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Interactions between Monetary and Budgetary Policies in the CEMAC Zone

Soulemanou[1*], Tadadjeu Dessy-Karl[2]

[1]Economist, PhD, University of Ebolowa, Cameroon
[2]Economist, PhD, University of Dschang, Cameroon

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***Corresponding author:** Soulemanou
Economist, PhD, University of Ebolowa, Cameroon

Abstract **Original Research Article**

The aim of this article is to analyse the impact of fiscal policy on the general price level in the CEMAC zone in a context of increasing of growing debt and budget deficits. In particular, it aims to study the effects of public deficit and debt on inflation. In using data from the 06 CEMAC countries covering the period 1990-2020, we have highlighted the budgetary theory of price levels. The results of the econometric estimates obtained using the Feasible Generalized methods show that the budget deficit and public (and external) debt (and external) debt have positive and significant effects on inflation. Furthermore, the results show that external public debt is more inflationary than inflationary than domestic public debt in this Zone.

Keywords: Fiscal Policy, Monetary Policy, Debt, Coordination, CEMAC, BEAC.
JEL Classification: E52, E58, E62, E64.

1. INTRODUCTION

Recently, during the global financial crisis and more recently, during the Covid-19 crisis and the Russo-Ukrainian conflict, negative shocks to commodity prices have considerably affected the global economy and particularly African commodity-exporting economies. The effects of these exogenous crises have impacted on the performance and economic integration of the economies of developing countries, specifically in the CEMAC zone [1]. Oil shocks, by affecting the consumer price index (CPI) and government revenues, have consequences for monetary and fiscal policy. These consequences raise the question of the most effective policy mix. As has been widely discussed in the literature, there are possible policy-mix interactions (Leeper (1991), (2016)

The fundamental questions of the interaction between the monetary and budgetary policies of a currency area and the transmission of asymmetric shocks [2, 3], from outside are focal points on which macroeconomic policies have been refocused. Coordination between fiscal and monetary policies has thus taken on a new dimension in discussions on macroeconomic policy management [4].

By policy coordination, we mean that fiscal and monetary policies complement each other to achieve predetermined economic objectives (Dramani (2013), Ka Sanusi *et al*., (2021)). The main arguments in favour of coordination [5], are based on the existence of fiscal externalities (which pass through two channels: the trade channel and the monetary and financial conditions

[1] The CEMAC countries are Cameroon, Central African Republic, Chad, Congo, Gabon and Equatorial Guinea.
[2] The great recession and the global financial crisis have caused fiscal imbalances to explode and brought fiscal policy and inflation to the forefront of political concerns.
[3] Symmetrical shocks are a matter for common monetary policy, while asymmetrical shocks can only be properly dealt with by national budgetary policies.
[4] In recent years, researchers have renewed interest in examining the extent to which fiscal policy could and should be used as a stabilisation tool alongside monetary policy. For a long time, the problems of monetary and fiscal policy were dealt with separately, or mainly within the framework of monetary unions.
[5] Pamis The various channels through which fiscal policy and monetary policy interact include: the risk premium, debt servicing, the exchange rate, the variation in aggregate demand from public spending, the level of public debt and inflation.

channel [6], and on the inflationary effects of national fiscal policies (lessons from the budgetary theory of the general price level). In a poorly coordinated macroeconomic environment, fiscal policies can affect the chances of success of monetary policies in different ways [7], for example: by eroding general confidence and the effectiveness of monetary policy through its short-term effects on aggregate demand, and by altering the long-term conditions for economic growth and low inflation. On the other hand, monetary policies can be accommodative or contrary to fiscal policies, depending on the prevailing political and economic paradigms (Chibi A. *et al*., 2019).

In Sub-Saharan Africa, the targeting of monetary aggregates and inflation rates has long been at the heart of monetary policy frameworks (MPFs) in many parts of the world. In the Franc zone, inflation has always been under control. In South Africa, inflation fell from around 12% over the period 1980 to 1999 to around 6% on average after the adoption of an inflation target. In Ghana, inflation also fell, from an average of over 33% between 1980 and 2006 to around 16% over the following period. In Ethiopia, it fell from 36% to 13%; in Uganda from 27% to 6% and in Kenya from 19% to 7% at the end of 2014. A comparison of the Franc zone's economic statistics with the rest of sub-Saharan Africa shows that there has been considerable success in combating inflation. The average inflation rate in the 1990s in the CEMAC countries, measured by the consumer price index, was 3.66%, or 5.97% lower than in the rest of sub-Saharan Africa. This trend continued in the decades between 2000 and 2010, with an average inflation rate of 3.16% for CEMAC countries, compared with 6.85% for the rest of sub-Saharan Africa (period 2000-2009), and 2.37% compared with 5.09% over the period 2010-2016 (IMF, 2022).

In the CEMAC zone, the weak economic performance of member countries poses the problem of coordinating macroeconomic policies. The economy of the CEMAC zone as a whole is strongly linked to oil exports, which account for more than 2/3 of the zone's exports. Budgetary management in this case is highly dependent on crude oil price trends. Without being able to build up reserves during the boom years when prices are high, these countries find themselves in a delicate situation when oil prices fall, as public spending is difficult to reverse.

The deterioration in the CEMAC budget (2.2% of GDP) was contained in 2020 given the multiple shocks suffered by the region (health shock, commodity prices and recession). This deterioration is essentially due to the fall in revenues, following the sharp drop in oil revenues [8], in 2020. The slowdown in economic activity has also had a negative impact on non-oil revenue collection. Expenditure [9], has been relatively contained, but with significant differences between CEMAC member countries. As a result, overall public debt increased by 7.7 percentage points, reaching 60% of GDP at the end of 2020, mainly due to the recession in 2020 and the accompanying deterioration in fiscal balances (BEAC, 2022). Debt and deficit have thus once again become a matter of concern, not only because of their macroeconomic impact, but also because of their possible negative effects on the conduct of monetary policy.

The aim of this article is therefore to analyse the impact of fiscal policy on inflation in the CEMAC. Such an analysis contributes to a better understanding of the relationship between fiscal policy and inflation in the CEMAC economies. This study also contributes to the discussion on the interaction between fiscal policy and monetary policy in a context of rising general price levels in the zone. Finally, this article focuses on the implementation of a multi-country model [10], which takes into account the specificities of the CEMAC

[6] When different countries share the same currency, unsustainable budgetary policies result in higher interest rates across the zone as a whole, due to the prospect of inflation or repudiation of public debt, thus affecting all countries and their economic agents (Tanimoune N., Combes J. L., Plane, P. (2005). What is more, the countries that are most handicapped are then the most virtuous, since the rise in interest rates that occurs exerts asymmetric pressure on real interest rates. The most inflationary country is less affected by the rise in nominal rates than the others.

[7] The increase in external and domestic financing has accentuated macroeconomic vulnerabilities and, in some cases, compromised the Central Bank's ability to maintain price stability.

[8] One of the problems with many models reproducing the effects of oil shocks on macroeconomic activity is that they can only analyse a positive oil shock, assuming that a negative oil shock leads to asymmetric consequences (Bergholt 2014).

[9] The effect of public spending on aggregate output depends on three idiosyncratic elements: first, the responsiveness of risk premia to changes in public debt; second, the length of time monetary policy is expected to be constrained if fiscal policy is active; and finally, the sensitivity of tax revenues to economic activity (Corsetti et al. 2013).

[10] One of the main challenges in modelling fiscal policy is that it is intrinsically dynamic thanks to the accumulation of public debt. An increase in debt manifests itself as a constraint on the scope for using fiscal policy to stabilise an economy.

Member States and those of the Central Bank [11]. (BEAC) [12].

The rest of the study is organised as follows: After the introduction, **section 1** presents a review of the literature, **section 2** illustrates the methodology and **section 3** discusses the results.

I. REVIEW OF LITERATURE

I.1 Theoretical Approach: Lessons from the Budgetary Theory of the General Price Level

Sargent and Wallace (1981) paved the way for modern macroeconomic theory by addressing the role of coordination between fiscal and monetary policies in determining the price level. Fiscal discipline is a condition for price stability. Proponents of the budgetary theory of the general price level sought to compete with the quantitative theory of money by demonstrating that price variation is as much a budgetary phenomenon as a monetary one (Creel, 2001). For monetarists, the general price level is determined on the money market and inflation is always and everywhere a monetary phenomenon (Friedman, 1968).

For Keynesians, on the other hand, the determinants of inflation can be real: the general price level is determined by the equilibrium conditions of the labour market and/or the goods and services market. This theory attempts to make the evolution of public debt the main determinant of the general price level by verifying the government's intertemporal budget constraint. The basic idea of the theory of the general price level is that the level of public debt determines the level of prices. More precisely, the general price level equalises the real value of public debt and the expected value of budget balances. If during the current period an increase in debt is not offset by the expectation of a budget surplus in the future, the price level may rise immediately.

In the early 1970s, Brunner and Meltzer (1972) criticised Friedman for neglecting fiscal variables in his explanation of inflation. Sargent and Wallace (1981) systematise the dominant relationship between fiscal policy and monetary policy on the basis of a public debt sustainability equation. Budget deficits may or may not lead to higher inflation, depending on the dominance of the fiscal or monetary authorities.

In a regime of budgetary domination (non-Ricardian regime), by continuing to pursue a lax budgetary policy, as is the case in the CEMAC countries, national governments can press the Bank of Central African States to monetise the deficit. In a regime of monetary domination (Ricardian regime [13]), on the other hand, the Central Bank does not give in and it is the national governments that have to adjust by cutting spending or raising taxes to satisfy the State's intertemporal constraint.

Leeper (1991) subsequently classified fiscal and monetary policies as active and/or passive according to their behaviour and effects on debt. An authority using an active policy has the autonomy to set its policy regardless of the behaviour of the current and past variables controlled by the passive authority. Conversely, if the authority uses a passive policy, it will be limited to the optimisation decisions taken by consumers and by the actions of the active authority. Active monetary policy targets inflation, while passive monetary policy adjusts interest rates to bring debt within sustainable limits. Active fiscal policy spends while ignoring debt levels, while passive fiscal policy adjusts taxes and spending to keep debt within sustainable limits. For there to be a unique equilibrium, one of the policies must be active and the other passive. For prices to be determined, one of the policies must be active, and for the budget to be solvent, one of the policies must be

[11] The Central Bank of the CEMAC zone is the BEAC (Bank of Central African States). It is the central bank common to the 06 countries of the CEMAC zone.

[12] The BEAC granted monetary financing (statutory advances) to CEMAC member states up to a ceiling of 20% of the previous year's budget revenue. In 2010, the BEAC decided to phase out these advances by freezing the ceilings at 2008 budget revenue levels and reducing them by 10% each year. In 2015, due to budgetary difficulties in some Member States, the BE AC reversed its policy and restored advances to their statutory level (20% of the previous year's budget revenue). These advances are defined as short-term facilities, which were effectively extended. Statutory advances had been reinstated in August 2015, before being abolished in August 2017 by the BEAC Board, which was an important step in restoring fiscal discipline and modernising the BEAC's monetary policy framework. Outstanding statutory advances had been consolidated at CFAF 2,779 billion and were to be repaid to BEAC over a period of 14 years, with a grace period of 4 years. The new schedule, adopted in September 2021, which will not affect BEAC's capital position, provides for statutory advances to be repaid over a period of 20, 30 or 40 years, at the discretion of countries, with a grace period of 3 years and interest rates of 2.77%, 2.88% or 2.94% respectively.

[13] In a Ricardian regime, additional public debt issuance is always accompanied by the announcement of a planned increase in future taxes just sufficient to repay the debt. In this system, additional public debt signals an increase in future tax pressure (Barro, 1974). In the non-Ricardian regime, on the other hand, the state sets its expenditure and revenue without worrying about its intertemporal budget constraint. In this situation, it is the variation in the price level that ensures compliance with the government's intertemporal budget constraint, i.e. equality between real debt and discounted future primary surpluses. Greater government indebtedness means a promise to increase base money in the future and ultimately to monetise the debt in the future.

passive. Sims (1994) and Leith and Wren-Lewis (2000) are other articles along these lines.

Woodford (1995) has proposed an alternative means by which fiscal policy can interfere with the determination of the price level, known as Fiscal Theory of the Price Level (FTPL). TFNP complements the theory developed by Leeper (1991) and differs from the theory put forward by Sargent and Wallace (1981) by assuming that the government's budget constraint equation represents an equilibrium condition. If the constraint is violated for a given price level, then that level is not compatible with equilibrium.

Woodford (2003) also shows that if fiscal policy is locally Ricardian, or if taxes are debt-sensitive, equilibrium is determined if and only if the response of monetary policy to inflation exceeds unity. If fiscal policy is locally non-Ricardian, monetary policy will have to violate the Taylor principle and moderate its response to inflation in order to avoid an explosion in public debt. Unsustainable borrowing therefore requires monetary easing.

As Davig and Leeper (2007) point out, policy-making is a complex process of analysing and interpreting data, obtaining advice and exercising judgement. In some periods, policymakers may pay more attention to stabilising inflation or debt, while in other periods they may pay more attention to stabilising output.

In this regard, many studies (Semmler and Zhang (2004); Fialho and Portugal (2005); Chuku (2010); Gonzalez-Astudillo (2013); Gerba and Hauzenberger (2013); Cekin (2013); Kliem *et al.*, (2016)) formulate and solve a New Keynesian model that incorporates monetary and fiscal policy rules with time-varying and interdependent coefficients (regime shifts in monetary and fiscal policy interactions). Time variation and interdependence allow for joint movements in monetary and fiscal policy making, introducing a direct channel of interactions. This channel influences expectations about future monetary and fiscal policy, which in turn affects the dynamics of variables in equilibrium.

Despite its popularity and general acceptability, TFNP has been the subject of fierce criticism in both theoretical and empirical terms. Canzoneri *et al*., (2000), McCallum (2001), Semmler and Zhang (2003) and Buiter (2002, 2018) provide detailed criticisms of TFNP. According to these authors, the original TFNP is based on a fundamental compound error: confusing the government's Intertemporal Budget Constraint (IBC), maintained with equality and with sovereign bonds valued at their contractual value, with a poorly specified equation for valuing nominal bonds in equilibrium, and the "dual use" of this IBC.

I.2 Empirical Literature

There are four (04) approaches to assessing the interaction between monetary policy and fiscal policy. The first is certainly linked to the fiscal theory of the price level (monetary dominance versus fiscal dominance), which proves that it can modify the conditions of stability of monetary policy.

Hughes and Weymark (2005) studied the interactions between monetary policy and fiscal policy in the UK and the Eurozone through a regression analysis using instrumental variables. They argued that there was substitutability in the interaction of monetary and fiscal policies in the UK, whereas complementarity was found in the Eurozone.

In resource-dependent economies, Elbadawi *et al*., (2017) analyse the fiscal basis for the choice of monetary regimes and the extent of fiscal policy procyclicality during the post-mid-1990s oil boom in the under-researched oil-dependent Arab economies. They find preliminary evidence of a threshold effect for per capita oil rents, below which countries tend to be subject to fiscal dominance and procyclical fiscal policy.

Jevđović and Milenković (2018) empirically verify the dominant policy regime (monetary dominance versus fiscal dominance) in five emerging European economies (Hungary, Romania, Bulgaria, Serbia and Macedonia). The results overwhelmingly suggest that monetary policy may have been subordinated to fiscal policy over the period of analysis in all the economies examined and that the fiscal regime prevailed.

The second approach tests the hypothesis of time-varying regime changes (accommodative and counter-accommodative) and the nature of interactions (i.e. substitutes or complements) between monetary and fiscal policies.

In order to study the interactions between monetary and fiscal policies more generally, Semmler and Zhang (2004) explore time-varying interactions by estimating a state-space model with Markov changes for some euro area countries. There appear to be regime shifts in the interactions between monetary and fiscal policies in France and Germany, but the interactions between the two policies are not strong. Moreover, the two policies have not been accommodative, but rather contrary to each other. The authors study forward-looking behaviour in policy interactions and find that expectations do not appear to have played an important role in policy design.

Gonzalez-Astudillo (2013) uses Bayesian methods to estimate policy rules with time-varying coefficients, endogeneity and stochastic volatility under limited information. The results show that monetary policy changes regime more frequently than fiscal policy, and that there is a non-negligible degree of

interdependence between the policies. Economic policy experiments show that a contractionary monetary policy reduces inflation in the short term and increases it in the long term.

Bianchi and Ilut (2017), using a Markov-Switching DSGE model, argue that the instability of US inflation can be explained by the interaction between the monetary and fiscal authorities. When the fiscal authority is the governing authority, fiscal imbalances generate long-lasting and persistent increases in inflation, and the monetary authority loses its ability to control inflation. The effects of these shocks last as long as agents expect the fiscal authority to prevail in the future. Consequently, if the monetary authority attempts to disinflate without the support of the fiscal authority, inflation remains virtually unchanged.

The third approach analyses the interaction between the monetary and fiscal authorities through Dynamic Equilibrium models, which have become an essential part of macroeconomic theory since the real business cycle (RBC) revolution. This approach involves both fiscal and monetary interactions through a government budget constraint. A considerable number of authors have examined the interaction between monetary and fiscal policy using new Keynesian Dynamic Stochastic General Equilibrium (DSGE) models, of which there are three types: the Solow model, the Ramsey model and the so-called "overlapping generations" model. In addition to conventional dynamic models, new Keynesian DSGE models have been developed in the literature, the New Keynesian Structural DSGE models, which take into account a richer range of fiscal channels. Using these models, some authors conclude that the automatic stabilisers used in the fiscal system are combined more effectively with rule-based monetary policy than with rule-based public spending policy.

Choudhri and Malik (2012) used a small-scale DSGE model for Pakistan to analyse monetary policy. Their empirical findings suggest that changes in government spending crowd out private investment and changes in the money supply do not cause inflation significantly. These results are corroborated by the empirical evidence of Coenen and Straub (2004).

Jin (2013) examined the interactions between debt maturity management and monetary and fiscal policies using a DSGE model. His empirical findings show that debt maturities do not significantly influence monetary and fiscal policy interactions. However, he argues that longer average debt maturities amplify the effects of monetary policy shocks on bond prices.

Shahid *et al*., (2016) study the interaction of fiscal and monetary policies in Pakistan using a dynamic stochastic general equilibrium model. Their results show that fiscal and monetary policies interact with each other and with other macroeconomic variables. Inflation responds to fiscal policy shocks in the form of government spending, revenue and borrowing shocks. Monetary policy decisions also affect fiscal policy variables.

Following Hayo and Niehof's (2014) reflections on the role of monetary and fiscal policies in fighting economic recessions or crises, Valdivia and Valdivia (2019) studied the effectiveness of fiscal and monetary policy coordination during the 2007-2010 global crisis using a DSGE model. The results show that fiscal and monetary policy shocks have adverse impacts on price stability and economic growth during a crisis.

The fourth approach uses the tools of game theory (strategic interaction) and considers that the fiscal and monetary authorities are playing a 'game' against each other.

For example, on a pooled sample of 19 industrial countries with annual information for the period 1970-1994, Bennett and Loayza (2000) present a game theory model in which fiscal and monetary authorities interact to stabilise the economy. These authorities are different in that they have different preferences for output and inflation differentials and control different policy instruments. Modelled as Nash or Stackelberg equilibria, the uncoordinated policy solution implies that an increase in the divergence of preferences between the monetary and fiscal authorities leads, other things being equal, to an increase in the output-inflation gap.

In the case of Brazil, Saulo *et al*., (2013) derived optimal monetary and fiscal policies in the context of three coordination schemes: when each institution independently minimises its welfare loss as a Nash equilibrium of a normal-form game; when one institution acts first and the other follows, in a mechanism known as a Stackelberg solution; and, when institutions behave cooperatively, in search of common goals. A numerical exercise shows that the lowest welfare loss is obtained in a Stackelberg solution in which monetary policy plays the leading role and fiscal policy the trailing role.

II. STUDY METHODOLOGY

II-1. MODEL SPECIFICATION

The model we will estimate is inspired by Nikki *et al*., (2017) for the Eurozone. These authors empirically determined whether a Ricardian or non-Ricardian regime is more plausible for the Eurozone.

The theoretical model is as follows:

$$P_t = \alpha_1 s_t + \alpha_2 w_t + \rho' X_t + \epsilon_t \quad (1)$$

Where w_t is the ratio of government debt to nominal GDP at the start of period **t**, s_t is the ratio of the government's primary balance to nominal GDP during period t; X_t is a vector consisting of a set of other possible determinants of the price level; ε_t is an error term.

Estimates of α_1 and α_2 will indicate the extent to which the price level depends on fiscal policy measures, i.e. s_t and w_t. According to the authors, in a non-Ricardian regime, a negative estimate of α_1 is expected, as a higher fiscal balance induces a lower price level.

The specific model is as follows:

$$INFL_{it}=\alpha_0+\alpha_1 DEBU_{it}+\alpha_2 DEBT_{it}+\alpha_3 OUV_{i,t}+\alpha_4 MAMO_{i,t}+\alpha_5+TPIB_{it}+U_i+V_t+W_{it} \quad (2)$$

With :

- $INFL_{i,t}$: inflation in country **i** in year **t**. It is measured by the consumer price index (CPI).
- $DEBU_{i,t}$: the overall budget balance relative to GDP in country **i** in year **t**.
- $DEBT_{i,t}$: total outstanding domestic public debt as a proportion of GDP in country **i** at period **t**.
- $OUV_{i,t}$: trade openness (sum of exports and imports relative to GDP) in country **i** in year **t**.
- $MAMO_{i,t}$: money and quasi-money (M2) as a percentage of GDP in country **i** in year **t** ;
- $GDP_{i,t}$: the real growth rate of gross domestic product per capita in country **i** in year **t** ;
- U_i: the individual effect; V_t: the time effect; $W_{(it)}$): the cross effect[14] ; **i**: number of countries from **1** to **6**; **t**: the period from 1990 to 2020; α_0: the constant; α_1 to α_6: the regression coefficients relating to fiscal policies. Our equation has explanatory variables numbered 1 to 6.

Table 1: Summary of expected signs and variables

Explanatory variables	**Variable explained**
	$INFL_{i,t}$ (Nikki *et al*., 2016)
	Expected signs and explanations
$DEBU_{i,t}$ (variable of interest)	**- negative** (Tax theory of the price level)
$DEBT_{i,t}$ (variable of interest)	**+ positive** (Tax theory of the price level)
$OUV_{i,t}$ (control variable)	**+/- uncertain** (Combes and Saadi-sedik (2006)
$MAMO_{i,t}$ (control variable)	**+ positive** (Fry, 1998)
$GDP_{i,t}$ (control variable)	**+/- uncertain** Woo (2003)

Source: Authors' construction.

II-2. NATURE AND SOURCE OF DATA

The data collected for this study came from secondary sources. The macroeconomic variables come from various sources such as the World Bank's World Development Indicators (WDI, 2020), the AfDB's African Development Indicators (2020) and the International Monetary Fund's International Financial Statistics (IFS, 2020). Our data is quantitative and qualitative, and covers the six (06) countries of the CEMAC: Cameroon, Congo, Gabon, Equatorial Guinea, CAR and Chad, whose specific characteristics may be the same or different. The periodicity is annual and runs from 1990 to 2020. The choice of this period is justified by the availability of data. The data is then compiled in Excel and imported into the econometric software (STATA 16) to be processed using specific statistical tools.

II-3. ESTIMATION TECHNIQUE

Estimating equation **(1)** above with ordinary least squares (OLS) could lead to inefficient estimates, as OLS does not take into account country fixed effects and may suffer from bias due to omitted variables. According to Judson and Owen (1999), using OLS to estimate a fixed-effect model would generate a significant bias even when the number of years (T) becomes large. Furthermore, the use of the pooled OLS estimator can be seriously biased in the presence of time-invariant unobserved heterogeneity, as was noted in the work of Deininger and Squire (1998). On this basis, Gaddis and Klasen (2014) propose using the fixed effects estimator, which they consider more appropriate in this context. This is because it takes into account country-specific intercepts and bases identification exclusively on variation over time. However, fixed effects do not allow us to correct for the problems associated with the presence of autocorrelation and the heteroscedasticity of the residuals, as well as multicollinearity.

On the other hand, the use of the Panel Corrected Standard Error (PCSE) method to solve the problems of autocorrelation and heteroscedasticity of

[14] These parameters are assumed to be fixed and different from one individual to another (Dumitrescu and Hurlin, 2012). In most cases, panel homogeneity tests lead to the conclusion that the panel is heterogeneous. As such, if the parameters are abusively imposed as homogeneous, the relevance of the results becomes questionable (Hurlin, 2004).

residuals may also be adequate; as a popular Prais-Winsten estimate with the Panel Corrected Standard Error (PCSE), suggested by Beck and Katz (1995), has been achieved to offer efficiency and consistency. However, a related technique that would also achieve the same objective of overcoming group heteroskedasticity, time-invariant cross-sectional dependence and serial correlations is the Feasible Generalised Least Squares (FGLS) estimator previously proposed by Parks (1967). In fact, Monte Carlo simulations have revealed that the FGLS and CFSP estimators are robust to three econometric problems: autocorrelation, heteroskedasticity and panel correlation (Bai *et al*., 2021). However, as reported in Reed and Ye (2011), the FGLS estimator has been found to be most suitable when the number of cross-sections (N) is smaller than the number of periods (T). Thus, given that our sample comprises a smaller N (6) compared to T (31), the appropriate choice for correcting the econometric problems is the FGLS.

III. RESULTS AND ECONOMIC INTERPRETATIONS

We now summarise the preliminary tests and the results of the estimation of our equation (3.1) before providing some economic interpretations (3.2).

III-1. TEST RESULTS PRELIMINARY

Table 2 above summarises the preliminary tests.

Table 2: Summary of preliminary econometric tests

Types of test/estimation	Null hypothesis	P-value	Decision on null hypothesis	Consequences
1- Breusch-pagan / Cook-Weisberg heteroskedasticity test and White correction.	Homo-codedasticity (absence of heteroscedasticity).	0.0000	Reject	Presence of heteroscedasticity.
2- Ramsey-Reset omission test.	The model did not omit any relevant explanatory variables.	0.0021	Reject	The model is not well specified by MCOs.
3- *Variance Inflation Factor* (VIF) test.	1 / VIF must be greater than 0.1.	1.55	Do not reject	No multi-colinearity problems.
4- Fixed effects model (tests for individual effects).	No specific effects.	0.0000	Reject	Presence of individual effects.
5- Random effects model.	Individual specificities of the model in random form.	0.0000	Do not reject	Presence of individual specificities.
6- Breusch-Pagan Lagrangian multiplier test for random effects.	Rejection of the choice of a random compound error structure.	0.0820	Do not reject	The test rejects random individual effects.
7- Hausman test (choice between fixed and random).	No correlation between errors and explanatory variables (effective compound errors).	0.0201	Reject	The compound error model in its version with individual fixed effects is appropriate (unbiased)
8- Wooldridge intra-individual auto-correlation test.	No auto-correlation mistakes.	0.0000	Reject	The auto-correlation structure is an AR1. Use of GCMs with error correction.
9- Normality test for Skewness/Kurtosis residuals.	Residues are normally distributed	0.0000	Reject	Residues are not normally distributed
10- Durbin-Wu-Hausman endogeneity test.	Exogeneity of the LIBC and TOR variables	LIBC=0.5000 TOR=0.0027	/	- Exogeneity of LIBC variables. - Endogeneity of the TOR variable.

Source: Authors' construction

Table 3: Results of the impact of fiscal policy on the level of inflation in the CEMAC zone using the Feasible Generalised Least Squares method applied to the fixed effects model corrected for heteroskedasticity and autocorrelation AR1

Variable explained: INFLATION		
Explanatory variables	**Coefficients**	**Capital gains**
$DEBU_{i,t}$	-0.17532	0.062*
$DEBT_{i,t}$	+0.079418	0. 007***
$OUV_{i,t}$	+0.202041	0.008***
$MAMO_{i,t}$	-0.04812 1	0.453
$GDP_{i,t}$	+0.110 402	0.160
Constant	-10.2923 1	0.033**
Robustness $EXTDEB_{i,t}$	+1.00041	0.000***
Wald chi2 (8) = 47.75 / Prob > chi2 = 0.0000		

Notes: ******* significant at 1%; ****** significant at 5% ; ***** significant at 10%.
Source: Author's calculations based on Stata 16.

In the following paragraph, we make comments and recommendations on the results obtained.

III-2. ECONOMIC INTERPRETATIONS

In general, our model is of good quality. **Table 4** informs us that it is globally significant at the **1%** threshold because (**Prob > F = 0.0000)**. On this basis, several interpretations can be made.

- The coefficient associated with the variable **$DEBU_{i,t}$** is negative **(-0.17532**) and significant at **10%**. This variable has an economically expected sign. All other things being equal, an increase of one unit in the budget balance (**$DEBU_{i,t}$**) leads to a decrease of **0.17532** points in the inflation rate (**$INFL_{i,t}$**). There is a negative relationship between the two variables. We can therefore say that the level of the budget balance leads to a reduction in inflation in the CEMAC zone in accordance with the budgetary theory of the price level. Our empirical results are contrary to those of Cevdet *et al*., (2001) and Ayesha and Mumtaz (2009) who found a positive relationship between budget deficit and inflation. According to the latter authors' study, financing the deficit by printing money or borrowing internally and/or externally leads to inflation in the long term.
- The coefficient associated with the **$DEBT_{i,t}$** variable is positive **(+0.079418**) and significant at **1%**. This variable has an economically expected sign. All other things being equal, a one point increase in total public debt (**DEBTi,t**) leads to a **0.079418** point increase in the inflation rate (**INFLi,t).** There is a positive relationship between the two variables. We can therefore say that public debt leads to an increase in the price level in Sub-Saharan Africa in accordance with the budgetary theory of the price level.
- The coefficient on the trade openness variable (**$OUV_{i,t}$**) is positive (**+0.202041**) and significant at **1%**. An increase of one unit in trade openness will lead to an increase in the budget deficit of **0.202041** times this unit. Following the example of Lucotte (2009), there appears to be a positive relationship between these two variables. This result highlights the vulnerability of public finances in CEMAC countries to external shocks such as the sharp fall in oil and commodity prices, which have a profound effect on external and fiscal balances.
- The money supply variable (**$MAMO_{i,t}$**) is insignificant. The negative sign of its coefficient (**-0.048121**) is unexpected. An increase of one unit in the money supply will lead to a decrease in the budget deficit of **0.048121** times this unit, hence an inverse relationship between these variables. Like Brown and Yousefi (1996), we find no evidence that budget deficits are monetised.
- GDP (**$GDP_{i,t}$**) has a positive coefficient (**+0.110402**). In this context, GDP has a positive impact on the budget deficit, but this effect is insignificant. A surplus of one unit of GDP will lead to an increase in the budget deficit of **0.110402** times this unit. This result is contrary to that of Easterly and Rebelo (1994) who find a positive and statistically significant relationship between per capita GDP growth and budget surpluses. As Talvi and Végh (2000) point out, fiscal policy can be pro-cyclical in developing countries. However, one factor may justify this pro-cyclical behaviour [15], in particular, the sharp increase in oil revenues over the last decade, which has led some

[15] The standard Keynesian model teaches us that fiscal policy should be counter-cyclical, i.e. expansionary during recessions and restrictive during expansions. Indeed, counter-cyclical policies run counter to the economic cycle.

African countries to significantly increase their public spending (Bikai, 2015).

Table 4 below summarises the expected signs and the results obtained in our analysis.

Table 4: Comparison table between expected signs and signs obtained

Variables	Expected signs	Signs obtained
$DEBU_{(i,t)}$ *	- (negative)	- (negative)
$DEBT_{i,t}$***	- (negative)	+ (positive)
$OUV_{i,t}$ ***	+/- (uncertain)	+ (positive)
$MAMO_{i,t}$	+ (positive)	- (negative)
$GDP_{i,t}$	+/- (uncertain)	+ (positive)
Validation report	**60%**	
Decision	**Average significance**	

Source: Authors' construction.

ROBUSTESSE

We assess the robustness of our results through robustness tests, which consist in analysing the effects of external public debt on inflation in the CEMAC.

External Debt ($EXTDEB_{i,t}$):

This is measured by total external debt as a percentage of GDP. This is the amount owed but not repaid, at a given time, by residents of a country to non-residents, who have undertaken to repay the principal, with or without interest, or to pay the interest with or without the principal. It is the sum of public debt, publicly guaranteed debt, private non-guaranteed long-term debt, recourse to IMF credit and short-term debt. The expected sign is positive (+).

The coefficient associated with the variable ($EXTDEB_{i,t}$) is positive (1.00041) and significant at 1%. This variable has an economically expected sign. All other things being equal, a one point increase in lagged external public debt ($EXTDEB_{i,t}$) leads to a 1.00041 point increase in the inflation rate ($INFL_{i,t}$). We find a positive and significant relationship between the two variables. Thus, external debt has positive and significant effects on the price level in Sub-Saharan Africa.

According to Pasha and Ghaus (2009), financing the public deficit through external borrowing leads to an increase in non-interest current account deficits and capital losses on external debt due to the depreciation of the real exchange rate, which leads to inflation. Furthermore, our results show that external debt is more inflationary than domestic debt in this zone.

CONCLUSION

During the recent crises, the implementation of fiscal stimulus plans and the decline in development aid and foreign direct investment flows have contributed to the increase in public debt and public deficits in CEMAC countries. It is in this sense that the autonomy of the Bank of Central African States and the objective of price stability assigned to the latter have limited the monetary financing of public deficits and reduced the correlation between the growth of the M2 money supply and inflation. From this perspective, the study of the links between fiscal policy and inflation in the context of the CEMAC zone appears to be of obvious interest, especially as work on the inflationary effects of fiscal policy is still rare in this zone.

This article sets out to show that fiscal policy in the CEMAC zone determines the level of prices in that zone. The central idea is that, contrary to the quantitative theory of money, which holds that inflation is determined by seigniorage, inflation in the CEMAC zone is determined by fiscal policy. This result is in line with the theoretical analyses of the budgetary theory of the price level (the anchor theory of this work) which stipulates that the government alone can, independently of the Central Bank, choose to create inflation by increasing the quantity of public debt, and therefore proposes to substitute the quantitative theory of public debt for the quantitative theory of money.

The negative and significant relationship of the budget balance in this article reinforced the theoretical idea that if the government is unable or unconcerned to balance its intertemporal budget constraint (the case of a non-Ricardian regime according to Woodford, 1995), budget shocks lead to an increase in the price level.

In accordance with the theory, we have identified two (02) channels through which fiscal policy is likely to influence inflation in the CEMAC: the budget balance and public debt. Thus, an econometric model taking into account the effects of fiscal policy and its behaviour proposed in the literature is built with the aim of analysing the effects of fiscal policy on inflation in Sub-Saharan Africa and the channels through which fiscal policy influences inflation. The model was estimated in one step using the generalised method of moments. Finally, we can state that the budget balance and public debt significantly explain the level of inflation in the CEMAC.

By way of recommendations, we suggest

- Strengthening the coordination of budgetary policies, in particular by putting in place tools

for the effective implementation of the new regional convergence framework and strengthening the monitoring and evaluation of the implementation of the Directives of the harmonised framework for public finance management in the CEMAC zone.

- Strengthening tax policy, particularly by improving the tax burden excluding oil resources.
- Harmonisation of procedures and improved coordination of budgetary policies are essential in the sub-region. In fact, the CEMAC States must in this section enshrine the counter-cyclical orientation of their fiscal policy. To this end, several instruments can be implemented, in particular the implementation of the reference budget balance and the operationalisation of the Multilateral Fund designed to replenish financial savings from oil resources. In order to prevent future crises, an early warning system for macroeconomic imbalances will be implemented in the sub-region.
- The predominance of domestic shocks on inflation suggests the use of heterodox interventions to revive economies, such as fiscal, banking and other regulatory policies. Attempts to stabilise the economy cannot be limited to standard macroeconomic interventions. Indeed, the limits to the effectiveness of standard instruments and the inefficiencies of the market, particularly in developing countries, point in the direction of micro-economic interventions. These judiciously designed interventions are likely to increase the efficiency of the economy while at the same time contributing to economic stability.

Promoting the supply of bank credit to the productive sector, in particular by improving the quality of financial information, increasing banks' access to long-term sources of financing, making collateral more flexible, creating a dynamic mortgage market in the CEMAC zone and reforming the judicial system and insolvency regulations to reduce the perception of credit risk in the CEMAC zone, can help to make monetary policy more effective.

- The persistence of the debt contribution in the medium term suggests that the medium-term objective for each sub-region should be to develop local capital markets to borrow in their own currency and thus encourage domestic savings.
- The monetary and fiscal authorities must pay particular attention to the implementation of economic policies in the face of uncertainty. For this reason, central banks must adopt leadership strategies and pay scrupulous attention to their credibility, as well as to the strategic transmission of monetary policy. Otherwise, the social losses in relation to the coordinated equilibrium are significant and fiscal policies become largely expansionary.

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