

EFFECT OF MONETARY POLICY REGIMES ON OUTPUT GROWTH IN WEST AFRICA

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Abstract

This paper examines the effect of monetary policy regimes on output growth in West Africa. This was undertaken given that countries in the region require output growth, but are pursuing different monetary policy regimes and are yet to witness adequate output growth. So this set the objective of the study. The study made use of a longitudinal research design that obtained cross-section data from the secondary sources of the Central Banks of the selected countries, the World Bank Development Indicator, the International Monetary Fund as well as the International Financial Statistics database for the period from 2000 to 2021. The data analysis method involved using both descriptive and inferential statistics. The Panel Autoregressive Distributed Lag (ARDL) using a Pooled Mean Group (PMG) regression was used for the estimation. The results obtained indicate that the monetary policy rate was only effective in the short run to exert a significant effect on output growth, while the money supply was significant in both the short run and long run. So, the study makes the following recommendations; money supply is an effective tool for achieving output growth and this should be effectively managed to curb inflationary trends that may arise as a result of increased money supply in order not to reverse economic growth. Monetary authorities should promote activities in all sectors of the economy, particularly in the high-growth sectors. There should be cooperation between the monetary and fiscal authorities in West Africa to ensure smooth coordination and consistency in monetary and fiscal pursuits.

Keywords: *Monetary Policy, Output, West Africa.*

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1. Introduction

The appropriate monetary policy regimes in developing economies have attracted research interest in literature (Poole, 1970; Bahmani-Oskooee & Rehman, 2009; Ujunwa et al., 2022; and Folarin & Asongu, 2019). This is due to the importance of monetary policy regimes in promoting macroeconomic stability. Across the globe, various targets of monetary policy regimes are adopted by the monetary authorities (Cobham, 2018). In West Africa, the existing monetary policy regimes are exchange rate targeting in Liberia, monetary targeting in Nigeria, Sierra Leone, Guinea, and the Gambia, and inflation targeting in Ghana (Tule et al., 2019). Whatever form is employed was determined by the structure of the economy, and the Central Banks remain key institutions in macroeconomic policy design and employ suitable forms to achieve macroeconomic objectives and output growth that should improve the welfare of citizens.

Monetary policy is vital for economic management and stability (Ufoeze, Odimgbe, Ezeabalisi & Alajekwu, 2018). It involves the use of money-related variables to address economic activities through the operations of the apex bank of the country on behalf of the government (Nwoko, IHEMEJE & ANUMADU, 2016). Although most economic goals can only be directly achieved through the real sector, a monetary policy embraced the participation of the financial sector (money and capital market), to complete the contribution of the whole economic sector to the macroeconomic objectives (Adabor & Buabeng, 2020). It brings together the cooperation of the real and money market in the pursuit of achieving economic goals.

Monetary policy has witnessed significant reforms in the last decade as many monetary authorities are adjusting old instruments and designing new ones to cope with various challenges including faltering transmission mechanisms, interest rate (liquidity) traps, and perceived inadequacies of traditional instruments in the era of digital money. In West Africa, the monetary authorities generally engaged monetary policy tools such as money supply and interest rate to stabilize macroeconomic variables such as inflation rate and exchange rate, because of their potential in achieving macroeconomic objectives for economic competition and output growth (Aderemi, Soyemi, Alaka & Efunbajo, 2020). Available data indicate that the inflation rate in West African countries has not been stable, the exchange rate value of local currencies against the US Dollar also showed some level of volatility in all the countries, except in Ghana and Gambia where it was moderate for quite a while. In general, the various monetary

policy regimes do not seem to have fared well in the respective countries. This is especially so when it can be observed that all countries do not have the adequate output growth that is required for sustainable economic development.

There is a theoretical argument on the relationship between monetary policy and macroeconomic performance among the economic schools of thought. The classicists such as Irvin Fisher and Pigou believed that given the equation of exchange and stability in the velocity of money plus the assumption that the economy operates at full employment, the change in money supply will only affect price without any effect on real demand, investment, and output (Nwoko et al, 2016). The Keynesians on the other hand believe that variations in money supply could lead to an increase or decrease in interest rate, while the decrease in interest rate will influence aggregate investment and enhance aggregate income and output (Kerongo & Nyamute, 2016). The monetarists base their views on money supply as the key factor affecting the well-being of the economy (Ufoeze, et al, 2018). They believed that an increase in money supply will lead to an increase in nominal demand, and an increase in output, provided there is excess capacity. However, they also believed that an increase in money supply, in the long run, would not have any effect on investment and output, but would increase the price level.

Macroeconomic performance in the region has continued to dwindle, with a low prospect of future stability in some cases. Among these are the perpetual challenge of price instability, high unemployment, volatility in exchange rates, inequitable distribution of income, unfavourable balance of payments, low output growth, and high levels of poverty. Given gaps in the literature and the fact that the core of the numerous economic reforms in West Africa has been financially centered on monetary policy dynamics, some empirical questions related to output growth come to mind. Despite the similarities in economic structure in West Africa, the countries adopted different monetary policy regimes, and even within the same country, different monetary policy regimes were implemented to no avail. So, it becomes necessary to ascertain an appropriate monetary policy regime that will achieve macroeconomic stability for improved output growth in West Africa. Hence, the objective of this study is to examine the effect of the different monetary policy regimes in achieving output growth in West Africa. The study is organized into five sections. Section one covers the introduction. Section two captures the review of related literature. Section three focuses on the research methodology, which consists of the research design, sources and kinds of data, and the method of data analysis.

Section four dwells on empirical results and discussion. Finally, section five presents the overall summary of findings, conclusion, and recommendations.

2. Literature Review

2.1 Conceptual Clarifications: Monetary Policy and Economic Output

Several related definitions have been given for monetary policy (Ufoeze et al, 2018, Adabor & Buabeng, 2020 and Olakanmi & Olagunju, 2020, among others. This study defined it as the various money control regimes utilizing the tools of interest rate and money supply by selected West African countries that are members of the West African Monetary Zone to achieve output growth in the economy. Economic output can be referred to as the extent to which desired levels of aggregate economic variables are achieved. This was referenced as economic growth in the selected West African countries in this study, as done by Ayomitunde et al (2020), Nwoko et al (2016), Fasanya et al (2013), and Balogun (2007).

2.2 Theoretical and Empirical Review

The modern quantity theory of money is based on the reformation of the cash balance approach to the quantity theory of money, with some elements from the Keynesian theory. The theory proposed that nominal income depends on the stock of money, and also that in the long run, the effect of the money supply is on the price level and that in the short run, price, income, and employment are determined by the supply of money. Thus, given the intention to capture macroeconomic performance from a metrics perspective of real gross domestic product, domestic investment level as well as the unemployment rate in the country. This study will make use of the modern quantity theory of money as the theoretical framework for this study.

Some studies have been carried out to track the link between monetary policy regimes and macroeconomic performance, but not much was done at the regional level, especially in the context of West Africa. Most of the studies carried out were country-specific. Some of these are Bashir and Sam-Siso (2020) in the context of Nigeria, Adabor and Buabeng (2020) in the context of Ghana, and Kerongo and Nyamute (2016) in the context of Kenya to mention but a few. While some studies only examined monetary policy as it relates to economic growth (Olakanmi and Olagunju 2020), some examine the impact of monetary policy solely on either inflation rate targeting (Caballero and Simsek, 2022all), Investment Level, and Stock Market Performance (Belke & Gocke, 2021) or private sector performance (Oyakegba & Arepo, 2022).

Succinctly, none of the previous studies captured macroeconomic performance using varieties of aggregated macroeconomic performance metrics such as growth in real gross domestic product, growth in domestic credit, as well as the exchange rate together. Another contribution of this study is that previous studies do not focus on tracking the long-run and short-run effects of monetary policy and macroeconomic performance in West Africa.

3. Methodology

3.1 Method and Materials

This study made use of a longitudinal research design that captures observations from both time series and cross-sections of data units. Specifically, the time series observation was the annual period related to the scope of the study, while the cross-sectional unit comprised data from six countries that are members of the West Africa Monetary Zone (WAMZ). Hence this study is panel-based. The secondary data were obtained from the documents of the Central Banks of the selected countries, the World Bank Development Indicator (WDI) Database, International Monetary Fund (IMF) database as well as International Financial Statistics (IFS) database for the period from 2001 to 2021. The data analysis method involved using both descriptive and inferential statistics. The Descriptive analysis conducted in the study includes mean analysis, standard deviation analysis, minimum and maximum analysis, and trend analysis, followed by cross dependence test, panel unit root test, and co-integration test. Panel Autoregressive Distributed Lag (ARDL) using a Pooled Mean Group (PMG) regression was used to track the long-run and short-run effect of the monetary policy regime on output growth in West Africa.

3.2 Model Specification

The study focuses on identifying the long and short-run association between monetary policy and output growth in West Africa, the technique used is the dynamic panel autoregressive distributed lag ARDL (p, q) model in the error correction form. This is estimated based on the pooled mean group (PMG) developed by Pesaran et al. (1999) as determined by the Hausman test (1978). From empirical literature, this study adapted the model of Ufoeze, Odimgbe, Ezeabalisi, and Alajekwu (2018), which specified economic output in terms of gross domestic product as a function of monetary policy variables such as monetary policy rate, broad money supply, and interest rate – that are the target variables of monetary policies in West Africa. Alongside these variables exchange rate and investment, level are introduced as control

variables. However, this study used the real gross domestic product growth rate (gdpg), growth rate of domestic credit to the private sector (dcr), real effective exchange rate (rexr) inflation rate (inf), and employment rate (emp) as macroeconomic performance variables.

To measure the heterogeneous short-run impact and the homogenous long-run impact of the respective variables on the dependent variable, Pesaran et al. (1999) adopt the maximum likelihood estimation (MLE) approach by assuming that the disturbances ε_{it} are normally distributed. The PMG model proposed by Pesaran et al. (1999) is estimated in the following format:

$$lmgdpgr_{it} = \mu_i + \sum_{j=1}^p \lambda_{ij} lmgdpgr_{it-j} + \sum_{j=0}^q \delta'_{ij} X_{it-j} + \varepsilon_{it} \quad \text{----- Eqn. 3.1}$$

where $i = 1, 2, \dots, N$ represents cross-sectional unit $t = 1, 2, 3, \dots, T$ represents time (annual), j is the number of time lag. X'_{it} is the vector of independent variables, e.g., finally μ_i is the fixed effect? By re-parameterization, the above equation can be written as:

$$\Delta lmgdpgr_{it} = \mu_i + \varphi_i lmgdpgr_{it-1} + \beta'_i X_{it} + \sum_{j=1}^{p-1} \lambda_{ij} lmgdpgr_{it-j} + \sum_{j=0}^{q-1} \delta'_{ij*} X_{it-j} + \varepsilon_{it} \quad \text{----- Eqn. 3.2}$$

Where;

$$\varphi_i = -1 \left(1 - \sum_{j=1}^p \lambda_{ij} \right), \beta_i = \sum_{j=0}^q \delta_{ij}$$

$$\lambda_{ij*} = - \sum_{m=j+1}^p \lambda_{im}, j = 1, 2, \dots, p - 1, \text{ and}$$

$$\delta_{ij*} = - \sum_{m=j+1}^q \delta_{im}, j = 1, 2, \dots, q - 1.$$

Now by grouping the variables in levels further, equation (3.2) is rewritten as an error correction equation:

$$\Delta \ln gdpgr_{it} = \mu_i + \varphi_i(\ln gdpgr_{it-1} + \theta'_i X_{it}) + \sum_{j=1}^{p-1} \lambda_{ij} \ln gdpgr_{it-j} + \sum_{j=0}^{q-1} \delta_{ij}^* X_{it-j} + \varepsilon_{it} \quad \text{----- Eqn. 3.3}$$

Where $\theta_i = -(\frac{\beta_i}{\phi_i})$ defines the long-run or equilibrium relationship among $\ln gdpgr_{it}$ and X_{it} . In contrast λ_{ij}^* and δ_{ij}^* are short-run coefficients relating growth to its past values and other determinants like X_{it} . Finally, the error-correction coefficient φ_i measures the speed of adjustment of $\ln gdpgr_{it}$ toward its long-run equilibrium following a change in X_{it} . The condition $\phi_i < 0$ ensures that a long-run relationship exists. Therefore, a significant and negative value of φ_j is treated as evidence of cointegration between $\ln gdpgr_{2it}$ and X_{it} . Thus, finally, the estimates are measured by:

$$\hat{\theta}_{PMG} = \frac{\sum_{i=1}^N \hat{\theta}_i}{N}, \hat{\beta}_{PMG} = \frac{\sum_{i=1}^N \tilde{\beta}_i}{N}; \hat{\lambda}_{jPMG} = \frac{\sum_{i=1}^N \tilde{\lambda}_i}{N}, \text{ and } \hat{y}_{jPMG} = \frac{\sum_{i=1}^N \hat{y}_i}{N}$$

Where $j = 0, \dots, q - 1, \hat{\theta}_{PMG} = \hat{\theta}$

Therefore, based on the above, the model to be estimated is:

$$\begin{aligned} \Delta \ln gdpgr_{it} = & -\mu_i + \varphi_i (\ln gdpgr_{i,t-1} - \lambda_2 mpr_{i,t-1} - \lambda_3 m2_{t-1} - \lambda_4 dcr_{i,t-1} - \\ & \lambda_5 rexr_{i,t-1} - \lambda_6 cpi_{i,t-1} - \lambda_7 emp_{i,t-1}) + \sum_{j=1}^{p-1} y_j^i \Delta (\ln gdpgr_i)_{t-j} + \\ & \sum_{j=0}^{q-1} \delta_{2j}^i \Delta mpr_{i,t-j} + \sum_{j=0}^{q-1} \delta_{3j}^i \Delta m2_{i,t-j} + \sum_{j=0}^{q-1} \delta_{4j}^i \Delta dcr_{i,t-j} + \sum_{j=0}^{q-1} \delta_{5j}^i \Delta rexr_{i,t-j} + \\ & \sum_{j=0}^{q-1} \delta_{6j}^i \Delta cpi_{i,t-j} + \sum_{j=0}^{q-1} \delta_{7j}^i \Delta emp_{i,t-j} + \delta_{i,t}. \quad \text{----- Eqn. 3.4} \end{aligned}$$

In the equation, λ_1 represents parameters to be estimated and Δ indicates differenced operator. If the respective variables are integrated order I (1), then the error term is integrated order I (0) process for all i . A principal feature of cointegration is that any short-run disequilibrium converges towards the long-run equilibrium at the rate of ϕ_1 . Therefore, the parameter ϕ_1 is the error-correcting speed of the adjustment term. If $\phi_1 = 0$, then there would be no evidence of a long-run relationship. This parameter is expected to be significantly negative under the prior assumption that the variables show a return to long-run equilibrium. Whether the PMG approach is valid or not, depends on several important findings (Samargandi et al., 2013). First, the error-correction term has to be negative and not lower than -2 to ensure

the existence of a long-run relationship among the variables of interest. Secondly, the obtained residual from the PMG estimator has to be serially uncorrelated then the explanatory variables have to be treated as exogenous determinants. But these conditions can be fulfilled by incorporating lags into an ARDL model for the dependent (p) and independent variables (q) in error-correction form. Finally, the PMG estimator is particularly useful when there are reasons to expect that the long-run equilibrium relationships between the variables are similar across countries because they might have similar natures in terms of economic activities.

Where:

gdpr = Gross Domestic Product Growth Rate,

dcr = Domestic Credit growth rate (Domestic credit to the private sector (% of GDP)

cpi = Consumer price index for the Inflation rate

Rexr = Real effective exchange rate

m2 = Broad Money Supply annual percentage growth rate

mpr = Monetary Policy Rate

emp = Labor force, total

3.3 Justification of Methodology

The study used the linear Panel ARDL within the framework of dynamic heterogeneous panel methods. The panel ARDL approach applies to cases in which the number of periods is relatively greater than the number of cross-sectional observations ($T > N$). Thus since the number of time series for this study is relatively larger than the number of cross sections ($T > N$), that is, for large T , Pesaran and Smith (1995) show that the traditional panel techniques [fixed estimator (FE), instrumental variables (IV), GMM estimators] can produce inconsistent and potentially misleading estimates of the average values of the parameters in a dynamic panel data model unless the slope coefficients are identical, hence, the need for analyzing the long-run effects and the speed of adjustment to the long-run. The pooled mean group (PMG) is an intermediate estimator between DFE and MG that allows the intercepts, short-run coefficients, and error variances to differ freely across groups but constrains the long-run coefficients to be similar across groups. It has the advantage of determining the long-run and short-run dynamic relationships.

4. Empirical Results and Discussion

4.1 Trend Analysis

Figure 4.1 presents the trends in the monetary policy rate and economic growth (proxy by gross domestic product growth rate) in selected West African countries covering the period from 2000 to 2021.

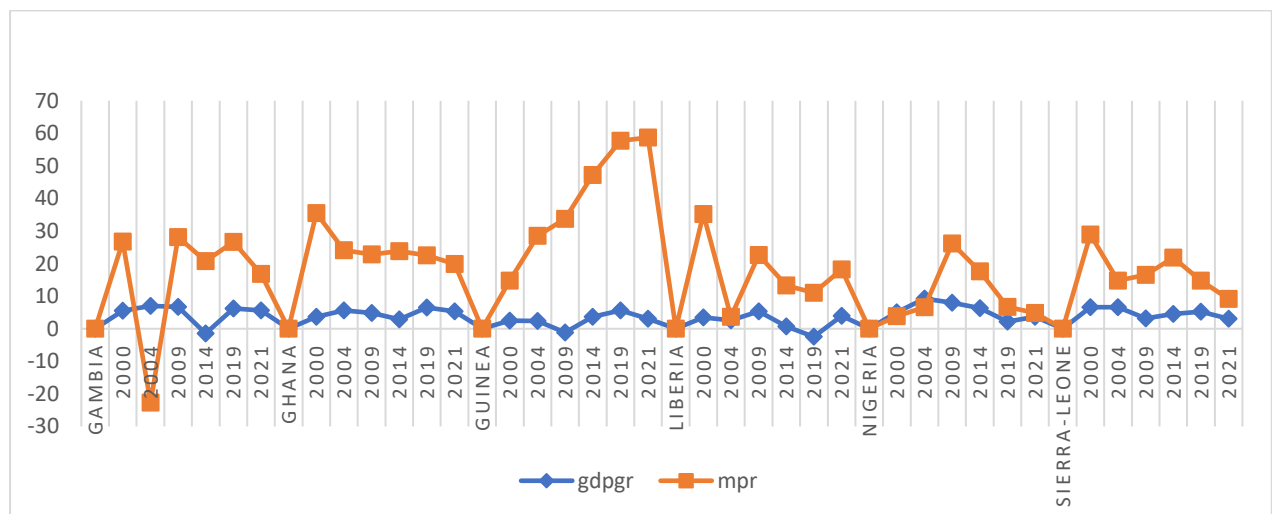


Figure 4.1: Trends in Monetary Policy Rate and Output Growth in West Africa

The selected countries in West Africa for the study are the Gambia, Ghana, Guinea, Liberia, Nigeria, and Sierra Leone- members of the West African Monetary Union (WAMU). Starting with the Gambia, the economic growth proxied by gross domestic product growth rate rose from 5.5 percent in 2000 to 7.05 percent in 2004 but fell slightly to 6.67 percent in 2009. However, the period of 2014 witnessed negative growth of -1.41 percent but return to the growth path in 2019 at 6.22 percent and further fell marginally to 5.6 percent in 2021. Ghana, on the other hand, witnessed a positive growth rate throughout the selected period, although the highest growth rate recorded was in 2019 at 6.5 percent, a period before the spread of the Covid-19 pandemic growth slightly declined in 2021 to 5.35 percent. Guinea's GDP growth rate within the corresponding period remains inconsistent with both falls and down, the highest rate stood at 5.62 percent in 2019 with a decrease in 2021 at 3.21 percent.

Statistics also reveal that Liberia's GDP growth rate exhibits both increases and decreases within the selected timeframe, rising from the highest rate in 2009 at 5.30 percent to

the lowest threshold in 2014 at 0.70 percent before recording negative growth in 2019 and appreciating significantly to 4 percent in 2021. Nigeria has witnessed quite a significant growth rate in GDP witnessed the selected period, rising from 5.01 percent in 2000 to 9.25 percent in 2004. However, the GDP growth rate fell slightly to 8.04 percent in 2009 and continues with that trend reaching its lowest in 2019 at 2.21 but returning to the growth path in 2021 at 3.65 percent. The trends in Nigeria's GDP growth rate demonstrate the highest rate than any of the other countries in the region. Similarly, Sierra Leone witnessed positive GDP growth through the period under consideration maintaining an appreciative level between 2000 and 2004 but fell to 3.18 percent in 2009 which might be tied to the global financial crisis. Since then, it has been rising reaching 5.25 percent in 2019 before falling to 3.19 percent in 2009 which could be tied to the global financial crisis of 2008/09. The period between 2014 and 2019 saw a significant growth rate but a decline slight to 3.05 in 2021. From the trends of the GDP growth across the selected countries in the region, Nigeria's GDP growth rate seems to exhibit a significant growth rate than the other countries under consideration, which is proof of her position as the largest market in West Africa and sub-Saharan Africa countries. Another common feature among the GDP growth rate in these countries is the effect of the Covid-19 pandemic of 2019 to 2021 that adversely affected the growth rate of the countries.

Examining the data on the real interest rate that was used due to the non-availability of monetary policy rate data in some of the selected countries. Essentially, the importance of monetary policy is to control and supply credit through contractionary or expansionary measures of tightening interest rates that trickle down to other macroeconomic variables. Thus, the use of real interest rates exhibits double digits from 2000 to 2021 for the Gambia. However, the only time the country witnessed a negative interest rate was in 2004, and when there was a decline to 11.21 percent in 2021 to boost the credit availability to the core private sector. However, Ghana's real interest rate is also on a double-digit trajectory but with the highest recorded in 2000 at 31.8 percent and currently (2021) standing at 14.5 percent. Essentially, tightening of monetary policy rate depends on the prevailing economic situation, particularly the inflationary rate, which most times is the major issue confronting developing countries in Africa, thus this is not surprising for the double-digit real interest rate witnessed across the sampled countries exception of Nigeria and Sierra-Leone in some years. Worrisome is the trend of the real interest rate in Guinea rising from 12.3 percent in 2000 to an astronomical threshold of 55.57 percent in 2021. This kind of trend is not favourable to the investment climate and thus could portend growth and development if not addressed. Similarly, Liberia also witnessed

a high real interest rate in 2000 at 31.69 percent before decreasing drastically to a single-digit rate of 1.05 percent. However, it returned to a double-digit trajectory throughout the remaining time horizon. Nigeria's real interest rate for 2000 and 2004 stood at a negative trajectory but move to 18.18 percent and 11.35 percent for 2009 and 2014 and since then it has continued to witness downward trends till 2021 at 1.23 percent.

Lastly, the real interest rate in Sierra Leone exhibits both double-digit and single-digit rates equally but currently, 2021 stands at 6.12 percent. Conclusively, only Nigeria and Sierra Leone seem to have real interest rates currently moving towards single-digit which might seem favourable to core private sectors willing to obtain loanable funds from commercial banks. These variances in real interest rates further justify different monetary policy regimes obtainable in these sample countries within the region. And the reason is not far-fetched, and most importantly on the account of the prevailing inflation rate with an adverse effect on investment funds.

Table 4.1 Summary of Descriptive Statistics

	gdPgr	cpi	dcr	lemp	m2	mpr	rexr
Mean	4.39	124.33	9.27	15.21	22.33	16.57	1,055.45
Median	5.09	102.40	9.01	14.84	21.29	14.53	100.00
Maximum	26.42	354.30	22.27	17.98	94.38	55.57	9,612.86
Minimum	- 30.15	- 16.32	1.60	12.91	- 17.44	- 29.71	40.90
Std Dev	5.71	81.79	4.57	1.45	17.08	13.88	2,419.41
Skewness	- 1.77	0.85	0.43	0.50	1.26	0.27	2.48
Kurtosis	16.13	2.98	2.66	2.30	6.95	4.58	7.81
Jarque-Bera	1,017.88	15.87	4.69	8.29	121.03	15.37	262.38
Probability	-	-	0.10	0.01	-	-	-
Sum	578.97	16,412.01	-	2,008.48	2,947.54	2,186.65	139,318.80
Sum Sq De	4,263.74	876,314.00	-	275.80	38,234.49	25,249.36	767.00
Observations	132.00	132.00	132.00	132.00	132.00	132.00	132.00

Source: Author’s compilation from Eviews 10 (2023)

Table 4.1 above show that all the variables have a positive mean. The exchange rate (rexr) recorded the highest figure on average as compared to other parameters. Meanwhile, besides the gross domestic product growth rate, all other series exhibited positive inclination, which means most of the distributions all have a long right tail i.e skewed to the right. Given that Kurtosis ranges between (0 and 3), gdPgr, m2, mpr, and rexr have values greater than 3 so

their distribution is Leptokurtic indicating they are peaked relative to the normal distribution, while cpi, dcr and lemp are Platykurtic indicating their distribution is flat relative to the normal distribution. The result of the Jarque-Bera (JB) statistic and the probability values indicate a non-normal distribution for the series. Therefore, most of the error terms in our sample did not follow the normal distribution at the 5% level of significance but keeping in mind that the JB test is a large-sample test, our sample of 132 observations may not be necessarily large. Also, the test of normality does not preclude the conduct of other tests, which may invariably correct this result (Gonzalo, 1994). Normality is not necessary to obtain many of the results we use in multiple regression analysis as it is possible to relax this assumption and still retain most of the statistical results obtained.

4.2 Preliminary Analysis

4.2.1 Cross-Section Dependence Test

This test is conducted to ensure that the estimates obtained are efficient. That is the estimation regression can be relied upon and the test statistic is valid. The balanced panel was chosen for the test because the number of time series (T) is greater than the number of cross sections (N). Also, the Pesaran CD estimates are most relevant to this study because the number of time series is small. The result of the CD test for the model is presented below in Table 4.2. Evidence from the result is that the null hypothesis of no cross-sectional independence was not rejected. This implies the non-existence of CD in the models, so the estimates are free of residuals that may be caused by the interdependency of economic activities in the West African countries.

Table 4.2: Residual Cross-Section Dependence Test

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	20.31940	15.00	0.1600
Pesaran scaled LM	0.97119		0.3315
Pesaran CD	0.66150		0.5083

Source: Author's extract from E-views 10 (2023)

4.2.2 Panel Unit Root Test

Table 4.3: Stationarity Test Results for the Panel Data

Variables	Levin-Lin-Chu unit-root test		Decision	Im-Pesaran-Shin unit-root test		Decision	Hadri LM		Decision
	Adjusted t-statistics	Prob. Value		w-t-bar statistics	Prob.		z statistics	Prob.	
gdpgr	-4.05	0.0000**	I (0)	-3.8174	0.0001**	I (0)	-2.3075	0.9895***	I (0)
D(gdpgr)	-	-	-	-	-	-	-	-	-
cpi	0.1213	0.5483		2.4142	0.9921		29.3892	0	-
D(cpi)	-8.9897	0.0000**	I (1)	-8.5061	0.0000**	I (1)	0.2689	0.3940***	I (1)
mpr	-6.9293	0.0000**	I (0)	-5.4241	0.0000**	I (0)	4.2806	0	-
D(mpr)	-	-	-	-	-	-	-1.7247	0.9577***	I (1)
m2	-2.2285	0.0129*	I (0)	-2.3364	0.0097**	I (0)	-1.9272	0.9730***	I (0)
D(m2)	-	-	-	-	-	-	-	-	-
dcr	-4.7358	0.0000**	I (0)	0.5123	0.6958	-	22.4386	0	-
D(dcr)	-	-	-	-4.5831	0.0000**	I (1)	-1.0467	0.8524***	I (1)
rexr	0.0093	0.5037	-	0.3871	0.6507		31.1931	0	
D(rexr)	-3.9913	0.0000**	I (1)	-3.9154	0.0000**	I (1)	-1.8879	0.9705***	I (1)
emp	-0.9533	0.1702		-0.3793	0.3522		24.3475	0	
D(emp)	-5.0952	0.0000**	I (1)	-4.3793	0.0000**	I (1)	-1.0844	0.8609***	I (1)

Source: Culled from STATA 15 Output.

Note: The asterisk (***) ** and *) denotes rejection of the null hypothesis that the series has a unit root at 1%, 5%, and 10% level of significance

The results of panel unit root tests are presented in Table 4.3. The Result shows the panel unit root test results using Levin, Lin, and Chu (2002) unit-root test and Im, Pesaran, and Hadri LM unit-root test. It indicates that most of the panels do not contain unit roots at levels except for gross domestic product growth (gdpgr) and money supply (m2) from the Levin-Lin-Chu unit-root test, Im, Pesaran, and Hadri LM unit-root test, the balance of payment from Levin-Lin-Chu unit-root test, domestic credit rate (dcr) from Levin-Lin-Chu unit-root test,

monetary policy rate from Levin-Lin-Chu unit-root test and Im, Pesaran unit-root test. However, all the variables consumer price index (cpi), monetary policy rate (mpr), domestic credit rate (dcr), real effective exchange rate (rexr), and employment level (emp) from Levin, Lin, and Chu (2002) unit-root test and Im, Pesaran, and Hadri LM unit-root test were integrated at first difference. Thus, the panels were estimated using non-stationary heterogeneous panel models.

4.2.3 Panel Co-integration Test

Table 4.4: Panel Cointegration Test Results

Monetary Policy and Output		
	Statistics	P Value
Kao Test (Dickey-Fuller t)	-8.0765	0
Pedroni (Philips-Perron t)	-7.1594	0
Westerlund	-1.3184	0.0937

Source: Authors extract from E-views 10 (2023)

The result of the Dickey-Fuller t, Philip-Perron t, and Westerlund, at 5%, 10% level of significance all the models under the Panel Kao, Pedroni test and Westerlund Statistic shows a long run relationship meaning that null hypothesis was accepted at the 5% level of significance. The Kao residual cointegration test rejects the null hypothesis since it is not up to a 5% level of significance. This means that we have a long-run relationship among all the variables models.

4.2.4 Multicollinearity Test

Table 4.5: Correlation Matrix

	gdpgr	m2	dcr	rexr	cpi	emp	rir
gdpgr	1.0000						
m2	0.0940	1.0000					
dcr	0.0272	- 0.0446	1.0000				
Rexr	0.0472	0.0075	- 0.1247	1.0000			
cpi	- 0.1030	- 0.2207	0.4050	0.2313	1.0000		
emp	0.0649	- 0.0005	0.3403	- 0.1701	0.1438	1.0000	
rir	0.0955	- 0.0331	0.0222	0.7384	0.1564	- 0.3148	1.0000

Source: Authors Extract from E-views 10

From the results obtained from the Pearson Product Moment correlation matrix in Table 4.5 above, there is a very low positive relationship between *gdpgr* and all the other variables except with *cpi* which has a low negative relationship. So, on the whole, the study can conclude that there is no multicollinearity among the regressors in the model since there is no pair-wise correlation coefficient in the model that is more than 0.80 (Gujarati and Porter, 2006).

4.3 Empirical Results and Analysis

The Hausman test was used to decide whether PMG or MG estimator is appropriate for estimating the objective of the study. The decision rule is: to reject the null hypothesis if the probability value is less than 0.05. The null hypothesis is that MG and PMG estimates are not significantly different or PMG is more efficient. Therefore, the outcome of the Hausman (1978) test is presented in Table 4.6 below.

Table 4.6: Hausman Test Results for output growth Model

MG vs PMG				
Variables	(b)	(B)	(b-B)	Sqrt (diag (V_b-V_B))
	MG	PMG	Difference	S. E
M2	0.453793	-0.01778	0.471576	0.729559
Dcr	14.29166	0.34823	13.94343	37.53238
Rexr	-2.73188	0.001021	-2.7329	7.204424
Cpi	2.494486	-0.01041	2.504892	6.805931
Mpr	-0.40569	-0.25033	-0.15537	1.094551
Lemp	-780.559	9.705087	-790.264	2052.384
Chi-square (4) = 0.49, Prob.= 0.9746				

Source: Authors’ Computed from STATA 15 Output (2023)

Table 4.6 holds the result of the chi-square values of 0.49 with the probability values of 0.97. Since the probability value is greater than 0.05 (at a 5% level of significance). The implication is that the study fails to accept the null hypotheses and concludes that the PMG estimator is most preferred over the MG estimator for the output growth model. This means long-run heterogeneous estimates and short-run individual country-specific effects (heterogeneity). That is, both short-run and long-run estimates do not differ among the countries. This is an indication that the economies in the region are similar in several aspects. The results are presented in that line, and this is in agreement with (Harvey and Cushing, 2015).

Table 4.7: Short-run effect of monetary policy on output growth in West Africa

Variables	Coefficients	Standard errors	Prob.
Ecm	-0.11844	0.054776	0.000***
gdpgr	-0.92795	0.089318	0.000***
mpr	0.201856	0.065234	0.002***
m2	-0.0608	0.03277	0.064*
dcr	-1.01244	0.354888	0.004***
rexr	-0.00125	0.00218	0.565
cpi	-0.11586	0.121376	0.34
lemp	108.9711	48.60256	0.025**
_cons	-176.604	117.4787	0.133

Source: Authors' Computed from STATA 15 Output. Note: This study used a 5% level of significance upon which the statistical significance of the estimated variables was examined. The asterisk (***) ** and *) denote rejection of the null hypothesis which implies that the estimate of the variable is highly significant at 1%, 5%, and 10% levels of observed significance respectively.

The short-run estimates of the effect of monetary policy rate on output growth are presented in Table 4.7. The result shows that the monetary policy rate has a positive and statistically significant effect on output growth in West Africa in the short run. This is against a priori but conforms to the finding of Ayomitunde et al (2020) and Tule et al. (2020). Money supply and domestic credit across the sample countries within the period of the study exert a negative and statistically significant effect on output growth in the short run. This is in agreement with the a priori for the money supply, but in disagreement with the a priori for domestic credit to the private sector. While employment level exerts a positive and statistically significant effect on output growth in agreement with a priori, it is contrary to the finding of Bashir and Okrinya (2020). Also, the real effective exchange rate and consumer price index exert a negative and insignificant effect on output growth in the short run. This means that the real effective exchange rate and consumer price index do not explain the changes in output growth in the period of the study, which conforms to the outcome of the study by Bashir and Okrinya (2020).

From the result of the error correction terms of the monetary policy regime effect on the output growth model in Table 4.7, the speed of adjustment coefficients for all 6 selected countries in West Africa shows negative estimates that are statistically significant at a 5 percent

level. This implies that in case of any initial distortion, the distortions would converge towards long-run equilibrium at the rate of 11 percent per period.

Table 4.8: Long-run effect of monetary policy rate on output growth in West Africa

D.gdpgr	Coefficient	Standard Error	Z	P> Z 	95% Conf. Interval	
mpr	-0.0456	0.098619	0.4600	0.644	-0.23889	0.147692
m2	0.09729	0.044722	2.1800	0.03**	0.009637	0.184944
dcr	0.1878	0.179586	1.0500	0.296	-0.16418	0.539786
cpi	-0.0201	0.018803	1.0700	0.286	-0.05693	0.016775
lemp	10.4963	6.91126	1.5200	0.129	-3.04957	24.04207
rexx	0.00097	0.000644	1.5100	0.131	-0.00029	0.002234

Source: Authors' Computed from STATA 15 Output. *** ** and * denote rejection of the null hypothesis which implies that the estimate of the variable is highly significant at 10%, 5%, and 1% levels of significance respectively.

The result in Table 4.8 holds the long-run estimates of the effect of the monetary policy regime on output growth in West Africa. The monetary policy rate exhibits a negative and statistically insignificant effect on output growth. This is in line with the finding of Ayomitunde et al (2020) but contrary to the finding of Nwoko et al (2016), Akinjare et al (2016) and Kilinc and Tunc (2019). The implication is that in the long run monetary authorities' decision does not explain changes in output growth in the selected West African countries. A similar interpretation was the case for the coefficient of domestic credit, employment rate, and the real effective exchange rate which were positive, and for the consumer price index which was negative but, were all statistically insignificant. Contrarily the result obtained for money supply exerts a positive and significant effect on output growth, which conforms to the findings of Aderemi et al (2019) but contrary to that of Olakanmi and Olagunju (2020).

4.4 Discussion of Findings

The short-run result obtained from the estimation shows that the monetary policy rate has a positive and statistically significant effect on output growth in at least one of the countries in the selected West African country. This is against a priori and may be a reflection of the negative relation between inflation and growth in the financially repressed countries of the region, where nominal interest rates are kept fixed for some periods. Money supply also exerts a negative and statistically significant effect on output growth in the short run across the sample

countries within the period of the study. This agrees with the Monetarists' belief that an increase in the money supply will not affect output, but will affect mainly inflation. When the monetary authorities in the region increase the money supply in an attempt to stimulate their economies inflation occurs. The general price level will increase, and the cost of goods will then be unstable. The ensuing high rates of inflation cause problems, not just for households, but for the aggregate economic performance. It will not only decrease the growth rate but also induces uncertainty in the economy with an adverse effect on financial sector development as it reduces the efficiency of investment. The vulnerable poor segment of the population is also affected concerning the distribution of both income and wealth. It is because of this that the monetary authorities believed that price stability is a prime function of monetary policy. Domestic credit to the private sector also hurt output growth. This may not be far from the effect of inflation that adversely affects the efficiency of capital. An increase in the rate of interest can also discourage investors from borrowing funds from financial sectors, thus, reducing the level of investment and productive activities in the economy.

In the long run, the monetary policy rate exhibits a negative and statistically insignificant effect on output growth in the region. Contrarily, the result obtained for money supply shows that it exerts a positive and significant effect on output growth. This is associated with the structuralist theory, which believes that an increase in the money supply will bring about an increase in the total money in circulation in an economy. This will increase aggregate demand and lead to a rise in productive activities and investment opportunities in the economies of West Africa. Of note, is that the monetary policy rate as a tool of monetary policy can be significant in the changes that are witnessed in output growth in the region only in the short run. While money supply can be utilized both in the short and long runs especially as the rate of adjustment of short-run disequilibrium to the long-run equilibrium is within a short period.

5. Conclusion and Recommendations

This study set out to examine monetary policy regimes and output growth in West Africa for the period from 2000-2021. The results obtained indicate that the various monetary policy regimes being implemented in West Africa yielded conflicting effects on output growth. The Hausman test results indicate that economic activities were similar in the countries in the region so homogenous estimates were reported in both the short-run and the Long-run. It indicates that the monetary policy rate was only effective in the short run to yield any

significant effect on output growth, while the money supply was significant in both the short run and long run. And, if you come to consider that most countries have a large unbanked population and loads of cash outside the formal financial sector then it should be realized that monetary policy regimes targeting output growth will portend great effort to achieve the objective.

Recommendations

Based on the findings of the study, it is imperative to make proper policy recommendations to enhance output growth in the selected West African countries. Hence, the following recommendations were made.

- i) The monetary policy rate and money supply tool can both be utilized to achieve output growth in West Africa in the short run, while in the long run, only monetary supply explains output growth in the zone. So, the money supply is an effective tool for achieving output growth and this should be effectively managed to curb inflationary trends that may arise as a result of increased money supply in order not to reverse economic growth.
- ii) The monetary authorities must be more proactive in determining the stance of fiscal policies, developing financial markets, and liberalizing the controlled interest rate practices with sound liquidity management practices.
- iii) The countries should review interest rate policies appropriately to stimulate output growth. That is, make the financial sector to be strong to provide credit at a lower interest rate which in turn will stimulate output growth in Nigeria.
- iv) There should be cooperation between the monetary and fiscal authorities in West Africa to ensure smooth coordination and consistency in monetary and fiscal pursuits. Put differently, the combination and coordination of both monetary and fiscal policies are highly recommended in the region.
- v) Monetary authorities should promote activities in all the sectors of the economy, particularly in the high-growth sectors in the region, such as the agriculture and industrial sectors to increase output and reduce the rate of dependence on imports.

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