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Monetary Policy and Macroprudential Policy in Fixed Exchange: The Case of the Bank of Central African States

Symphorien Engone Mve

University of Omar Bongo, Libreville, Gabon
Email: egonemve@yahoo.fr

Abstract

This article examines the nature of the policy-mix between monetary policy and macroprudential policy in the member countries of the Bank of Central African States (BCAS). For this, we test a monetary rule "augmented" by the financial stability objective using a regime-switching panel model over the period 2006-2018. The results show that the nature of the policy-mix between monetary policy and macroprudential policy depends on the economic situation, assessed by the evolution of BCAS's net foreign assets.

Keywords

Policy-Mix, Monetary Policy, Fixed Exchange Rate, Financial Stability, Macroprudential Policy

1. Introduction

The recent financial crisis has led all countries to increase the attention given to financial stability in the definition of their economic policies. Reflection on the means of promoting this financial stability has led to proposals for reforming and strengthening financial regulation, in particular by placing particular emphasis on the implementation of macroprudential instruments.

Macroprudential policies (MPPs) are generally defined as "the measures and the institutional framework whose specific objective is to control the risks that affect the entire financial system" (Vinals, 2011). Macroprudential logic therefore dictates that even if individual financial institutions appear sound and respond rationally to shocks, they can create negative externalities that pose real threats to the stability of the financial system as a whole. To this end, there are at least two

ways of creating contagion for interbank links: the propagation of financial stress through the contractual interdependencies of banks, on the one hand, and the spillover effects of an asset liquidation in disaster (fire-sale), on the other side (Greenwood et al., 2011). Macroprudential policies therefore aim to limit systemic risk (IMF, 2013) by mitigating two phenomena: the pro-cyclicality of financing, which generates sudden reversals in credit and liquidity in the economy (time dimension of risk), on the one hand, and the concentration of risk on a few institutions and financial markets that are highly integrated into the national and international financial system (cross-cutting dimension of risk), on the other hand.

As regards the definition of the concept of financial stability, there are broadly three main approaches. The first approach designates crises as pure phenomena that are difficult to predict and exogenous. Financial stability is defined as the resilience of the financial system to these external shocks. The second interprets crises as the inevitable correction of imbalances accumulated during good times within the system Minsky (1982). It is based on a notion of risk that takes into account the potentially destabilizing nature of the collective behavior of economic agents, which is called "endogenous risk". Financial stability is defined here as the resilience to fragilities formed within the financial system (Borio & Lowe, 2002). The last approach highlights the transmission channels of financial stress at the Rochet and Tirole (1996). This distinction can be integrated into the second approach to financial instability, by focusing particularly on the balance sheet or behavioral connections linking the financial system.

These definitions of financial stability lead to the calibration of the regulatory and supervisory instruments that will be implemented. However, it turns out that the implementation of macroprudential instruments is a factor of conflict in the pursuit of the objective of price stability by monetary policy.

The question then arises of the nature of the relationship between monetary policy and macroprudential policy. And this question is of particular interest in the CEMAC zone for at least two reasons. 1) In the CEMAC zone, the monetary policy of the Bank of Central African States (BEAC) has the ultimate objective of guaranteeing monetary stability, namely a low inflation rate and a sufficient external currency coverage rate (the minimum threshold is 20%), so as to maintain the fixity of the exchange between the CFA franc, the currency issued by the BEAC on behalf of the Member States and the euro, the European currency. Without prejudice to this objective, the BEAC provides support for the economic policies of the Member States. During the 1980s, the main economies of the CEMAC member states were facing the banking crises. Since 2010, the BEAC has introduced the objective of financial stability among its missions. 2) Financial stability may become an important objective of the BEAC in the event of a downturn in the oil situation due to the increase in bad debts in a context of deterioration in the quality of credit to the private sector.

This research is a contribution to the study of the articulation between monetary policy and macroprudential policy. And the main question it tries to answer

is what is the nature of the policy mix between monetary policy and macroprudential policy in the member countries of the Bank of Central African States (BCAS)?

In this regard, it relies on a monetary policy rule inspired by Mc Callum (1987), in order to take into account the monetarist orientation of the monetary policy of the BCAS. The rule adopted is supplemented by a financial stability objective. Furthermore, a methodology based on a regime-switching model was used (Hansen, 1999; Gonzalez et al., 2005). The choice of such a model seems appropriate insofar as the level of foreign exchange reserves within the zone is subject, on a recurring basis, to fluctuations due to the dependence of BCAS member countries on variations in the prices of commodities and the exchange rate between the euro and the US dollar. In this, a regime-switching model makes it possible to take into account the uncertainty (Friedman, 1960; Brainard, 1967; Wieland, 2002; Grigoli et al., 2015; Drew-D-Creel, 2017) with which the BCAS is in the conduct of monetary policy with regard to developments in the international environment.

Thus, the originality of this research lies in the fact that the articulation between monetary policy and macroprudential policy is considered from the economic situation.

The rest of the study is organized as follows: Section 2 is devoted to the literature review. Section 3 presents a brief overview of macroprudential policy management in the CEMAC zone. Section 4 is devoted to the presentation of the model. Section 5 proceeds to the empirical analysis. Finally, Section 6 concludes.

2. Literature Review

The literature highlights two polar cases of the combination between monetary policy and macroprudential policy. The two approaches have different theoretical foundations and underlie different conceptions as to the transmission channels, the instruments used and the methods of assigning them.

The first advocates the separation between monetary policy and macroprudential policy by emphasizing, on the one hand, the limits of the interest rate instrument and, on the other, the effectiveness of the macroprudential instrument in the financial instability (Svensson, 2012; Bernanke, 2013; Beau et al., 2012). Based on a review of both Tinbergen's consistency rule (1952) and Mundell's rule of efficient instrument allocation (1963), the separate approach advocates allocating monetary policy to stability prices and macroprudential policy to financial stability. In this perspective, the central bank should become more involved in the prudential supervision of financial institutions. This is the "modified Jackson Hole" consensus (Dees, 2019) that monetary policy should keep its usual framework, i.e. that of the standard Taylor rule. The idea supported here is that the credibility of the central bank risks being undermined by a dual objective of monetary stability and financial stability (Goodhart & Schoenmaker, 1995). Moreover, in the absence of a uniform and clearly established rule, macroprudential policy would be exposed to problems of time inconsistency, which also

affects the credibility of central banks and, consequently, the effectiveness of their monetary policy (Ueda & Valencia, 2012).

On the other hand, the second approach advocates the integration of monetary policy and macroprudential policy, both of which should be entrusted to the same institution for a better articulation between the respective objectives (Adrian & Shin, 2009; Mishkin, 2011; Eichengreen et al., 2011). Indeed, the integrated approach emphasizes that a standard Taylor rule accentuates financial risks via the "risk-taking channel" inspired by Minsky (Borio & Lowe, 2002). From this perspective, because they are more targeted, the instruments of macroprudential policy are easily circumvented, hence they need to complement their action with that of the interest rate (Angeloni, 2014). The central bank should then integrate financial stability considerations when implementing its interest rate setting decisions. Price stability and financial stability can therefore be integrated into an "augmented" Taylor rule including one or more financial variables, in particular credit (Christiano et al., 2010) or indicators of financial imperfections (Curdia & Wooford, 2010)[1]. Thus, each of these two policy-mix regimes corresponds to a representation of monetary policy via the Taylor rule. In the separate policy-mix approach, there is no reason to increase the Taylor rule. The macroprudential instrument is assumed to be fully effective in preventing financial instability. Conversely, in the integrated policy-mix approach, the rule is increased by a financial target so that the interest rate complements the action of the macroprudential policy, or at least ensures that the action of the interest rate does not go against financial stability.

It should also be noted that between these two approaches, intermediate positions have been considered[2]. Indeed, following Beau et al. (2012), the optimal policy mix depends on the type of shock and the intersection of inflation and financial stability conditions. The integrated regime will therefore constitute an emergency solution for certain central bankers and especially when it is "the only possible option" in the event of an extreme crisis[3]. In these exceptional conditions, Bernanke (2013) "does not rule out" using the interest rate to fight against financial instability. Conversely, in a normal situation, a decoupled policy-mix is appropriate. Moreover, in the event of a conflict of objectives, that is to say when there is a lack of synchronization of the real and financial cycles, priority is given to a single objective so that when it is achieved, we focus on the second[4]. The

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[1]The proposal to broaden the definition of the measure of inflation to include certain asset prices (Alchian & Klein, 1973; Shibuya, 1992) is no longer relevant; the augmented Taylor rule means that monetary policy is "lean" oriented to support the macroprudential instrument; the interest rate and the macroprudential instrument are then assumed to exert complementary actions.

[2]This is the conditional policy-mix approach or the intermediate approach, which results in an asymmetric or non-linear Taylor rule, sometimes non-augmented, with the stability response coefficient varying over time.

[3]These are cases of complementarity between the two policies. Two cases can be distinguished. First, when there is coexistence of inflation above its target and financial exuberance (boom). Second, when there is coexistence of inflation below its target and financial deflation.

[4]These are two cases of conflict of purpose. First case, when there is coexistence of inflation above its target and financial deflation. Second case, when there is coexistence of inflation below its target and financial exuberance.

choice of policy-mix is not just a theoretical question, it is just as much empirical since it varies according to macroeconomic conditions.

Finally, empirically, in economies where the conduct of monetary policy is based on the Taylor rule, the latter is augmented by financial conditions to determine the relationship between monetary policy and macroprudential policy. The estimation methods used for this purpose are based on the Bayesian approach (Smets & Wouters, 2003), or reaction function matching techniques (Christiano et al., 2005). However, the results do not settle the debate on whether or not to increase the Taylor rule (Carré et al., 2015).

The studies cited above have a definite limit: they do not allow us to identify the nature of the policy-mix between monetary policy and macroprudential policy in a fixed exchange rate context. It is for this reason that the objective of this work is to fill this gap in the literature by seeking to determine the nature of the policy-mix between monetary policy and macroprudential policy in a fixed exchange rate context. In addition, this work is also the first to be carried out in the member countries of the Bank of Central African States.

3. The Management of Financial Stability in the CEMAC Zone: State of Places

In the wake of the 2017-2018 global financial crisis, authorities in the CEMAC zone initiated a comprehensive reform of financial stability management instruments. The first part of this reform is that related to microprudential supervision, the objective of which is to comply with the fundamental principles of the Basel Committee. A major implication of this compliance is the adoption of supervision on a consolidated basis of banking groups. The second part of this reform is the establishment of additional instruments that act at the level of the entire financial system. Macroprudential policy is part of this second component. Thus, since 2010, the management of macroprudential policy in the CEMAC zone has resulted in the definition of institutional, analytical and operational frameworks.

First of all, concerning the institutional framework, CEMAC has a macroprudential surveillance framework which is coordinated by the Governor of the BCAS, as part of his financial stability mission. It was implemented gradually: 1) registration of the "promotion of financial stability in the Union" as one of the statutory missions of the BCAS in 2010; 2) creation of a Department of Studies and Financial Stability in 2010; 3) establishment of the Financial Stability Committee in Central Africa (FSC-CA) in 2012, an advisory body whose mission is to coordinate the various players in financial stability and to assess the risks of financial instability. It integrates non-banking institutions into the financial stability mechanism; and 4) adoption of the FSC-CA Rules of Procedure in 2014.

With regard to the analytical framework, the BCAS has identified financial stability indicators which are classified by sector (Banks, Microfinance Institutions, Other Financial Institutions, Financial Markets, Public Sector), in order to

monitor the development of activities and risks in the various components, and by objectives (Macroeconomic context) to monitor the appearance of certain imbalances. Since 2014, the Financial Stability Committee has made the following significant analytical advances: 1) revision, in March 2018, of the grid of financial stability indicators adopted by the CSF-AC on 27 November 2015; 2) production of a "Note on the vulnerabilities of the Central African financial system" intended for FSC-CA meetings; 3) definition of the methodology for identifying and monitoring procedures for institutions of systemic importance in the CEMAC by COBAC Regulation; 4) implementation of macroprudential stress tests in order to probe the resilience of the banking system in the sub-region in the face of severe macroeconomic shocks; 5) establishment of an emergency liquidity provision (ELP) mechanism allowing the BCAS to provide liquidity to institutions deemed solvent by the Central African Banking Commission (CABCO) to enable them to deal with serious liquidity tensions; and 6) publication of the Financial Stability Review in Central Africa to provide a detailed look at the risks and vulnerabilities to which the Zone's financial system is exposed over the course of a year.

Lastly, with regard to the operational framework, the Financial Stability Committee issues opinions, alerts and recommendations to its members. These recommendations are not binding, but their implementation is carefully monitored. Since its creation, the Committee has issued no opinion. With regard to the main mission of the Financial Stability Committee, namely the prevention of systemic risks, Table 1 below gives a synoptic view of the evolution as well as the assessments of these risks. Admittedly, while the progress made in promoting financial stability in CEMAC is significant, the fact remains that the implementation of macroprudential policies in the CEMAC zone still faces obstacles: 1) it is difficult to rationally define the instruments of macroprudential policy due to the lack of reliable information on financial activities in the sub-region; 2) the effective implementation of the macroprudential policy comes up against the inherent limits in terms of human resources; 3) the implementation of macroprudential policy is constrained by the need for coordination between economic policies, between Member States and the regulatory authorities of non-member economic partners. A difficulty specific to the context of the CEMAC zone is having to manage the heterogeneity of macroeconomic and financial situations between member countries.

4. Econometric Modelling

In the context of this research, we suggest a Mc Callum type rule because of the main mission of the BCAS which is the search for monetary stability, understood as a low level of inflation and a sufficient level of foreign exchange reserves. This mission suggests that the monetary policy of the BCAS has a monetarist theoretical anchoring, in that it combines the quantity theory of money and the monetary approach to the balance of payments.

Table 1. Evolution and assessment of risks in the CEMAC zone: status report.

RISK	EVOLUTION	EVALUATION
Countries	High and stable	- low overall attractiveness of the business environment (last places in international assessments) - socio-political tensions in Cameroon, CAR and Chad - some progress made by certain States in the creation of companies
Macroeconomics	Moderate and stable	- expected recovery in growth to 2.2%; - recovery of public accounts; - external sustainability of the currency still fragile (2.7 months of reserves for the import of goods and services. Currency external coverage rate around 60%); - fragile forecasts, highly dependent on oil prices and the outcome of programs with the IMF
Credit	High and rising	- improved growth prospects - deterioration in the quality of the bank loan portfolio (significant increase in doubtful and fixed loans of 12.5% and 15.5% respectively); - continued rise in the cost of resources mobilized on the government securities market (above the TIAO)
Market	Weak and stable	- timid markets in a context of expected recovery - illiquid securities (liquidity ratios on BVMAC and DSX below 0.5%)
Liquidity	Moderate and stable	- decline in recourse to BCAS refinancing (about 30% to 482.1 billion between June 2017 and June 2018) - 20.3% increase in bank reserves with the BCAS - 42/51 banks have a liquidity ratio > 100%, compared to 41 in June 2017; - worrying liquidity of the OPS, in relation to their management and governance problems (immediate cash ratio at 41% for a standard of 100%)
Solvab	Moderate and stable	- generally satisfactory situation at the level of the banks (45 banks out of 51 complying with the risk coverage ratio); - comfortable situation in terms of insurance (rate of coverage of regulated commitments by quality assets above the standard of 100%)

Source: Authors.

Alongside variables relating to monetary stability and economic smoothing, particular interest is given to the objective of financial stability, measured by the deviation of bank claims from its long-term trend (Curdia & Woodford, 2010), in insofar as in the BCAS zone the financing of the economy is essentially based on the banking system, the financial markets being embryonic. Mc Callum's "augmented" rule looks like this:

$$\Delta bm_{i,t} = \delta\left(\pi_{i,t} - \pi_{i,t}^*\right) + \tau\left(aen_{i,t} - aen_{i,t}^*\right) + \partial\left(y_{i,t} - y_{i,t}^*\right) + \theta\left(cred_{i,t} - cred_{i,t}^*\right) + \epsilon_{i,t} \tag{1}$$

With $i = 1, 2, \cdots, N$; $t = 1, 2, \cdots, T$

- $\Delta bm_{i,t}$, the change in the monetary base;
- $\pi_{i,t}$, inflation rate;
- $\pi_{i,t}^*$, inflation target rate;
- $aen_{i,t}$, net foreign assets;
- $aen_{i,t}^*$, target foreign assets;
- $y_{i,t}$, gross domestic product per capita;

- $y_{i,t}^*$, potential gross domestic product;
- $cred_{i,t}$, doubtful debts;
- $cred_{i,t}^*$, target doubtful debts;
- δ, τ, ∂ et θ represent respectively the weights given to the inflation, net foreign assets, product and credit gap targets;
- $\epsilon_{i,t}$, the error term.

A non-linear panel is estimated by integrating net foreign assets as the variable defining the regime change. Indeed, in fixed exchange rates, as is the case between the CFA franc and the euro, foreign exchange reserves constitute the adjustment variable for the central bank and their level influences the parity of the currency concerned. Moreover, the model used seems appropriate for determining the nature of the policy-mix between monetary policy and macroprudential policy according to the evolution of the BCAS's external assets.

The "augmented" McCallum rule of financial stability then takes the following nonlinear form:

$$
\begin{aligned}
\Delta bm_{i,t} = \theta_{0i} + &\Big[\delta^1 \left(\pi_{i,t} - \pi_{i,t}^* \right) + \tau^1 \left(aen_{i,t} - aen_{i,t}^* \right) + \partial^1 \left(y_{i,t} - y_{i,t}^* \right) \\
&+ \theta^1 \left(cred_{i,t} - cred_{i,t}^* \right) \Big] * I \left(laen_{i,t} \le \gamma \right) + \Big[\delta^2 \left(\pi_{i,t} - \pi_{i,t}^* \right) \\
&+ \tau^2 \left(aen_{i,t} - aen_{i,t}^* \right) + \partial^2 \left(y_{i,t} - y_{i,t}^* \right) + \theta^2 \left(cred_{i,t} - cred_{i,t}^* \right) \Big] \\
&* I \left(laen_{i,t} > \gamma \right) + \epsilon_{i,t}
\end{aligned}
\tag{2}
$$

With:
- $laen_{i,t}$, logarithm of net foreign assets (threshold variable);
- γ, is the threshold;
- The exponents 1 and 2 are marginal effects, respectively in regimes 1 and 2;
- *I*, an indicator function which takes the value 1 if the condition between brackets is respected and 0 otherwise.

The value of the threshold γ is determined so as to minimize the sum of the squares of the residuals (SSR), according to the following formula:

$$
\hat{\gamma} = \arg \min SSR \left(\gamma \right)
\tag{3}
$$

Estimation of the "augmented" Mc Callum rule also makes it possible to determine whether the monetary base is an appropriate instrument to guarantee the articulation between monetary policy and macroprudential policy according to the phases (good or bad economic situation) of evolution of the net foreign assets.

5. Empirical Analysis

The data used come from the database of the World Bank and the Bank of Central African States (BCAS) for the period 2006-2018. They include gross domestic product per capita (gdp), bad debts (cred), net foreign assets (aen), inflation rate (ipc) and monetary base (bsm). For the sake of harmonizing quantities, GDP and the monetary base are linearized by the natural logarithm (ln). In ad-

dition, the trends of the series are determined using the Hodrik and Prescott (HP) filter and the annual data are quarterlyized according to the method of Mansouri and Afroukh (2008). To identify the nature of the policy-mix between monetary policy and macroprudential policy, the threshold model is estimated according to the method of Hansen (1999) using Stata14 software.

Concerning the preliminary panel tests, the results of the Fischer heterogeneity tests show that the BCAS countries are heterogeneous, thus confirming the possibility of estimating the model in the form of a panel (prob > F = 0.000). Kennedy's multicollinearity tests (1985) show that the variables, taken two by two, are not strongly correlated with each other. In addition, the Hausman test supports the idea that the most relevant model for estimating Mc Callum's rule is fixed effect (prob > chi^2 = 0.000). All the results of these tests are available on request.

The estimate of the single threshold by the bootstrap method is provided by the following Table 2.

Thus, the transition from regime 1 (low economy) to regime 2 (high economy) occurs when the logarithm of net foreign assets (laen) goes above 28.2809. The confidence interval of this threshold is between 28.2527 and 28.2998 at the 95% level. The estimation of the "augmented" McCallum rule of financial stability leads to the results presented in Table 3 below.

Table 2. Threshold effect test.

Tests (bootstrap = 300)	Threshold	Minimum	Maximum	p-value
Single	28.2809*	28.2527	28.2998	0.0000

Notes: The Student tests on each coefficient are based on a null hypothesis of significance at zero and an alternative hypothesis of non-significance at zero. When the coefficient is preceded by (*) then the null hypothesis is rejected at the 1% threshold; for (**) the null hypothesis is rejected at the 5% threshold; for (***) it is rejected at the 10% threshold.

Table 3. "Augmented" Mc Callum rule Endogenous variable: the monetary base ($lbsm_{i,t}$).

Exogenous variables	Coefficients	
	Regime 1 $\gamma < 28.2809$	Regime 2 $\gamma > 28.2809$
Output gap ($spibh_{i,t}$)	1.87e−08	1.90e−06***
Price stability ($sprix_{i,t}$)	−0.00302*	−0.1429*
Financial Stability ($sfin_{i,t}$)	1.43e−06	−4.27−05*
Stability of net foreign assets ($snfa_{i,t}$)	1.34e−05*	3.55e−06
Constant	13.284*	13.284*

Notes: The Student tests on each coefficient are based on a null hypothesis of significance at zero and an alternative hypothesis of non-significance at zero. When the coefficient is preceded by (*) then the null hypothesis is rejected at the 1% threshold; for (**) the null hypothesis is rejected at the 5% threshold; for (***) it is rejected at the 10% threshold.

The overall significance of the estimated McCallum rule (prob > F = 0.0000) and that of the 5% threshold confirm the relevance of the nonlinear relationship at two regimes retained. Indeed, the results in Table 3 show that the monetary base is a relevant instrument for identifying the nature of the policy-mix between monetary policy and macroprudential policy.

Indeed, the choice of an "integrated" or "separate" policy-mix depends on the international economic situation which impacts net foreign assets (nea). In particular, it appears that in periods of low economic conditions (Regime 1: $laen_{i,t}$ less than 28.2809), financial stability does not have a significant effect on the monetary base. This suggests that the policy-mix between monetary policy and macroprudential policy is "separate" in nature. On the other hand, in a boom period (Regime 2: $laen_{i,t}$ greater than 28.2809), the monetary base reacts to variations in financial stability. This suggests that the policy-mix between monetary and macroprudential policy is "integrated" in nature.

Thus, according to the results, in regime 1, the objective of financial stability can be achieved thanks to a "separate" policy-mix. This involves developing interaction between monetary and macroprudential policies, conducted respectively by the BCAS and the Central African Banking Commission (CABCO), one taking into account the measures taken by the other. In this regard, the BEAC should, within the framework of the conduct of monetary policy, ensure, among other things, the proper functioning of the credit channel so as not to prejudice the financial stability measures taken by the CABCO.

On the other hand, in regime 2, it is suggested, in the context of an "integrated" policy-mix, that the steering of monetary policy instruments by the BCAS anticipates economic downturns, a source of financial instability insofar as the level of bad debts held by banks can become significant in low economic conditions.

In other words, it is for the BCAS to take all the appropriate measures to prevent the harmful effects on financial stability, which could be observed in a recession phase (low economic situation or regime 1), and which would be caused by the euphoric behavior of banks during the expansion phase (boom or regime 2).

6. Conclusion

In this article, we have tried to identify the nature of the policy-mix between monetary policy and the macroprudential policy of the BCAS. To this end, we tested a monetary rule "augmented" by a financial stability objective using a regime-switching panel data model covering the period 2006-2018. The results show that the nature of the policy-mix between monetary policy and macroprudential policy depends on the economic situation, precisely on the evolution of net foreign assets. Consequently, it appears that in a period of "low economic conditions" (regime 1), the monetary authorities should use a "separate" policy-mix. On the other hand, in a period of "boom" (regime 2), the results suggest that they implement an "integrated" policy-mix taking the form of a McCallum

rule augmented by a financial stability objective.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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