Analysis of the Effects of Macroprudential Measures on GDP's Trend – Simulation Using A Macro Financial Model For Albania

Ela Golemi
University "Aleksander Moisiu", Department of Economic Sciences
Rr. Currilave
Durres, 2000
Albania
e-mail: golemiela31@yahoo.com

Abstract
This study provides an assessment of the impact of macroprudential policy measures taken from the Bank of Albania, on the main financial indicators and real economy's dynamics, as well as their impact in raising the resilience of financial system and its stability. Based in Albania's financial system composition, the level of market development and the quality of data, this study finds appropriate to make use of a Macro Financial Model for Albania to assess the effects of countercyclical macro prudential measures taken by the Bank of Albania on March 2013, as a toolkit to address credit revival. Our analyses support that all measures implemented individually improve the main financial variables and affect positively Albania's GDP growth, although the impact of the simultaneous implementation of these three measures is higher. The implementation of macroprudential policy measures can help contribute to a stable financial intermediation by raising the resilience of the financial system against risks.

Keywords: macroprudential policy, systemic risk, financial stability, economy dynamics
JEL codes: C81, E5, G38

1. Introduction

Experience from the last global crisis shows that an internal shock can deepen through the procyclical behavior of institutions and individuals and spread to the real economy and across borders. So, the debate among researchers has been focused on identifying systemic risks and developing an appropriate response known as "macroprudential policy" - a framework of high-end and intermediate objectives and of relevant tools (mainly with prudential nature) to address the risks that threaten the stability of the entire financial system. It is understood as the ability to adopt prudential measures for addressing systemic risk.

Given the significant correlation among the financial system and the real economy, whereby the destabilization of the financial system leads to the stagnation of the real economy and, in turn, to further destabilization of the financial system (Mishkin, 2008); and given the important role of macroprudential policy to prevent further financial crisis and/or to reduce the impacts of a crisis, meaning at the same time to prevent and/or reduce the large costs on the public budget; this paper sought to focus on and explore this issue , by raising the research question: To what extend Macroprudential policy measures affect the real economy dynamics?

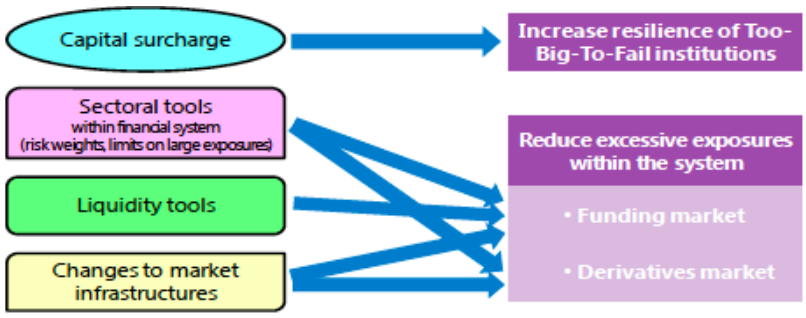
Conventional macro stress testing fails to fully capture the interaction between the financial system and the real economy, assessing only the impact of a slowdown in the real economy on the financial system without taking into account the negative feedback loop. This research emphasizes the importance of the feedback effects and in order to evaluate the impact of financial regulations, such as macroprudential measures in Albania, it uses a macrofinancial model that incorporates the interrelation between the financial sector and the macroeconomic sector.

2. Literature Review

Regarding the macroprudential tools, the discussion is also on-going. (Galati and Moessner, 2011) point out that there have been investigated a range of possible macroprudential measures, without identifying a primary instrument or a standard taxonomy of instruments. (Weistroffer, 2012)

state that macroprudential tools (measures) are mainly derivations of microprudential tools that incorporate a system-wide perspective. In addition, one has to consider other macroeconomic tools that support financial stability. In fact, (Borio and Shim, 2007), and (Caruana, 2010), argue that prudential policies are not enough to achieve financial stability and that fiscal and monetary policies can help to mitigate the build-up of financial imbalances.

Figure 1: Mapping tools to Objective: Structural Dimension



Source: IMF

Macroprudential measures can be classified in various ways, which can also be overlapping (Galati and Moessner, 2011). One important distinction among them is linked with the two dimensions of the systemic risk, that is its time dimension and cross-sectional dimension. Some of the macroprudential tools linked with the time dimension feature, capturing the evolution of risk over time and targeting its procyclicality, include the countercyclical capital requirements, forward-looking statistical provisioning, practices related with valuation of collateral and maximum loan-to-value (LTV) ratios. Shin (2009) finds an important contribution of countercyclical capital requirements for banks, in moderating the fluctuations in their leverage and size of balance sheet. Discussing the loan-loss provisioning, various authors have noticed its pro-cyclical behavior, being lower at times of credit booms and rising at times of distress (Borio et al., 2001). Hence, referring to the case of Spain, Shin (2009) finds that forward-looking statistical provisioning, through its direct impact on capital, can reduce the lending ability of the bank during the capital buoyancy. Some of the macroprudential tools linked with the cross-sectional dimension focus on systemic risk arising by similar or common exposures arising from banks' balance sheet interlinkages. Galati and Moessner (2011) find out that those measures target the bank's capital and/or the amount of short-term debt in relation to bank's total liabilities. These vulnerabilities spillover to the rest of the system through credit chains, payment and settlement systems or bank runs which are triggered also by the asymmetric information and the inability to distinguish solvent from insolvent institutions (Galati and Moessner, 2011). More specific macroprudential tools in this case, are those known as net stable funding ratio and liquidity coverage ratio (BIS, BCBS, 2010), targeting the maturity structure of banks' balance sheets.

Another distinction of macroprudential tools is whether they are applied based on rules or discretion (Borio and Shim, 2007). By making an analogy to monetary policymaking, rule-based macroprudential tools can offer accountability, transparency and efficacy (Galati and Moessner, 2011). On the other hand, discretion-based tools can prove to be time-inconsistent. Referring to the work of Goodhart (2004), Galati and Moessner (2011) find that loan loss provisions, capital requirements and surcharges, or loan-to-value ratios can be designed in a rule-based way. As examples of discretionary tools Galati and Moessner (2011) mention supervisory reviews or warnings, in the form of speeches or reports targeting the build-up of risk in the system.

Another distinction between macroprudential tools is whether they represent quantity or price restrictions. Examples of price restrictive tools are measures that act as a "tax" on variable margins, i.e. on the difference between liquid assets and short-term liabilities. Examples of quantity restrictive tools include the net funding ratio of a bank (BIS, BCBS, 2009). Perotti and Suarez (2011) find that such tools may be used to target different incentives for risk creation. Their analysis suggests that combining "price" and "quantity" macroprudential tools may be desirable to better manage systemic risk externalities and control risk's appetite of banks. Galati and Moessner (2011) confirm that some

studies make another classification of macroprudential tools, in the context of industrial or emerging market countries. Interestingly, they find that some emerging market countries have been using macroprudential tools, without calling them by this name (McCauley, 2009; as referred by Galati and Moessner, 2011).

3. Data and Methodology

To analyze the impact on the macro economy landscape, of using macro prudential policy measures to directly affect the financial system, it is necessary to use a model that incorporates the feedback loop between the financial sector and real economy. The Macro Financial Model (MFM) from Dushku and Kota (2012) that it is used in this study is a small and medium-sized structural model, comprising two sectors, a financial sector introducing mainly by banking sector in Albania, and some macroeconomic variables. The Model focuses the banks' soundness in the Albanian financial system. To these banks, the Model provides a quantitative framework for assessing the transition mechanism of different shocks to banks' balance sheets, taking in consideration the macro-credit risk, the interaction between banks and feedback loop displayed in two sides of balance sheet (assets & liabilities). The MFM is a model that explicitly incorporates the feedback loop between the financial sector and the real economy in Albania. Through this mechanism, it allows to know how the banks act to macroprudential measures and how this shock is transmitted in real economy through GDP trends.

The Macro Financial Model (MFM) has in total 49 financial and macroeconomic variables. The MFM emphasizes the importance of financial activities, where 40 variables being included in the financial sector, and 9 variables are included in macroeconomic sector.

Among total 35 equations of the model, eight are behavioral equations and the rest are identities equations. Estimation of the equations is based on regressions with fix effects, to account for the dynamic relationship at individual bank level, using the quarterly annualized growth rates as the main variables and we have paid attention to enter all variables as stationary variables in all behavioral equations. All the dates are quarterly from 2002T1 – 2014T3. The estimated equations are:

- household and corporate lending volume equations,
- lending interest rate equation,
- net interest income equation,
- credit cost equation,
- credit risk equation,
- portfolio risk (or non-performing loans) equations for households and business

Using statistical software E-views 7.2, with panel data, observing banks several time it is analyzed the linear relationship between endogenous variables and explanatory variables, or exogenous variables. A general approximation of a multiple linear regression for banks i = 1, 2, 3 …, N , who is observed at several time periods t= 1, 2, 3…, N is given as below :

$$Y_{it} = \alpha + x'_{it}\beta + c_i + u_{it} \qquad (1)$$

Where Y_{it} is the dependent variable, x'_{it} is a K-dimensional row vector of explanatory variables excluding the constant; α is the intercept; β is a K-dimensional column vector of parameters; c_i is an individual-specific effect and u_{it} is an idiosyncratic error term.

The linear regression is estimated based on the so-called balanced bank *i*, in all times period *t*. The *T* observations for individual *i* can be summarized as follows:

$$\mathbf{y_i} = \begin{bmatrix} y_{i1} \\ y_{it} \\ y_{iT} \end{bmatrix}_{T\times 1} \qquad \mathbf{X_i} = \begin{bmatrix} x'_{i1} \\ x'_{it} \\ x'_{iT} \end{bmatrix}_{T\times K} \qquad \mathbf{u_i} = \begin{bmatrix} u_{i1} \\ u_{it} \\ u_{iT} \end{bmatrix}_{T\times 1} \qquad (2)$$

NT observations for all banks and time periods are presented as :

$$Y = \begin{bmatrix} y_i \\ y_i \\ y_N \end{bmatrix}_{NTx1} \quad X = \begin{bmatrix} X_1 \\ X_i \\ X_N \end{bmatrix}_{TxK} \quad u_i = \begin{bmatrix} u_1 \\ u_i \\ u_N \end{bmatrix}_{NTx1} \tag{3}$$

Data generation process (DGP) is described by linearity and independence, while idiosyncratic error term u_{it} is assumed uncorrelated with the explanatory variables of the same individual. There are chosen to estimate fixed versus random effect equations, to see how the main relationships variables vary across individuals at the same point in time, and possibly over time for all banks all together. Due to the lower (cross-section) banks number than the number of the period we use in the model, we have been oriented towards fixed-effects regressions, by not considering GMM models.

4. Simulations and Results

Regarding the macroprudential measures taken from the Bank of Albania, through the Macro Financial Model for Albania, this paper analyses the impact that three instruments from the package of macroprudential measures have on the main financial and real indicators, and the impact of the three measures used jointly. The simulations analysis is the way to evaluate the performance of these measures, by observing the reactions of all endogenous variables and feedback loop between financial and macroeconomic sectors. Generation of the baseline[1]- current level of endogenous variables, determined according to the assessed equations and the connections provided in the model, with assumption that exogenous variables have a determined value and behavior and all other exogenous shocks are equal to zero. The simulations results for the entire banking system are given as the differences between the simulation results and the baseline, expressed as a percentage or in base points. As shocks results are taken within the sample, the deviations of scenarios from the model baseline bears also their current behavior during the period of assessing the equations in the model.
Assumptions:

Combination of:

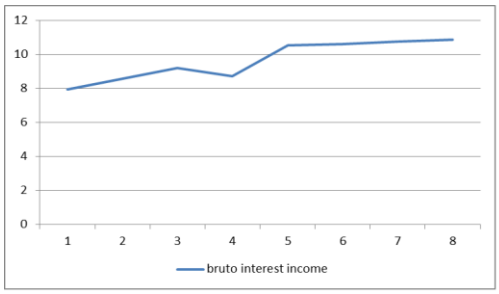
- increase of total credit stock by 10% for a period of two years ;
- general reduce of regulatory liquidity indicator by 5%;
- increase of provision by 10%, from credit restructuring in regular categories.

The impact of a combination of all three measures causes a significant rise of lending volume by an average of 17.84% during first year and 21.73% during the second year. Credit cost ratio is reduced by an average of 1.8 percentage points during eight quarters and capital adequacy ratio is shrunk by an average of 0.84 pp and 1.57pp during first and second year respectively. Impact on the GDP is on average 0.7 pp during second year.

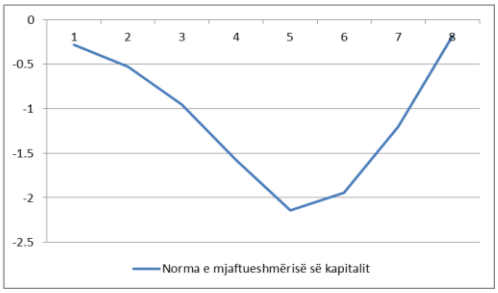
[1] The baseline is the behavior of variables when no policy measures are used

Figure 2: Results of the Scenario of Measures' Combination

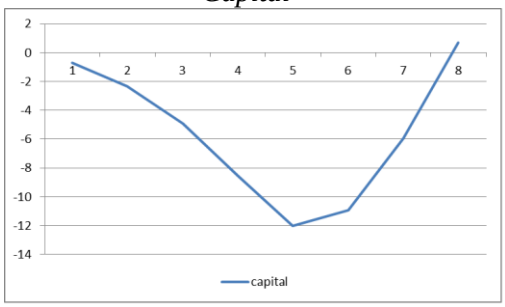
Bruto Interest Income



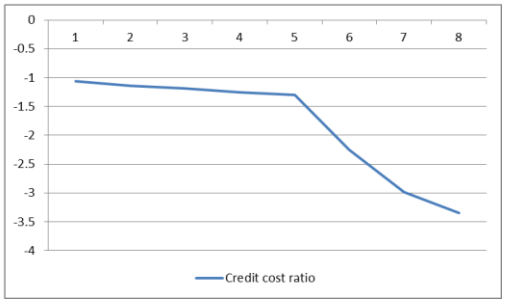
Capital Adequacy Ratio



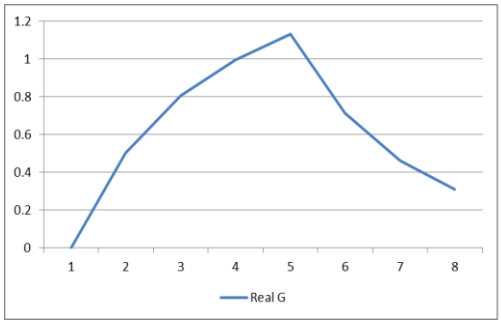
Capital



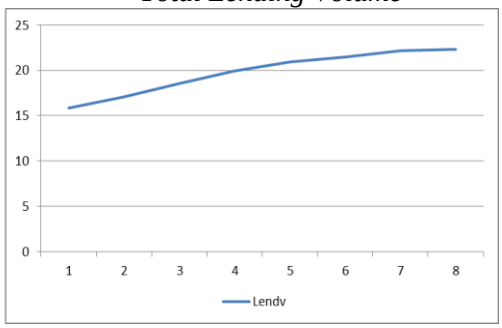
Credit Cost Ratio



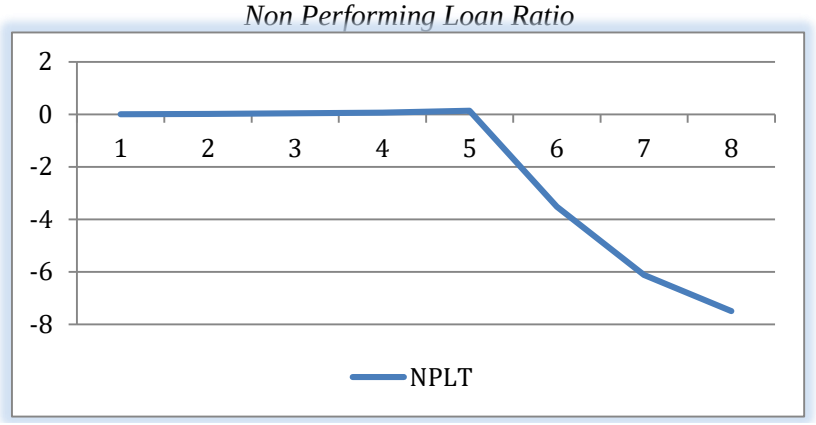
Real GDP Ratio



Total Lending Volume



Non Performing Loan Ratio



Source: author's calculation

5. Discussion of the Results

The increase of total lending by 4% and 10% causes the improvement of NPL rate by an average of 0.81 and 1.54 percentage points; the increase of the Real GDP rate respectively by an average of 0.22 and 0.42 percentage points during eight quarters; and slight increase of capital adequacy ratio by an average of 0.049 percentage points in case of credit growth by 10% for two years.

The general decrease by 5% of the regulatory liquidity indicator, as per banks' risk profile will be associated with improvement of the NPL ratio by an average of -0.79 pp during two years; slight

decrease of Capital Adequacy ratio by an average of -0.24pp; and improvement of real GDP rate of 0.3 pp during eight quarters.

The increase of 10% of provisions for credit restructuring when it is considered as a good credit – does not have any impact on real GDP ratio. This measure serves mainly to prevent further deterioration of credit quality.

The combination of all three measures impact positively Real GDP growth by an average of 0.62pp during eight quarters; Lending volume and Total assets by an average of 19.7% and 9.64% respectively. CAR decreases on average by 1.10 pp during eight quarters.

6. Conclusion

As most of the theories conclude, a primary objective of macroprudential policy measures is to increase the resistance of the financial system to shocks and ensure financial stability. Given the significant interaction between the financial sector and the macroeconomic one, this study emphasizes the high economic costs of financial instability. The package of macroprudential measures undertaken by the Bank of Albania, beyond addressing the considerable slowdown in crediting and the worsening quality of credits given, considered increasing the resilience of the financial system to shocks from different grounds, that is eliminating risk from financial crisis.

As a general conclusion, a single macroprudential policy measure has a slight positive affect on financial and economic variables, but their role is not ideal. While using multiple macroprudential policy measures is a better alternative, because of their significant positive impact on main financial and economic variables and the ability to maintain the efficiency of policy measures by responding to the multiple source of risks.

The performance of NPL and CAR indicators shows that the package of measures addressed also the resistance of financial system to shocks, the parameters of NPL and CAR stand in good levels compared to their current respectively regulatory thresholds.

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