Assessing Monetary Policy in Albania Using an Interest Rate Rule[1]

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I. INTRODUCTION

The conduct of monetary policy, in both industrialized and developing countries, has been significantly re-evaluated over the past two decades. First, there has been an increasing tendency toward central bank independence in order to enhance transparency and reduce political interference in monetary policy decisions. Second, the focus of monetary policy has shifted toward controlling inflation, with other factors—such as output—entering the decision making process primarily to the extent that they influence future inflation. Third, there has been a shift of emphasis from monetary aggregates toward interest rates as the main instruments of monetary policy. This has been accompanied by an increased stress on using rules, while acknowledging the need for a certain degree of discretion in practice.

Against this background, modeling central bank behavior using interest rate rules has attracted much attention. A simple rule, popularized by Taylor (1993), stipulates that the central bank sets its policy interest rate by reacting to the deviations of current inflation from a target rate and of output from its potential. Taylor suggested that this rule replicated closely monetary policy decisions in the U.S.. Other authors have shown that under certain assumptions, such a rule could also be optimal. While clearly no central bank can be expected to follow such a rule strictly,

[1] This paper has benefited from comments by participants at the Bank of Albania Conference in Saranda, September 10-12, as well by my colleagues at the International Monetary Fund.

extended versions of the Taylor rule have been used as a tool to appraise monetary policy decisions (see, for example, Orphanides (2002), and Gerlach and Schnabel (2000)).

In line with international trends, monetary policy in Albania has, since the beginning of transition, become increasingly more transparent, systematic, and market based. Despite the underdeveloped financial system, a banking system that is dominated by one bank, and very limited private sector credit in domestic currency—which limit the use of indirect instruments of policy—the Bank of Albania (BoA) has had success in strengthening policy making. The focus on inflation has increased—through adopting an informal inflation targeting framework in the context an independent central bank and a flexible exchange rate—supported by policies that target reserve money. In part as a result of this, but also owing to stabilization policies followed after the collapse of the pyramid schemes, inflation has been under control since 1998. Low inflation has also been supported by large official inflows and private remittances, which have contributed to a strong exchange rate.

The objective of this paper is to use Taylor-type rules to analyze whether, in setting policy interest rate, the BoA has responded systematically to relevant economic developments. The estimation results provide some support for this hypothesis, although they are only indicative, given the simple nature of the analytical framework, structural shifts in the Albanian economy over the past decade, and serious data deficiencies.

The paper is organized as follows. Section II discusses the basic Taylor Rule; Section III presents two backward-looking and forward-looking dynamic extensions of the formula for estimation

purposes; Section IV highlights the data problems; Section V presents the estimation results; and Section VI concludes.

II. THE TAYLOR RULE

The simple Taylor rule stipulates that the policy interest rate deviates from its equilibrium level to the extent that inflation deviates from its target and output from its potential:

$$i = r^* + \pi + \alpha\,(\pi - \pi^*) + \beta\,(y - y^*)$$

where i is nominal policy interest rate, r^* equilibrium real interest rate, $\boldsymbol{\pi}$ and $\boldsymbol{\pi}^*$, respectively, actual (or expected) and target inflation rates, and y and y^*, respectively, (logarithms of) actual and potential output. The term $(y - y^*)$, therefore, measures the output gap.

Taylor argued that this rule could replicate Fed's monetary policy for α and $\beta = 0.5$, or equivalently for response coefficients of 1.5 for inflation and 0.5 for the output gap. With these coefficients, a rise (fall) in inflation would provoke a more than proportional rise (fall) in nominal interest rates, implying a rise (fall) in the *real* interest rate, thus making it more likely for the rule to be stabilizing.

Taylor's original formulation, as a possible reaction function for monetary authorities, or as a means to assess monetary policy, is subject to a number of qualifications. First, it requires observations on expected inflation and the real interest rate, which are not readily available; and on the inflation target, which are available only in the presence of formal inflation targeting. In

practice these have to be estimated or simplifying assumptions need to be made—for example that the real interest rate and the inflation target are unchanged over time, in which case they would be absorbed by the intercept term. In addition, the information available to the monetary authorities at the time decisions are made, may not be the same as the historical data used in estimation. Second, in practice, policy rates are likely to display some autoregression and to respond to economic developments with a lag. A dynamic formulation, therefore, would be more appropriate. Finally, other factors could influence policy interest rates, including the exchange rate, foreign interest rates, and money growth.

III. ESTIMATED EQUATIONS

We estimate dynamic formulations that include other variables that could influence decision making. Given the informational issues, we consider two types of behaviors on the part of policy makers: backward- and forward-looking. In the backward-looking case the central bank is assumed to respond to past values of inflation and the output gap, as well as exchange rate changes, monetary growth, and foreign interest rates (and their lags), which are jointly denoted by the vector z_t:

$$i_t = \delta + \rho \quad i_{t-1} + \sum_{j=1}^{k} \alpha_j \pi_{t-j} + \sum_{j=1}^{k} \beta_j (y_{t-j} - y^*_{t-j}) + \gamma' z_t + u_t$$

The real interest rate and the inflation target are assumed constant and subsumed under the constant term δ; and u_t is an error term, assumed to have the standard properties.

In the forward-looking specification the interest rate is assumed to react to expectations of inflation at time *t*+*k* and output gap at time *t*—which are both unobserved at time *t* when the interest rate decision is made:

$$i_t = \delta + \rho\, i_{t-1} + \alpha\, \pi^e_{t+k} + \beta(y^e_t - y^*_t) + \gamma' z_t + u_t$$

This equation is estimated using instrumental variables for expected inflation and output gap, under the assumption that expectational errors are white noise.

IV. Data Problems

Before discussing the estimation results, it is important to stress some of the numerous data problems that limit the scope for a meaningful empirical analysis. First and foremost, GDP data are extremely imprecise. For the period 1994-97, and again 2001-02, in the absence of national accounts, they are estimated based on scarce activity data. For the period 1998-2000, although national accounts are now available, the data suffer from inaccuracies resulting from extensive informal activity. Furthermore, quarterly GDP data are unavailable and, for the purpose of this exercise, they were estimated (using conversion by the quadratic match sum method). Finally, potential output is estimated using the HP filter. Given the very unreliable nature of the estimated quarterly GDP data, this measure of potential output is only meant to give an indication of the extent of pressure on the economy.

Second, the Bank of Albania switched to using indirect instruments of monetary policy in January 2001. The data used here for the policy interest rate are the BoA's refinance rates prior to that date, and the weekly repo rates since then. This could be a source of inconsistency and

structural break, especially because it is reasonable to assume that interest rate policy took a more meaningful form following the switch to indirect instruments. Given the short length of the data it is not possible to address this problem in a satisfactory fashion.

Finally, while, in comparison with GDP, CPI inflation is relatively accurately measured, the data are subject to a structural break in 2002 owing to a revision of the basket, and suffer from biases resulting from the outdated weighting system prior to 2002. However, for the purpose of assessing the BoA's approach to monetary policy (i.e. its response to measured inflation) this may not be an important source of inconsistency.

V. ESTIMATION RESULTS

The estimation results are presented in Tables 1 and 2. Other variables included in the equations (money, exchange rates, and foreign interest rates) [2] turned out to have insignificant (or implausible) coefficients and are dropped from the regressions. The presented results, therefore, amount to testing for the Taylor rule in its original form, but allowing for dynamics and alternative assumptions about expectations formation. [3]

They are, on the whole, surprisingly supportive of a Taylor-type reaction function. Specifically, 1-quarter lagged inflation and 3-quarter lagged output gap in the estimated backward-looking equation, and 4-quarter ahead inflation in the forward-looking equation appear to be significant

[2] Both euro and dollar exchange rates and interest rates were tried.

[3] All estimations are carried out by *Microfit 4.0* (M. H. Pesaran and B. Pesaran (1997)).

determinants of policy interest rates. The output gap in the forward-looking equation is insignificant. The diagnostic tests indicate that the equations are broadly well specified (the assumption of normality in the backward-looking model, however, is rejected).

Based on these results, and subject to the provisos already made, the results appear to indicate that the BoA has been acting systematically in response to inflation and activity. In particular, in the backward-looking model, a 1 percentage point increase in past inflation average leads to 0.1 percentage point increase in nominal interest rate in the short run and about 1 percentage point over the longer run. In the forward-looking model, the effects of an increase in expected inflation on the interest rate are estimated to be larger.

While the results are encouraging, they are tentative, given the extensive data difficulties and the short length of the data, coupled with the presence of sharp movements in inflation, the output gap, and interest rates following the pyramid schemes. Furthermore, while there is support for the basic Taylor rule, the estimation results are not robust to including other variables, possibly due to the short length of the data or measurement errors.

VI. Concluding Remarks and Policy Implications

The results reported in this paper provide some evidence that the BoA has followed a systematic approach to monetary policy—although severe data problems reduce the reliability of the results. This approach has clearly played an important role in maintaining low inflation, although the paper does not examine this issue—low inflation has also been helped by the gradual fiscal

consolidation and large inflows, which have maintained a strong exchange rate. A systematic and focused approach to monetary policy will be increasingly more important as the interest rate transmission mechanism becomes stronger.

The support for a Taylor Rule does not, of course, imply that the BoA should or could follow such simple policy rules—any more than any other central bank does. In practice, the BoA bases its monetary policy decisions on a variety of indicators, and a Taylor rule could be considered as summarizing these factors (for assessment and estimation purposes) in a compact form. The BoA should continue to develop its ability to analyze economic developments in setting monetary policy. Furthermore, the Taylor rule seems to be based on interest rate response to demand shocks, while inflation in Albania is significantly influenced by supply shocks, to which monetary policy may not react in the same manner. Finally, monetary policy in Albania is supported by targets on NIR and NDA. Given the weaknesses in interest rate transmission mechanisms, policy will need to continue, for the time being, to rely on both interest rates and monetary targeting.

Table 1. OLS Estimation of the Backward-Looking Interest Rate Reaction Function[1]

Dependent variable is i_t
34 observations used for estimation from 1994Q4 to 2003Q1

Regressor	**Coefficient**	**T-Ratio [Prob]**
C	0.20	0.22 [0.83]
i_{t-1}	0.89	14.25 [0.00]
π_{t-1}	0.12	2.12 [0.04]
$y_{t-3} - y^*_{t-3}$	0.51	4.91 [0.00]

R^2 =	0.96	$\bar{R}^2$ =	0.95
S.E. of Regression =	2.01	F-Stat. F(3, 30) =	231.10 [0.00]
DW-statistic =	2.68	Durbin's h-statistic	-2.14 [0.03]

$\chi^2_{sc}(1) = 5.10$ [0.200] Test for serial correlation

$\chi^2_{ff}(1) = 3.52$ [0.061] Test for functional form

$\chi^2_{n}(2) = 14.56$ [0.001] Test for normality

$\chi^2_{he}(1) = 2.05$ [0.152] Test for hetroscedasticity

1/ Data is quarterly. i_t is the short-term policy interest rate; π_t is year-on-year inflation rate; y_t and y^*_t are (logs of) actual and potential GDP.

Table 2. IV Estimation of the Forward-Looking Interest Rate Reaction Function[1]

Dependent variable is i_t
30 observations used for estimation from 1994Q4 to 2002Q1

Regressor	**Coefficient**	**T-Ratio [Prob]**
C	-0.57	-0.34 [0.74]
i_{t-1}	0.91	10.93 [0.00]
π_{t+4}	0.21	3.61 [0.00]
$y_t - y_t^*$	-0.12	-0.43 [0.67]

R^2 =	0.94	$\bar{R}^2$ =	0.93
S.E. of Regression =	2.37	F-Stat. F(3, 26) =	133.90 [0.00]
DW-statistic =	2.41	Sargan's CHSQ (3)	4.12 [0.25]

$\chi^2_{sc}(1)$ =5.16 [0.27] Test for serial correlation $\chi^2_{ff}(1)$ = 0.01 [0.92] Test for functional

χ^2_n (2) = 0.48 [0.79] Test for normality $\chi^2_{he}(1)$ = 2.64 [0.10] Test for hetroscedasticity

1/ Data is quarterly. i_t is the short-term policy interest rate; π_t is year-on-year inflation rate; and y_t and y_t^* are (logs of) actual and potential output. $\pi_{t-1}, \pi_{t-2}, \pi_{t-3}, y_{t-3} - y_{t-3}^*$, and $y_{t-4} - y_{t-4}^*$ are used as instruments.

References

Gerlach, S. and G. Schnabel (2000). "The Taylor Rule and interest rates in the EMU area", *Economics Letters,* 67, 165-171.

Orphanides, A. (2002). "Monetary-policy rules and the great inflation", *American Economic Association, Papers and Proceedings,* Vol. 92, No.2, 115-120.

Taylor, J. (1993). "Discretion versus policy rules in practice", *Carnegie-Rochester Conference Series on Public Policy* 39,195-214.