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Macroprudential policy and cross-border financial flows

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Résumé. This article analyzes the relevance of conducting macroprudential policy within a small open economy such as WAEMU. While it remains a key tool for preserving financial stability today, its conduct is nevertheless subject to a certain degree of uncertainty in a world where capital circulates freely. Empirical analyses indicate that macroprudential measures oriented exclusively towards the sources of internal imbalances cannot be fully effective in the presence of cross-border financial flows. It would be appropriate to add an external dimension to macroprudential policy in view of the negative externalities associated with cross-border financial flows.

Keywords: *Macroprudential policy; Financial integration; DSGE; Dynamic Stochastic General Equilibrium Model.*

1. Introduction

The need for a macroprudential framework emerged in the aftermath of the 2008 global financial crisis, establishing itself as a crucial tool for safeguarding financial stability. However, its implementation remains uncertain, particularly in a financially integrated world where capital moves freely (Aizenman et al., 2020). In such a context, economies are increasingly exposed to global financial conditions, often driven by monetary impulses originating from the Federal Reserve (FED), which constitute a significant channel of contagion (Miranda-Agrippino and Rey, 2022). As a result, pursuing financial stability amid the vulnerabilities associated with cross-border capital flows poses a major challenge for the effective conduct of macroprudential policy.

For West African Economic and Monetary Union (WAEMU) economies—characterized by persistent current account deficits—this issue is of particular concern. These structural vulnerabilities further complicate the implementation of macroprudential measures in the face of a global financial cycle that exacerbates domestic imbalances through volatile financial flows.

The evolution of the WAEMU banking system's external liabilities highlights their sensitivity to periods of global financial stress, notably during the 2006–2008 subprime crisis and the 2017–2019 COVID-19 pandemic. These liabilities reflect the exposure of the WAEMU financial system to a dense network of cross-border capital flows, which function as real transmission channels for external financial shocks to the regional monetary union. Moreover, the persistent current account deficit reinforces these vulnerabilities, imposing additional constraints on the region's ability to maintain financial stability.

A distinctive feature of the WAEMU financial structure is the dominance of highly concentrated international banks. These international financial institutions—originating from the Maghreb, the European Union, and the Central African Economic and Monetary Community (CAEMC)—hold a market share exceeding 50%, surpassing that of regional financial institutions (WAEMU institutions represent only 41.8%). Their central role in financing the real economy underscores their systemic importance and the potential externalities linked to their failure (Too Big to Fail).

Against this backdrop, it is essential to assess the relevance and effectiveness of macroprudential instruments in a context where there are no restrictions on cross-border capital mobility. Can macroprudential policy alone ensure financial stability within a monetary union like WAEMU? If not, what is the effectiveness of national macroprudential tools in increasingly

integrated economies?
Macroprudential policy remains relatively recent and underexplored in the context of small open economies, especially in the WAEMU region. This paper seeks to address this gap by highlighting the challenges involved and offering concrete proposals to enhance the implementation of macroprudential measures.
This paper is structured as follows. Section 2 reviews the literature. Section 3 discusses the model. Section 4 discusses the methodology. Section 5 interprets the results. Finally, Section 6 concludes.

2. Literature review

Macroprudential policy fundamentally aims to prevent the macroeconomic costs associated with financial disruptions and thereby ensure financial stability (Bengui and Bianchi, 2018; Farhi and Tirole, 2020). However, in the context of increasingly integrated financial markets, new challenges have emerged.
Theoretical literature has clearly established the benefits of capital mobility. Yet, in a globally interconnected economy, systemic risk calls for a reassessment of the orientation of macroprudential policy. Indeed, disruptions in global financial markets are transmitted across countries through financial flows, amplifying vulnerabilities and reducing the effectiveness of domestic regulatory frameworks (Aizenman et al., 2020; Miranda-Agrippino and Rey, 2022). As such, the conduct of macroprudential policy is now surrounded by uncertainties linked to the distortions caused by financial integration.
A central concern in this regard is the issue of regulatory "leakages." Due to capital mobility, macroprudential tightening in one jurisdiction can lead to the migration of financial activity to less regulated sectors—such as the shadow banking system—or to jurisdictions with laxer oversight. This process of regulatory arbitrage undermines the effectiveness of domestic measures (Aiyar et al., 2014; Bengui and Bianchi, 2018).
Another key driver of the global financial cycle is the monetary policy stance of major economies, particularly that of the U.S. Federal Reserve. Its decisions have significant spillover effects on global financial conditions through capital flow channels (Rey, 2018). In such an environment, macroprudential policies focused solely on domestic sources of imbalance are unlikely to be sufficient. As Rey (2018) argues, the macroprudential management of capital flows becomes essential to safeguard financial stability. The procyclical nature of capital flows calls for macroprudential tools that can operate countercyclically, especially by curbing excessive credit expansion and asset price bubbles during the upward phase of the global financial cycle.
While theoretical advances have paved the way, empirical research remains relatively recent. Nonetheless, interest has grown in evaluating macroprudential effectiveness using Dynamic Stochastic General Equilibrium (DSGE) models (Galati and Moessner, 2018). These new-generation models, particularly those inspired by New Keynesian frameworks, aim to incorporate financial frictions to better capture the complex interactions between financial markets and the real economy (Woodford, 2012; Rubio, 2020).
Angelini et al. (2014), employing a DSGE model that integrates financial frictions, analyze the role of macroprudential instruments in mitigating financial imbalances in the euro area. Their findings suggest that while macroprudential tools are effective, they also interact with other policy instruments, particularly monetary policy. These interactions can lead to potential conflicts, as macroprudential tightening affects credit supply and, by extension, the transmission mechanism of interest rates. Their results underline that the combined use of macroprudential and monetary tools within an integrated policy mix improves convergence towards macroeconomic objectives.

Rubio (2020) also adopts a DSGE framework to assess macroprudential effectiveness in the presence of cross-border banking. He finds that combining loan-to-value (LTV) ratio regulations with conventional monetary policy can reduce domestic financial imbalances. Nevertheless, cross-border banking activities facilitate regulatory bypasses, which limit the full effectiveness of national macroprudential efforts. This highlights the need for international policy coordination to preserve global financial stability.

While empirical studies generally support the efficacy of macroprudential instruments, the external dimension of these measures remains insufficiently explored, especially in light of growing cross-border financial interdependencies. Most existing analyses account for financial openness, but do not fully consider the vulnerabilities posed by international banking activity and cross-border regulatory arbitrage.

This study aims to address this gap by re-examining macroprudential measures within a globalized financial system. It offers a comprehensive analysis of the limitations of current approaches and proposes frameworks for more effective macroprudential governance in an era of deepening financial integration.

3. Methodology

The purpose of the model is to analyze the ability of macroprudential measures to effectively reduce financial imbalances within a monetary union in the presence of cross-border financial flows.

The model hypothesis is formulated as follows: *In a small open economy such as WAEMU the effectiveness of macroprudential instruments is limited in the presence of cross-border financial flows*.

We present the model variables before proceeding with the econometric approach and the interpretation of the results.

a. Presentation of variables

The explained variable of our model taken as a measure of systemic risk is the credit spread $(systemic\_risk)$, which describes the cyclical accumulation of systemic risk during characteristic periods of excessive credit growth and asset price bubbles. Recent literature and the guidelines of the Basel Committee make it a reference indicator for capturing the dynamics of systemic risk accumulation with regard to the evolution of the financial cycle (Drehmann and Juselius, 2014; Nakatani, 2020).

As for the explanatory variables, we distinguish respectively:

- the macroprudential instrument (cbc), defined by countercyclical capital buffers evolving according to the state of the financial cycle (Cerutti et al., 2017; Cizel et al., 2019). They take the form of a dichotomous variable taking the value 1 sign of a tightening of macroprudential measures when systemic risk accumulates and the value 0 otherwise. The expected negative sign indicates that the tightening of macroprudential measures is likely to reduce systemic risk.
- Cross-border financial flows (k_flow), reflect the financial links of the union with the rest of the world. Such links are approximated by banks' external liabilities to non-residents expressed as a ratio to GDP (Lane and Milesi-Ferretti, 2018). The expected positive sign indicates that cross-border financial flows contribute to fueling financial imbalances within the monetary union;
- Monetary policy independence (mi), allows to assess the degree of independence of the monetary policy of the domestic economy in a context of financial integration. Otherwise the ability of the WAEMU central bank to conduct its monetary policy without being constrained by external financial conditions globally affected by the

monetary policy of the Federal Reserve (FED). In this article we use the index of monetary independence as Azienman et al., (2010) defined by the inverse of the annual correlation between the short-term interest rate within the union and that of the Federal Reserve (FED) as follows:

$$mi = 1 - \frac{cor i_{waemu}, i_{fed}) - (-1)}{1 - (1)} \quad (1)$$

A positive sign indicates greater autonomy.

With: i_{waemu} (short-term interest rates in the monetary union); i_{fed} (short-term interest rates of the Federal Reserve) and $corr(i_{waemu}, i_{fed})$, the correlation of interest rates between the monetary union and the Federal Reserve.

- The interaction variable between macroprudential policy and the monetary policy independence index allows us to assess the impact of external financial conditions on macroprudential policy (pmp_mi), otherwise assess the impact of the global financial cycle on the macroeconomic balance of the domestic economy in the presence of a national macroprudential policy with an exclusive orientation to the management of internal imbalances.

Following the methodology of Nakatani (2020), we analyze the ability of macroprudential policy to effectively reduce financial imbalances with regard to market integration and its ability to reduce the probability of systemic risk.

The relationship for estimation purposes is as follows:

$$\Pr ob(systemic\_risk_{it} = 1/X_{it}) = F(\beta X_{it}) + \varepsilon_{it} == \frac{1}{1+e^{-X_{it}\beta}} + \varepsilon_{it}, (2)$$

with :

$\Pr ob(systemic\_risk_{it} = 1/X_{it})$, the conditional probability of occurrence of systemic risk conditionally on the vector of exogenous variables X_{it}.

$F(.)$, the distribution function following a logistic law;

$X_{it} = \begin{bmatrix} cbc_{it} \\ mi\_waemu\_fed_{it} \\ k\_flow_{it} \\ pmp\_mi_{it} \end{bmatrix}$, the vector of exogenous variables;

Or :

β, with $\beta = (\beta_1, \beta_2, \beta_3, \beta_4, \beta_5)$, corresponds to the vector of parameters associated with the explained variables;

ε_{it} , the error term;

$i$and t, represent the individual and temporal dimension respectively.

b. The econometric approach

The data used come from the BCEAO database, covering the period from 2000 to 2023 for all countries of the union excluding Guinea-Bissau for reasons of sufficient data availability. The econometric approach proceeds from the estimation method.

The estimation of the dichotomous dependent variable model is carried out using the Logit regression method in panel data (Baltagi, 2013). Such a method has a double advantage:

- Given the dichotomous nature of the explained variable, it makes it possible to resolve [1]estimation biases resulting from heteroscedasticity and the non-normality of disturbances, unlike the ordinary linear regression model;
- It is a probabilistic method which allows us to define the probability of occurrence of an event (systemic risk in our case) conditionally on a vector of explanatory variables.

4. Results

The table below presents the results from the Logit estimation.

Table 1.2 Summary of results

Logit	$\Pr ob(systemic\_risk_{it}=1)$
cbc_{it-1}	-0.30**
	(-3.60)
k_flow_{it}	0.67**
	(2.41)
$mi\_waemu\_fed_{it}$	-1.78**
	(-2.71)
pmp_mi_{it}	-0.89
	(-1.38)
Wald Chi2	19.84
Prob>chi2	0.0005
HL Statistics	12.67
Predict	92

Source: author, from stata 16, z-student in parentheses.
Significance at 10% (*), 5% (**) and 1% (***)

It appears that the estimated model presents an overall significance with regard to the Wald test and good predictive qualities with more than 90% of the predictions correct. Furthermore, the econometric estimations indicate that all the parameters except that of the interaction variablecbc_mi_{it} are significant .

The positive sign The macroprudential instrument parameter (cbc_{it})indicates that countercyclical capital requirements contribute to reducing systemic risk.

However, in an integrated global economy, cross-border financial flows contribute to the accumulation of systemic risk in view of the positive sign of the parameter of the cross-border financial flows variable (k_flow_{it}) , which is likely to inhibit the effectiveness of macroprudential policy and surround it with a certain degree of uncertainty.

Moreover, the negative sign of the monetary independence index (6.3 **) reveals that a loss of monetary autonomy adds an additional constraint to the preservation of financial stability within the union.

In this context, as indicated by the positive and insignificant sign of the interaction variable of macroprudential measures and the index of independence of monetary policy (k_flow_{it}), a

[1]The assumptions of normality and heteroscedasticity of disturbances are no longer verified (Baltagi, 2013).

- Absence of normality of the residuals

with$y_i = \alpha + \alpha_i x_i + \varepsilon_i$
where: $i = 1 \ldots n$, $Prob(y_i = 1) = P_i$from where $Prob(y_i = 0) = 1 - P_i$;
When $y_i = 1$=> $E(\varepsilon_i) = 1 - \alpha + \alpha_i x_i$with the probability P_i ;
When $y_i = 0$=> $E(\varepsilon_i) = -\alpha + \alpha_i x_i$with the probability $1 - P_i$;
SO $E(\varepsilon_i) \neq 0$ $quelque\ soit\ i$;

- Absence of homoscedasticity of residuals

The variance of the error is given $Var(\varepsilon_i) = P_i(1 - P_i)$ as a function of the vector of explanatory variables x_i.

national macroprudential policy exclusive to the management of internal imbalances is ineffective.

5. Discussions

The model estimation results confirm our working hypothesis. Macroprudential policy contributes to limiting systemic risk, however, in an integrated international financial system, the mobility of capital flows surrounds its effectiveness with a certain degree of uncertainty.
Indeed, the structural characteristics of the union, financial openness adds an additional constraint to the preservation of financial stability. As Rey's work (2018) points out, no economy is isolated from the global financial cycle driven by the dynamics of central economies, in this case the US Federal Reserve (FED) due to the predominance of the US dollar in invoicing trade, holding official reserves; which in fact constitutes the main dominant global currency. Thus, financial conditions on the global market constrain the conduct of monetary policy in the WAEMU zone and the loss of monetary independence further constrains macroeconomic stability.
In the WAEMU zone , national macroprudential measures have proven particularly effective in reducing systemic risk when they originate from internal imbalances. However, they have proven ineffective in the presence of external shocks from international markets. It appears that macroprudential measures by acting on the sources of internal imbalances cannot be fully effective in a globalized economy where capital circulates freely.
In light of the above, national prudential policy cannot be fully effective when the capital market is open to cross-border transactions.
Such findings underscore the need for measures to insulate the domestic economy from disruptions in the global financial market. Thus, negative externalities related to global financial integration, particularly contagion effects, represent new challenges for the preservation of financial stability within the monetary union. Faced with such fragilities associated with financial integration, the prudent management of negative externalities associated with changes in financial conditions on the international market through macroprudential measures oriented towards the management of capital flows should be prioritized.

6. Conclusion

This reflection consisted of an analysis of the capacity of macroprudential policy to guarantee financial stability in a context of financial integration within a monetary union such as the WAEMU . The results of the empirical analysis indicate that macroprudential instruments oriented towards the factors of internal imbalances cannot be fully effective in a financially integrated global economy. Indeed, to the extent that cross-border financial flows fuel internal imbalances, they are likely to alter the effectiveness of macroprudential policy within the monetary union.
The negative externalities associated with financial integration therefore add an additional constraint to maintaining financial stability. Thus, international coordination of macroprudential measures to reduce regulatory arbitrage (circumvention and spillover effects) may be useful for greater effectiveness of macroprudential instruments.
One of the main contributions of this article is to push the reflection on measures to complement macroeconomic management in an open economy in light of the new challenges presented by financial integration. In other words, how can economies be insulated from the transmission of disruptions to global financial markets in an integrated international financial system?

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