. The aim of this index is to give information about monetary conditions. The MCI considers both changes in interest and exchange rates, expressed in real terms. The index is a weighted average of these two indicators and can be used to determine whether monetary conditions in any economy have been "loosened" or "tightened". It summarizes in a single number the pressure that monetary policy is exercising at any point in time on the economy and, therefore, on inflation.

Through the interest rate and the exchange rate, monetary policy can affect both economic activity and inflation. Loose monetary conditions are expected to support economic growth, while growth is not supported in neutral monetary conditions. It should be noted that the components of the monetary conditions index do not necessarily affect the economy in the same direction. For example, the exchange rate can be estimated as "loosened" and the interest rate as "tightened", and vice versa. In determining monetary conditions, the interest rate plays the crucial role, while the exchange rate responds to the interest rate: lower interest rates in a given period tend to bring in low returns on local currency and hence a weaker exchange rates, and vice versa. Monetary policy affects inflation mainly through two channels: the interest rates and the exchange rate. An increase in either one causes a slowdown in growth and a decline in inflationary pressures. In a similar way, a decrease in interest rates or the exchange rate stimulates the economy and can lead to higher inflationary pressures. So, the aim of the construction of the MCI is to consider both these channels.

The MCI, at time t, is determined as the weighted sum of changes in the interest rate (i) and the exchange rate (e) from their levels in a base year (t=0), and can be written as:

$$MCI = \theta_i (i - i_b) + \theta_e (e - e_b) \quad (1)$$

Where, θ_i and θ_e are, respectively, the weights of the interest rate and the exchange rate.

According to Tase (2006), in the case of Albania, the Monetary Conditions Index (MCI) is the weighted average of changes in the base interest rate (REPO) and the nominal effective exchange rate of lek (NEER) relative to a base period. The ratio of this index was estimated at 1.82:1, meaning that the effect of a depreciation of the exchange rate of 1.82 percentage points can be offset by a 1 percent increase in the interest rate. The base period of the Estimation of MCI was September 2000.

The estimate of the ratio of Monetary Conditions Index in the case of Albania was made through calibration based on IMF (2004). Such an approach is rather indirect and not quite precise. Hence, following the need for a new method, and given greater data availability, I calculate the average weights of the interest rate and the exchange rate in the case of Albania in this paper. This methodology is based on OLS estimation and considers quarterly data for the period 1998Q1–2008Q4. The new ratio derived is 3.8, implying that the appreciation of the real exchange rate (REER) by 3.8 percentage points can be neutralized by a 1 percentage point increase in the interest rate.

2. ANALYZING THE DATA

This study begins by analyzing the stationary properties of the data. After that, the short-run dynamics of aggregate demand are estimated by OLS. Finally, the weights obtained for this equation are used in constructing the MCI for Albania. The analyses are performed using quarterly data and the sample covers the 1998Q1-2008Q4 period. Some of the variables are in logs.

The data considered are the following:

- REER, the effective exchange rate of LEK, based on foreign and domestic CPI (Consumer Price Index);
- TB_3, the three month treasury bill rates;
- TB_6, six month treasury bill rates;
- TB_12, the twelve month treasury bill rates;
- INF, the inflation;
- GDP, the Gross Domestic Product.
- GAP, the output gap as the percentage deviation of the real GDP from the potential one.

Initially, unit root tests are conducted for each of these variables. These tests show that the null hypothesis can be rejected at the 5 percent level for inflation and it cannot be rejected for the Treasury bill rates and the effective exchange rate. In contrast, the unit root of the null hypothesis is rejected at the 5 percent level for the first difference of the Treasury bill rates and the effective exchange rate; hence, it is concluded that these variables are integrated of order one. Then, the coefficients of the Treasury bill rates and the exchange rate are estimated by OLS. In our equation the output gap is the dependent variable. Tables 1, 2 and 3 in appendix B show estimation results. In the three cases, the adjusted R-squared has a high value, respectively equal to 0.808, 0.833 and 0.834, which means that a high percentage of the variation in the dependent variable is explained by the explanatory variables considered. The high level of the F-statistic confirms the importance of the model. Durbin Watson values are within the range 2 with variation of +/- 0.2. We have also performed residual diagnostic tests and coefficient stability tests. Test results are summarized in tables 4

and 5 in appendix B. Therefore we can conclude that the model is statistically significant.

From these coefficients we derive three different ratios for the Monetary Conditions Index, for the three-, six- and twelve-month Treasury bill rates, respectively equal to -2.16265, -4.96696 and -4.27701. Thereafter, we compute the simple mathematical average of these three ratios to obtain -3.8. Finally, we get the new ratio of the Monetary Conditions Index multiplying this value by -1, since a numerical increase in the REER indicates a depreciation of the LEK. Therefore, the new ratio of this index, derived by the new methodology, is equal to 3.8.

3. THE MONETARY CONDITIONS INDEX FOR ALBANIA

For the construction of the Monetary Conditions Index for Albania monthly data are used for the period from January 1996 to September 2009. The base period of the estimation of MCI is January 1996. The real Monetary Conditions Index in the case of Albania is defined as:

MCI = (Real_TB - Real_TB(base))*3.8 + (log(REER) – log(REER)(base)) + 100 (2)

Where:
Real_TB is the real Treasury bill rate;
Real_TB(base) is the real Treasury bill rate at base year;
REER is the Real Effective Exchange Rate;
(REER)(base) is the Real Effective Exchange Rate at base year;
3.8 represent the value obtained from the ratio between the coefficients of the Real Treasury bill Rates and the coefficients of the Real Effective Exchange Rate.

An increase in the Monetary Conditions Index indicates a tightening of monetary conditions; by contrast, a decrease in the MCI indicates an easing of monetary conditions relative to the base year. In the case of Albania, the MCI ratio is equal to 3.8, implying that the effect of a depreciation of the exchange rate of 3.8 percentage points is offset by a 1 percent increase in the interest rate. Figure 1 in the appendix A indicates the trend of the MCI for the January 2006 - September 2009 period, and its comparison with the real effective exchange rate and the real Treasury bill rates. The monetary activity, during 2007 and until the third quarter of 2008 and in contrast to the average term during the last 15 years, has shown significant improvements. These improvements were largely affected due to the corresponding exchange rate depreciation, which means loose economic conditions. Fluctuations in interest rates have not been a determining factor in the monetary conditions. The beginning of the financial crisis is reflected in the tightening of monetary conditions, due to increasing real interest rates. However, monetary conditions remain tight due to higher

real interest rates, which are the main determinants of MCI.

We also construct another index, the Financial Conditions Index (FCI), using the real lending rate and the real effective exchange rate as variables. This index is a measure of financial conditions and it represents an attempt to capture the effect of the other channels of transmission of monetary policy. In fact it includes the lending rates to analyze the effect of the level of financial activity.

The real Financial Conditions Index in the case of Albania is defined as:

MCI = (Real_LR - Real_LR(base))*3.8 + (log(REER) – log(REER) (base)) + 100 (3)

Where: Real_LR is the real lending rate and Real_LR(base) is the real lending rate at base year. It uses the same weights as the Monetary Conditions Index. Figure 3 in the appendix A indicates the trend of FCI for the January 2006 - September 2009 period, and its comparison with the real effective exchange rate and the real lending rates. In contrast to the average during the last 15 years, the financial activity has shown important improvements during 2007 and until the third quarter of 2008. The beginning of the financial crisis is characterized by tightening financial conditions, due to increasing real lending rates. After mid-2009, financial conditions have loosened due to the falling lending rates.

4. CONCLUSIONS

The Monetary Conditions Index (MCI) represents an operational tool in the conduct of monetary policy. This index evaluates the impact of monetary policy implemented by central banks on the evolution of the economic cycle. The MCI represents the combined effect of the interest rate and exchange rate on the economy. This index is a weighted average of these two indicators. We also construct the Financial Conditions Index (FCI), which represents an attempt to capture the effect of the other channels. We use the real Treasury bill rates and the real effective exchange rate for MCI and the real lending rate and the real effective exchange rate for FCI.

In this paper I estimated the ratio of the weights in the MCI using a new methodology in the case of Albania, based on OLS estimation. The MCI ratio estimated by this technique is 3.8:1, which means that the effect of a depreciation of the exchange rate of 3.8 percentage points is offset by 1 percent increase in the interest rate. The FCI uses the same weights as the MCI. Both indices give us additional information concerning monetary and financial conditions, respectively. In contrast to the average level of the indices during the last 15 years, in Albania the monetary and financial activity, during 2007 and until the third quarter of 2008, has shown significant improvements. These improvements were largely a result of a depreciation of the exchange rate. Fluctuations in interest rates have not been a determining factor in causing changes in monetary conditions. The beginning of the financial crisis is reflected in the tightening of monetary and financial conditions, due to increasing real interest rates. However, monetary conditions remain tight due to exchange rate movements and changes in Treasury bill rates. After mid-2009, there have been favorable financial conditions due to the falling lending interest rates.

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APPENDIX A – FIGURES

Figure 1. MCI in comparison with REER and Real Interest Rates

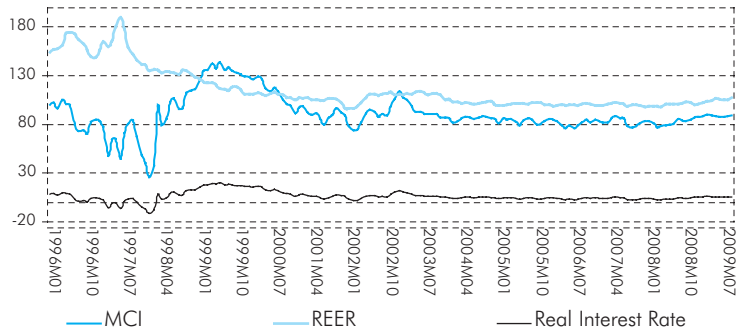


Figure 2. Monetary Conditions Index for the period 1996M01 - 2009M09

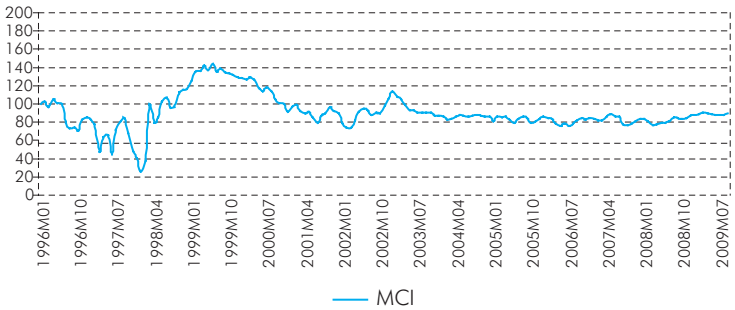


Figure 3. FCI in comparison with REER and Real Lending Rates

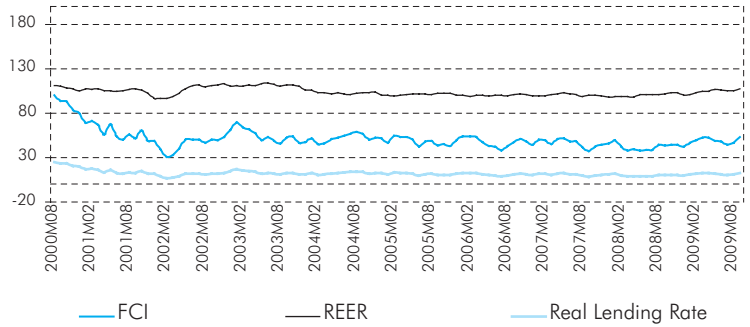
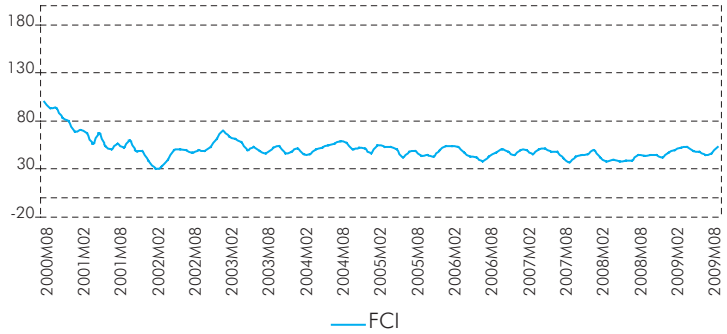


Figure 4. Financial Conditions Index for the period 2000M08 – 2009M09



APPENDIX B – TABLES

Table 1. OLS estimation of the three months Treasury bill rates

Dependent Variable: GAP				
Method: Least Squares				
Date: 07/19/10 Time: 13:24				
Sample: 1998Q1 2008Q4				
Included observations: 44				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(REER(-1))	0.169160	0.089161	1.897247	0.0654
D(BONO_3(-3))	-0.365834	0.178913	-2.044760	0.0479
D(INF(-5))	-0.306712	0.098075	-3.127334	0.0034
GAP(-1)	0.431393	0.107043	4.030080	0.0003
GAP(-4)	0.242004	0.095481	2.534581	0.0155
C	0.118298	0.312628	0.378400	0.7072
R-squared	0.830149	Mean dependent var		-0.620206
Adjusted R-squared	0.807800	S.D. dependent var		4.241113
S.E. of regression	1.859330	Akaike info criterion		4.204433
Sum squared resid	131.3701	Schwarz criterion		4.447732
Log likelihood	-86.49753	F-statistic		37.14506
Durbin-Watson stat	2.085663	Prob(F-statistic)		0.000000

Table 2. OLS estimation of the six months Treasury bill rates

Dependent Variable: GAP				
Method: Least Squares				
Date: 07/19/10 Time: 13:25				
Sample: 1998Q1 2008Q4				
Included observations: 44				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(REER(-1))	0.142869	0.081866	1.745158	0.0890
D(BONO_6(-3))	-0.709624	0.217751	-3.258882	0.0024
D(INF(-5))	-0.313903	0.090224	-3.479170	0.0013
GAP(-1)	0.352671	0.104923	3.361232	0.0018
GAP(-4)	0.324855	0.094929	3.422080	0.0015
C	-0.014647	0.295709	-0.049531	0.9608
R-squared	0.852644	Mean dependent var		-0.620206
Adjusted R-squared	0.833255	S.D. dependent var		4.241113
S.E. of regression	1.731834	Akaike info criterion		4.062363
Sum squared resid	113.9715	Schwarz criterion		4.305661
Log likelihood	-83.37198	F-statistic		43.97575
Durbin-Watson stat	2.020142	Prob(F-statistic)		0.000000

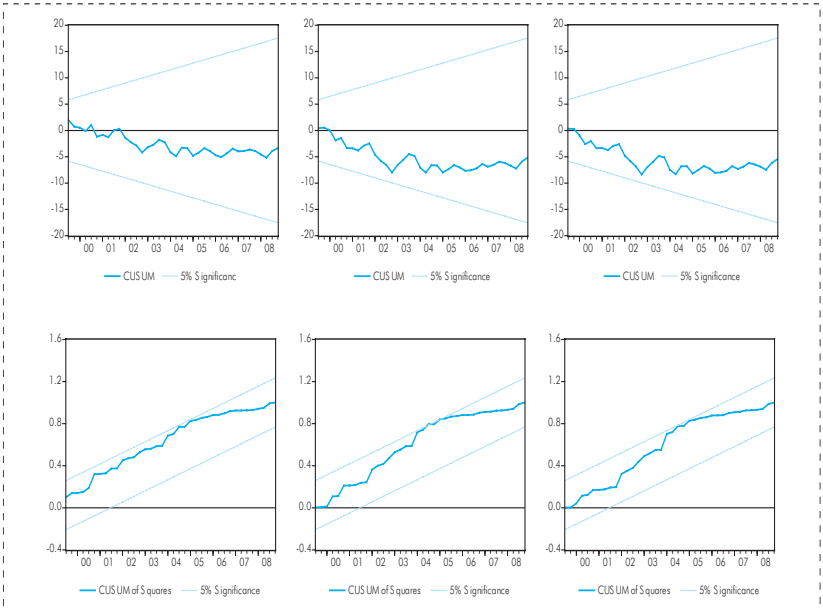
Table 3. OLS estimation of the twelve months Treasury bill rates

Dependent Variable: GAP				
Method: Least Squares				
Date: 07/19/10 Time: 13:27				
Sample: 1998Q1 2008Q4				
Included observations: 44				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(REER(-1))	0.163905	0.079557	2.060221	0.0463
D(BONO_12(-3))	-0.701024	0.214230	-3.272287	0.0023
D(INF(-5))	-0.322242	0.089914	-3.583895	0.0009
GAP(-1)	0.354044	0.104591	3.385021	0.0017
GAP(-4)	0.316702	0.093331	3.393307	0.0016
C	-0.005670	0.294503	-0.019251	0.9847
R-squared	0.852909	Mean dependent var		-0.620206
Adjusted R-squared	0.833555	S.D. dependent var		4.241113
S.E. of regression	1.730277	Akaike info criterion		4.060564
Sum squared resid	113.7666	Schwarz criterion		4.303862
Log likelihood	-83.33240	F-statistic		44.06862
Durbin-Watson stat	1.991964	Prob(F-statistic)		0.000000

Table 4: Diagnostic tests – residuals

Equations	(1) - 3-months Treasury bill rates	(2) – 6-months Treasury bill rates	(3) – 12- months Treasury bill rates
Serial correlation (LM test) F-statistic	2.26	1.04	1.40
p-value	0.11	0.36	0.25
White Heteroskedasticity F-statistic	2.10	1.12	1.57
p-value	0.05	0.38	0.14
Normality J. Bera	0.87	1.70	1.78
p-value	0.64	0.42	0.41

Table 5: Diagnostic tests – stability of coefficients



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