Endogenous Inflation in the UEMOA Zone: Trade-Off Between Inflation and Output

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Ensuring price stability is currently the priority objective of most central banks around the world, such as the BCEAO. However, one may wonder if the inflation targeting policy of between 1% and 3% is relevant? Several authors such as Kouame (2009), Combey and Nubupko (2010) have addressed this issue. Contrary to their approaches which use all the method of Hansen (1999) to highlight the endogenous level of inflation, this study proposes to highlight the existence of an endogenous threshold by the log quadratic model before its determination.

The objective of this paper is to determine the level of endogenous inflation in WAEMU from the perspective of production. Our methodology, which is based on the criticisms of the Hansen model, consists in estimating two models: a log-linear model and a log-quadratic model. Using a robust estimation method, the Pooled Mean Group (PMG) on WAEMU data, it emerges on the one hand, the non-linearity of the Inflation-Production relationship in WAEMU, and the other hand, the level of endogenous inflation which maximizes production is estimated at 4.5%.

Thus, the endogenous targeting policy of the BCEAO is not conducive to the stimulation of production and, by extension, to growth in the WAEMU space.

Keywords: price stability, inflation targeting, endogenous inflation, production, PMG

INTRODUCTION

During the 1960s, Keynesianism argued for a trade-off between inflation and output in line with the teachings of the original Phillips curve. This doctrine implied the possibility of boosting economic growth at the expense of higher inflation.

However, in the late 1970s, this assumption was challenged by stagflation, which materialized in high inflation accompanied by stagnation of economic activity and rising unemployment. A new consensus emerged that there could be no long-term trade-off between inflation and output. This new consensus, which was strongly supported by Milton Friedman, recommended that central banks ensure only price stability for the improvement of economic performance. Thus, controlling inflation is becoming the main objective of several central banks around the world. With this in mind, one might ask what inflation rate should be targeted? This issue continues to be controversial in both academia and central banks. In this context, the problem of central banks' monetary policy remains the choice of the inflation target that maximizes the well-being of populations.

Since then, in the early 1990s, developing countries (DCs) began to make remarkable progress in fighting inflation and reducing their domestic and external deficits. Yet these countries have failed to stabilize macroeconomic output or achieve sustainable economic growth. This is largely due to structural adjustment policies (SAPs) focused on price stability, although real stability, not price stability, is the most important objective for attracting investors and achieving sustainable development (Shari, 2007). Thus, the literature mainly driven by Akerlof's (1996) work highlights the non-linearity of the relationship between inflation and growth. It is therefore necessary to determine the endogenous threshold for inflation stabilization.

Within the West African Economic and Monetary Union (UEMOA), the Gross Domestic Product (GDP) growth rate has remained on average below 5% during the 1975-2016 period (Ramde, 2018). This level is lower than the 7% growth target deemed necessary by the Millennium Development Goal (MDG) for reducing poverty by 50%. The relative weakness of the economic growth of the union combined with a high poverty rate among the population remains a crucial problem hindering its economic development. This problem raises the following question: What level of inflation should the Central Bank of West African States (BCEAO) set as a goal to maximize production and well-being in the union? Is the recommended maximum target of 3% by the West African Economic and Monetary Union (UEMOA) monetary authorities the threshold above which the relationship between inflation and economic growth becomes negative?

The analysis of the relationship between inflation and economic growth has generated a large body of literature. Most investigations on this issue, such as those by Combey and Nubukpo (2010), Bikai and Kamgna (2011) in the UEMOA and the CEMAC respectively, use the threshold effect method as developed by Hansen (1999). However, Khan (2005); Ramde (2018) show that among econometric models, the log-quadratic model is the most indicated for determining a threshold effect. Unlike threshold models, which assume the a priori existence of a non-linear relationship, this method takes into account all possibilities by relaxing the assumption of the a priori existence of a threshold.

Thus, building on the criticism of previous authors, this research aims to determine the endogenous level of inflation in the UEMOA space through the log-quadratic method. The rest of the paper is organized into four parts. The first section highlights some theoretical and empirical works. The second presents the methodology. The third is dedicated to the evolution of the variables of interest. The results are analyzed in the fourth part followed by the conclusion.

THEORETICAL AND EMPIRICAL REVIEW OF THE LITERATURE

This section presents a theoretical and empirical review of previous research.

Theoretical Review of Optimal Inflation

The economic problem of inflation is related to both its level and its variability. A high inflation rate as well as its high variability is a source of uncertainty and error of anticipation and therefore damaging economic activity. Mainstream economic theory calls for low and stable inflation. Virtually all central banks aim to stabilize inflation, but their objective of inflation varies from one central bank to another.

Some authors recommend a zero inflation target to ensure complete price stability and eliminate any price expectations instability (Feldstein 1997; Poole 1999). However, others present several arguments against the idea of a zero-inflation level as a goal.

First, according to Tobin (1972), Akerlof et al. (1996), a zero-inflation target implies that real wages cannot decrease when nominal wages are downwardly rigid. In this context, a decrease in labor demand results in an increase in structural unemployment. Furthermore, according to Mishkin (1999), such a goal implies that the fight against inflation is an obsession for the central bank.

Moreover, as Mishkin (2001) and Kenneth (2011) argue, a zero-inflation target can lead to high deflation risks. Deflation tends to lead to a decrease in the nominal interest rate. Furthermore, a sharp decrease in the nominal interest rate can significantly reduce the central bank's room for maneuver in further lowering the rate to pursue an expansionary monetary policy. Additionally, deflation contributes to a decrease in nominal returns on financial assets. This decrease in returns can result in significant banking and financial crises. On their part, Blanchard and al (2010) recommend an inflation rate of 4% for monetary policy conduct. For these authors, the cost difference between the two inflation levels (0 and 4%) is low, while the cost of going from 4% to 0% inflation results in increased unemployment. They therefore invite central banks to target a normal period inflation rate higher than 2% to have more maneuvering room during recessions.

Empirical Review of the Literature

The debate about the threshold between inflation and economic growth in the empirical literature is long-standing. This debate was rekindled due to the criticisms of the long-term inflation target set by central banks (Bernanke and Gertler, 1999). Empirical studies have most often shown a positive relationship between inflation and growth below a certain threshold, but the level of this threshold varies from study to study.

The results of comparative studies on the optimal inflation level for developing and developed countries are ambiguous. Khan and Senhadji (2000) found a higher optimal inflation threshold in developing countries than in developed countries. After examining the existence of a non-linear relationship between inflation and growth, these authors proved that the significant inflation threshold for industrialized economies is between 1 and 3%, and for developing countries, it is between 7 and 11%. In contrast to these results, Burdekin and al (2004) used a panel of 72 countries between 1967 and 1992 to conclude that inflation reduces growth beyond a threshold of 8% for developed countries and 3% for developing countries. An increase of 1% in inflation reduces economic growth by 0.27% in developed countries and 0.24% in developing countries.

For Developing Countries, the authors are mostly in agreement on a high inflation target that falls between 4% to 10%.

First, using panel data from the period 1987-2008, Bikai and Kamgna's (2012) study revealed a threshold of 6% above which the correlation between inflation and economic growth is negative in the Economic and Monetary Community of Central Africa (CEMAC).

Then, Yabu and Kessy (2015) used a panel for three countries in East Africa (Kenya, Tanzania, and Uganda) from 1970 to 2013 to conclude that beyond a threshold level of 8.46%, inflation negatively and significantly impacts the economic growth of these countries. More specifically, the optimal inflation levels for these countries are 6.77% for Kenya, 8.8% for Tanzania, and 8.41% for Uganda.

Furthermore, Mondjeli and Tsopmo (2017) showed using a dynamic panel for countries in the BEAC zone from 1985-2013 that the optimal inflation rate for this zone is 4.28%. Below this threshold, any 1% increase in inflation leads to a 0.287% increase in economic growth. However, above the threshold, economic growth decreases by 0.257 points if inflation increases by 1%.

Finally, Loubassou and Tendelet (2018) show through the Hansen method on data from Cameroon and Congo-Brazzaville during the period 1986-2015 that the inflation threshold level is 5% and 10% respectively for these two countries. Below these thresholds, any expansionary monetary policy measure would favor economic growth. On the other hand, beyond these thresholds, inflation is negatively correlated with economic growth. Specifically, for the UEMOA zone, very few studies have been conducted on this

issue. Is the BCEAO's inflation targeting policy of inflation falling between 1-3% relevant? Why choose this target when the results of different empirical studies indicate that the endogenous inflation rate is high in developing countries? Furthermore, some authors such as Combey and Nubukpo (2010) and Kouame (2018) in their investigations of the UEMOA zone have found an endogenous inflation rate of 8%. Although relevant, these studies all use the Hansen threshold method to determine the optimal inflation threshold. However, this technique, which a priori assumes the existence of a threshold, is heavily criticized in the literature (Khan, 2005; Ramde, 2018).

METHODOLOGY

This section first presents the model specification, then the choice of variables, and finally the source of the data.

Model Specification

The objective of this article is to determine the inflation level that is compatible with the economic growth objective in the UEMOA zone. To do this, we start from the framework of a neoclassical growth model analysis:

$$Y = f(L, K, KH) \tag{1}$$

where Y represents production, L is the factor that measures the active population, and the K factor corresponds to the value of the gross fixed capital formation. In addition to these production factors, we introduce the lagged value of the dependent variable into the growth model to take into account the dynamics of GDP growth, the consumer price index which captures the level of inflation, the credit granted to the domestic economy, and the degree of trade openness, all of which are taken into account by the KH factor.

Thus, the model is specified as follows:

$$PIB_t = f(PIB_{t-1}, INFL_t, FBCF_t, POP_t, CRED_t, OUV_t) \tag{2}$$

When we consider the panel data and the logarithm of the variables of (1), two specifications can be elaborated.

The linear model has the following form:

$$lnPIB_{i,t} = \alpha_0 + \alpha_1 lnPIB_{i,t-1} + \alpha_2 lnINFL_{i,t} + \alpha_3 lnFBCF_{i,t} + \alpha_4 lnPOP_{i,t} + \alpha_5 lnCRED_{i,t} + \alpha_6 lnOUV_{i,t} + \mu_i + v_t + \varepsilon_{i,t} \tag{3}$$

where ln denotes the natural logarithm, the terms u_i, v_t, ε_{it} are respectively the country specific effect, the temporal specific effect and the random term. The country-specific effect makes it possible to take into account the unobservable characteristics of countries; (i) is the country index and (t) the period index.

For the nonlinear model, we have the following form:

$$lnPIB_{i,t} = \alpha_0 + \alpha_1 lnPIB_{i,t-1} + \alpha_2 lnINFL_{i,t} + \alpha_3 lnINFL^2{}_{i,t} + \alpha_4 lnFBCF_{i,t} + \alpha_5 lnPOP_{i,t} + \alpha_6 lnCRED_{i,t} + \alpha_7 lnOUV_{i,t} + \mu_i + v_t + \varepsilon_{i,t} \tag{4}$$

where ln denotes the natural logarithm; $\ln INFL^2$ represents the square of inflation; The terms U_I, V_T, ε_{IT} are the country specific effect, the temporal specific effect and the random term respectively. The country-specific effect makes it possible to take into account the unobservable characteristics of countries; (i) is the country index and (t) the period index.

The method of the nonlinear equation (quadratic) will allow us to determine the optimal threshold of the level of inflation in the WAEMU zone. The procedure consists of cancelling the partial derivative of equation (4) with respect to inflation as follows:

$$\frac{\partial lnPIB}{\partial lnINFL} = 0 \Longrightarrow \alpha_2 + 2\,\alpha_3 infl^* = 0 \quad (5)$$

$$\Longrightarrow infl^* = -\frac{\alpha_2}{2\alpha_3} \quad (6)$$

Rationale for the Choice of Variables in the Econometric Model

Our model consists of two variables of interest and four explanatory variables of control. The endogenous variable of interest is the real Gross Domestic Product (GDP). It is considered to be one of the best indicators for measuring a country's economic activity as it measures economic behavior in terms of both income and expenses. Following several theorists including Solow (1956), we also include this variable in our work.

The exogenous variable of interest is the Consumer Price Index (Infl). In developing economies, it is a better approximation of prices as a large portion of expenses is made up of consumer expenses. Additionally, this indicator is preferred because it is regularly calculated (monthly, annually) and has all positive values that are favorable for the use of the logarithmic function. The expected sign can be either positive or negative.

In view of prior empirical studies on the determinants of economic growth, we include the following control variables: Gross Fixed Capital Formation (FBCF), the population aged 15 to 64 (POP), domestic credit extended to the economy (CRED), and trade openness (OUV).

The inclusion of Gross Fixed Capital Formation captures the dynamism of both the private and public sectors on economic activity. Investment is measured by gross fixed capital formation (FBCF) and takes into account private sector gross fixed capital formation (FBCFpriv) and public sector gross fixed capital formation (FBCFpub). The expected effect is positive.

Furthermore, the inclusion of the active population (Pop) is justified by the fact that in economic literature, several studies highlight its effect on economic growth (Solow, 1956). Theoretical and empirical studies show that the effect of demographic growth on economic growth is mixed. It can either positively (Thuku and al. 2013) or negatively (Dao, 2012) influence economic growth.

Moreover, domestic credit measures secondary bank credit extended to the private sector. The literature on the credit channel has sought to highlight the role played by credit supply and suggests that the evolution of credit supply on economic growth might be correlated. Following Ivan (1997), its effect on economic growth can be positive.

Finally, the consideration of trade openness (Ouv) in our model is grounded in theories of international trade and economic growth (Adam Smith, David Ricardo). For Guillaumont (1985), it can increase domestic savings if the private savings rate is higher in the tradable goods sector. This variable is obtained by summing exports and imports for the considered year. The literature shows that in developing economies (PED), its effect on economic growth is ambiguous. The expected sign can be either positive or negative.

The expected signs of the different variables are presented in the table below:

TABLE 1
SUMMARY OF EXPECTED SIGNS OF CONTROL VARIABLES

Control variable	Notations	Expected sign
Gross Fixed Capital Formation	**GFCF**	**+**
Active Population	**POP**	**+ or -**
Domestic Credit	**I think**	**+**
Trade Opening	**OUV**	**+ or -**

Source: Authors based on 2022 World Bank data.

Estimation Method and Data Source

In the economic literature, the use of panel data has several advantages over cross-sectional data (Hsiao, 2003). Indeed, several methods can be used for the estimation of dynamic panels. Generally, three types of estimators are considered for the estimation of dynamic panels. These are the Dynamic Fixed Effects (DFE), the Mean Group (MG) and the Pooled Mean Group (PMG).

The use of Dynamic Fixed Effects requires that the settings of all countries are identical. This type of method is suitable for small temporal panels.

The use of the second estimator (MG) is appropriate when the individual dimension exceeds the time dimension.

The Pooled Mean Group (PMG) estimator has an advantage in the treatment of dynamic panels for which the number of temporal observations T is greater than that of individuals N (Pesaran and al. 1999). Indeed, inflation in the various WAEMU countries converges in the long term (LT) while following singular dynamics in the short term (CT). The impact of inflation differs from country to country because of the specific specificities of each country. Therefore, estimating a unique coefficient for each variable may be affected by heterogeneity bias (Pesaran and Smith, 1999).

The major difference between the GMP and the MG is the constraints imposed on the coefficients. In the GMP, the constant, short-term coefficients and variances of errors differ between individuals. However, the long-run coefficients are forced to be identical for all countries due to the absence of trade-offs between inflation and economic growth. While the MG imposes no restrictions on either the coefficients or the estimated variances.

In practice, the choice between these two estimators, particularly with regard to long-run coefficients, is tested empirically using the Hausman test. This test makes it possible to make a choice between the two estimators (MG or PMG).

Before estimating through the PMG method, we will conduct stationarity and co-integration tests of the different variables. These preliminary tests are necessary for the reason that they prevent us from conducting fallacious regressions.

In conducting our study, we were interested in quantitative data. The data comes from the World Bank's World Development Indicators (WDI, 2022) database. For data availability reasons, our study covers 26 years from 1995 to 2019 and takes into account the eight (08) countries of the WAEMU zone.

THE EVOLUTION OF THE VARIABLES OF INTEREST

In this section, we will use graphs to uncover the major trends of economic growth and inflation in the UEMOA. To do this, we will provide a summary of the macroeconomic environment within the UEMOA before conducting a graphical analysis of the different variables of interest over time.

Presentation of the Macroeconomic Environment in the WAEMU Zone

In English: The West African Economic and Monetary Union (UEMOA) was created on January 10, 1994 in Dakar, Senegal and includes eight countries: Benin, Burkina Faso, Ivory Coast, Guinea-Bissau, Mali, Niger, Senegal, and Togo. These eight countries share the use of the same currency, the CFA franc. Within the union, a convergence and stability pact defining several criteria must be respected by the different member countries.

The convergence criteria of the UEMOA zone aim for several objectives, including acceleration of economic growth and control of macroeconomic stability. These criteria can be decomposed into two groups: first-rank criteria and second-rank criteria.

Performance indicators for assessing the degree of achievement of the objectives are taken into account at the level of the first-rank criteria. As for the second-rank criteria, they are intended to facilitate respect and viability of the first-rank criteria. The table below summarizes the essentials of these criteria.

TABLE 2
WAEMU CONVERGENCE CRITERIA

Criteria	Standards
First-tier criteria	
Ratio of the overall budgetary balance, including grants, to core nominal GDP	< or = -3%
Average annual inflation rate (HICP) in (%)	2% + or – 1%
Ratio of outstanding domestic and external debt to nominal GDP	< or = 70%
Second-tier criteria	
Ratio of payroll to tax revenue (%)	< or = 35%
Tax burden rate	> or = 20%

Source: As of Additional Act No. 03/2021/CCEG/UEMOA

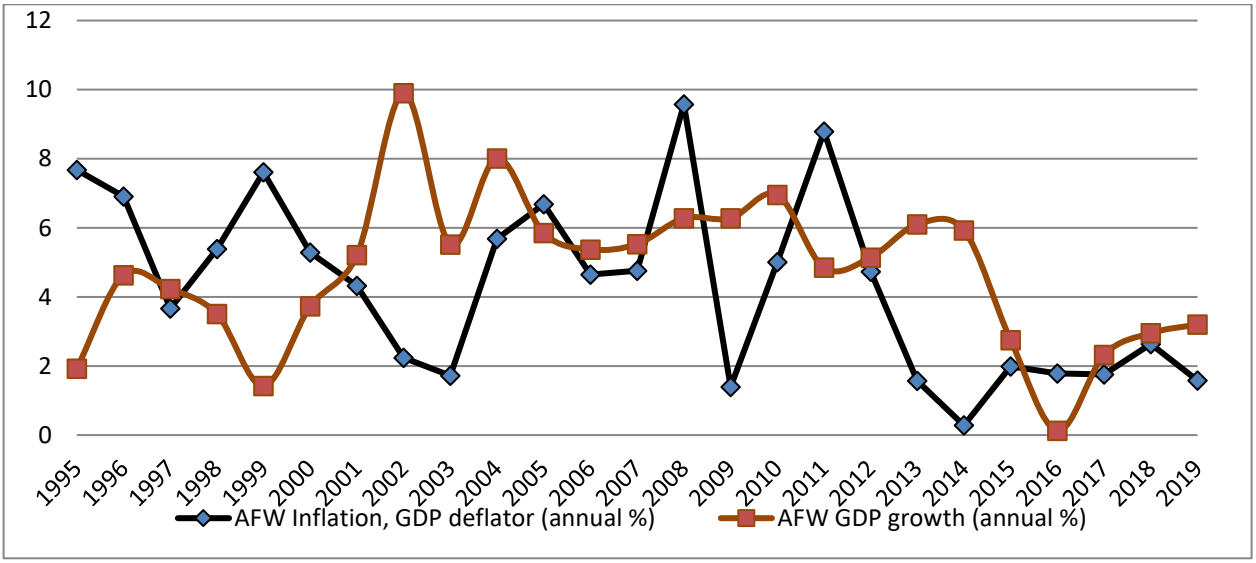
Since the 1990s monetary reforms, the goal assigned to the BCEAO is to ensure monetary stability. In fact, the trade-off between inflation and production has taken place at the expense of the latter (production). To this end, the UEMOA Commission proposes an inflation rate of 3% per year as an operational criterion for the member states.

The average annual inflation rate criterion aims to minimize inflation disparities from one country to another in order to avoid misalignment of real exchange rates. Furthermore, the objective of this criterion is to take into account global inflation, particularly in the Eurozone, due to the FCFA's link to the Euro, in order to avoid appreciation of the effective real exchange rate. It is also necessary to take into account major importing countries such as China and the United States, in the inflation of the exchange rate between the FCFA and the dollar.

Evolution of Inflation and Economic Growth Rates

The graph below shows the joint evolution of the average annual rate of inflation and the rate of economic growth over the period 1995-2019 for the economies of the WAEMU zone.

FIGURE 1
JOINT EVOLUTION OF INFLATION AND ECONOMIC GROWTH



Source: Authors based on 2022 World Bank data

Overall, this graph shows that the inflation rates recorded in this area guarantee positive growth rates. Moreover, the relationship between these two variables appears to be negative.

Statistics show that inflation peaks were 7.6%, 9.5% and 8.7% respectively in 1995, 2008 and 2011. At the same time, the growth rates associated with these years remained relatively low at around 1.92%, 6.27% and 4.84% compared to 2002 (10%).

ANALYSIS OF RESULTS

In this section, the answers from the various econometric tests are interpreted followed by the estimation of the log-linear and log-quadratic models, the choice and interpretation of the appropriate model.

Econometric Test Results

In this section, the results of the various unit root and co-integration tests of our variables are presented.

Before these tests, it is important to verify that the explanatory variables in the model are not strongly correlated. In other words, it is necessary to question the possibility of multicollinearity between the explanatory variables that could result in instability of the estimated coefficients.

The analysis of the correlation matrix through Table I (in appendix) indicates that the various correlation coefficients are low for most of the variables retained, with the exception of the variable's gross capital formation and population which are strongly correlated with the GDP variable. Furthermore, the population variable is strongly correlated with the gross capital formation variable. In sum, the reading of this table proves the absence of multicollinearity between the different variables and the non-significance of the linear relationship between Gross Domestic Product and the inflation indicator. So we can anticipate the non-linearity of the relationship between inflation and production in the West African Economic and Monetary Union (UEMOA).

Among the unit root tests, the most frequent in panel data are the Im-Pesaran-Shin, Levin-Lin-Chu tests, and the Breitung tests. The interest of these tests lies in the fact that they allow to detect the degree of stationarity of the different variables.

In Table II (in appendix), the results indicate that all variables are non-stationary at level. However, they are all integrated to order 1 at the 5% threshold, except for the growth rate, the commercial openness rate, and the demographic growth rate which are integrated to order 2, as shown by the results of the various Breitung and Im-Pesaran and Shin tests.

In order to avoid fallacious regressions, it is important to conduct cointegration tests to detect the presence or absence of a long-term effect between the different variables.

For this purpose, the Kao test shows a long-term dynamic in both models at the 1% threshold. At this level, we can conclude that the variables are cointegrated and we will use an error correction model (ECM) to estimate this long-term relationship.

Results of Estimates

The results of the log linear and log quadratic estimations are compiled in the table below. Overall, the non-linear equation (log quadratic model) highlights a long-term effect between production and inflation within the UEMOA zone, while the linear equation (log linear model) highlights a lack of relationship between economic growth and inflation.

Furthermore, in the log linear model, only the variables Gross Fixed Capital Formation and Domestic Credit are statistically significant at a 10% threshold. On the other hand, in the log quadratic model, all variables are statistically significant at a 10% threshold with the exception of the Population variable.

Through the various analyses in Table III, it is clear that the results of the non-linear model (log quadratic) are more relevant than those from the linear model (log linear). Thus, the long-term relationship between inflation and production in the UEMOA zone is non-linear. In the following, the interpretations focus on the equation of the non-linear model (4).

The endogenous inflation rate is given by equation (6) as follows: **Infl* = -(-23,423)/(2*2,598)**. In the UEMOA zone, it is 4.5%. At first, inflation has a negative effect on economic growth. This is reflected by the elasticity of GDP with respect to inflation, meaning that if inflation increases by 1%, the Gross Domestic Product decreases by 23,423 percentage points. In a second stage, this relationship becomes positive when it reaches the 4.5% threshold.

TABLE 3
RESULTS OF ESTIMATES WITH GDP AS A DEPENDENT VARIABLE

Variables Long-term relationship	**1995-2019 Log linear model Log quadratic model. Equation (3) Equation (4)**	
Recall force	-0,047	-0,098**
lnInfl	-0,297	-23,423***
lnInfl2		2,598***
lnFBCF	0,896*	0,564***
lnPop	-0,541	0,138
lnCRED	-0,399*	-0,273**
lnOUV	0,083	-0,268**
_Cons	0,677	6,236*
Probability of the Hausman	0,0000	0,0001
Number Observations	171	171

Source: Author based on 2022 World Bank data.
*Notes: (...) Probability, *** significant coefficients at 1%, ** significant coefficients at 5%, * significant coefficients at 10%.*

The investment coefficient (Gross Fixed Capital Formation) is positive and significant at the 1% threshold. This coefficient being 0.564 implies that a 1% increase in gross fixed capital formation leads to a 0.564% increase in production in the UEMOA, all things being equal. To improve the effect of total investment on growth, its two public and private components must be complementary. When public investment, which remains important in UEMOA countries, is not in line with private investment, its eviction effect could dominate, resulting in a negative effect on future activity according to the Ricardian equivalence theory.

The sign of the coefficient for the variable of credit extended to the economy is negative and significant at the 1% threshold. A 1% increase in credit leads to a 0.273% decrease in production, ceteris paribus. The financing of the private sector of the UEMOA during the study period leads to a decrease in the Union's production.

Also, the coefficient of the trend in the terms of trade (lnOuv) is negative and significant at the 1% threshold. All things being equal, a 1% increase in the terms of trade leads to a 0.268% decrease in the UEMOA's production. This negative effect implies that the union does not reap a substantial gain from its participation in foreign trade. Such a result would find its explanation in the primary specialization of economies that are primary product rent-seeking economies.

Analysis of Short-Term Outcomes

The table below shows the results of the short-term estimate by country. This table shows the diversification of results by country.

TABLE 4
SHORT-TERM MARGINAL EFFECTS BY COUNTRY

Country	IN	BUR	THERE	GUB	MLI	NGER	ITS	TGO
Marginal Effects	**4,6**	**4,6**	**4,4**	**6,1**	**4,6**	**4,5**	**5,4**	**4,6**

Source: Author based on 2022 World Bank data.
*Notes: (...) probability, *** significant coefficients at 1%, ** significant coefficients at 5%, significant coefficients at 10%.*

Overall, the analysis of the results in this table shows a lack of relationship between inflation and economic growth. This is justified by the fact that, in the short term, the GMP takes into account the heterogeneity between the different countries in the sample.

Indeed, inflation has a positive impact on the economic growth of the various WAEMU countries, but these effects are statistically zero for all these countries in the short term.

CONCLUSION

The objective of this research is to analyze the relationship between inflation and economic growth within the UEMOA zone before questioning the relevance of the inflation target set by the monetary authorities of this zone. Using annual data from the UEMOA countries for the period 1995-2019, we use a robust dynamic panel estimation method (Pooled Mean Group) to prove the consistency of the results obtained. The following results can be drawn from the empirical investigations.

Econometric investigations show that the results from the non-linear model are better compared to the results of the linear model. Thus, we have reached the conclusion that the endogenous level of inflation in the UEMOA zone is 4.5%. This result is in line with the conclusions of Combey and Nubukpo (2010) regarding the existence of an endogenous threshold higher than the one set by the BCEAO (3%). Specifically, the results indicate that an increase in inflation becomes harmful to production in the UEMOA only below 4.5%. The goal of any economic policy is to maximize the well-being of the populations, therefore a monetary policy targeting an inflation level of 4.5% or a target range [4%; 5%] would be desirable. In the same vein, two studies such as those by Williams (2009) and Blanchard and al. (2010) recommend an optimal inflation rate of 4% for the conduct of central bank monetary policy.

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APPENDIX

TABLE 1
CORRELATION MATRIX BETWEEN THE DIFFERENT EXPLANATORY VARIABLES

	LNPIB	**LNINFL**	**LNFBCF**	**LNPOP**	**LNCRED**	**LNOUV**
LNPIB	1					
LNINFL	**0,25**	1				
LNFBCF	0,95	0,47	1			
LNPOP	0,93	0,24	0,92	1		
LNCRED	0,47	0,44	0,59	0,5	1	
LNOUV	0,02	0,26	0,14	-0,05	0,44	1

Source: Author based on 2022 World Bank data.

TABLE 2
UNIT ROOT TEST RESULTS AT THE 5% LEVEL

In level	**In difference (I(1))**		**In difference (I(2))**			
Levin, Lin& Chu t-stat	**Breitung t-stat**	**Im, Pesaran and Shin W-stat**	**Levin, Lin& Chu t* stat**	**Breitung t* stat**	**Im, Pesaran and Shin W-stat**	**Fisher Chu t* and Shin W-stat**
lnPibr 0,38	0,72	0,80	0,68	0,00	0,00	0,60
lninfl 0,99	0,55	1,00	0,00	0,00	0,00	
lnFBCF 0,60	0,03	0,30	0,00	0,00	0,00	
lnPop 0,57	0,00	0,98	0,00	0,38	0,00	0,02
lnCRED 0,66	0,00	0,37	0,00	0,00	0,00	
lnOuv 0,45	0,54	0,38	0,38	0,00	0,00	0,00

Source: Author based on 2022 World Bank data.

TABLE 3
KAO COINTEGRATION TEST RESULT

Equations	Log-linear	Log-quadratic
Probabilities	0,0000	0,0000
Decisions	Presence of Cointegration	Presence of co-integration

Source: Author based on 2022 World Bank data.