Role of Central Bank Independence in the Effect of Monetary Policy on Economic Growth in Sub-Saharan Africa

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ABSTRACT :

This study investigates the role of central bank independence in the influence of monetary policy on economic growth in Sub-Saharan Africa, employing a panel vector error correction model after completing preliminary and cointegration tests. The findings reveal that monetary policy significantly boosts economic growth in the long term but exerts notable short term negative effect. Moreover, results indicate that while the labour force positively and prominently influences economic growth in the short term, its impact is minimal in the long term. In contrast, the interaction between central bank independence and monetary policy has a pronounced negative effect on economic growth in both the short and long terms. Furthermore, trade openness and gross fixed capital formation appear to have no considerable influence on economic growth, regardless of the time frame. The study comes to the conclusion that enhancing central bank independence can improve the effectiveness of monetary policy on Sub-Saharan Africa's economic expansion. In order to reduce asymmetric patterns of trade and thereby accelerate sustainable economic growth in the region, the study recommends that Sub-Saharan African countries should regularly improve the skills of their labour force, review and strengthen their central bank Acts, implement an economic diversification strategy, and focus on value-addition.

Keywords: Monetary Policy, Economic Growth, Central Bank Independence, Panel Vector Error Correction Model, Sub-Saharan Africa

1.0 Introduction :

Unexciting economic performance is one of the global issues that both rich and developing nations are facing in the wake of COVID-19. Developing nations, particularly those in Sub-Saharan Africa, have been disproportionately impacted. Between 2015 and 2019, the global real Gross Domestic Product (real GDP) per capita experienced an average annual growth rate of 1.8%. However, the COVID-19 pandemic in 2020 led to a sharp decline of 4.1%. In 2021, growth rebounded by 5.2% but slowed to 2.2% in 2022. Projections indicated further trends in growth still slowed to 1.4% in 2023 hoping that it would increase slightly to 1.6% in 2024 (United Nations, 2023). Nearly thirty-three percent of Sub-Saharan African nations still have double-digit inflation, despite the fact that many central banks responded to the ongoing price increases by implementing stricter monetary policies in an effort to restore macroeconomic stability in the region. As a result, many nations have experienced severe problems resulting in higher cost of living and other immediate consequences of macroeconomic adjustment (International Monetary Fund [IMF], 2024). Furthermore, Sub-Saharan Africa's poor condition has gotten worse as a result of the region's population increase outpacing its economic expansion. Therefore, decreasing poverty in the area will be greatly aided by speeding economic growth to the point that it surpasses the pace of population growth (World Bank, 2024).

As stated by the Central Bank of Nigeria (2011), monetary policy refers to deliberate measures put in place by a nation's apex bank to control the money supply and credit in the economy, with the goal of achieving important macroeconomic objectives such as full employment, economic growth, and price stability. Additionally, economic growth is described as a continuous rise in the value of goods and services produced within a country over time (Ivic, 2015). However, central banks are expected to have a high degree of independence in order to manage monetary policy efficiently. Central bank independence refers to the capacity of a central bank to execute monetary policy without external political interference (Strong, 2021). This independence implies that the central bank has the autonomy to determine monetary policy objectives and select the tools necessary to achieve them, free from outside influence. Consequently, a central bank's chances of developing successful monetary policies to maintain financial and economic stability increase with its level of independence.

While a successful monetary policy is anticipated to stimulate price stability and drive economic growth, costly consequences may result from easing too little too late or easing too much too soon (Musalem, 2024). Meanwhile, in order for Sub-Saharan Africa to profit from price stability and steady growth, the threshold hypothesis states that a number of prerequisites must be fulfilled before a nation can accomplish its goals of price stability and economic expansion (interchangeably referred to as economic growth). If not, there may be financial crises and slower economic growth. Various forms of the threshold effect suggest that only countries with relatively high levels of central bank independence can effectively use monetary policy to achieve sustained economic growth (see Prasad, Rogoff, Wei & Kose, 2003; Kose, Prasad & Terrones, 2006). Notably, in nations with low central bank independence, the implementation of monetary policy may not produce significant benefits.

The argument for central bank independence is theoretically grounded in its ability to counter inflationary tendencies that may emerge in the absence of such autonomy (Fischer, 2015). One key driver of these tendencies is political pressure to boost short-term output for electoral gains. Additionally, politicians may be inclined to exploit the central bank's power to issue money as a means of financing government spending, The time-inconsistency issue with monetary policymaking can potentially lead to inflationary bias. The issue is that policymakers lack credibility. In other words, they have an incentive to break their pledge to maintain low inflation in the future. Promises to maintain low inflation are more credible when monetary policy is left to an independent, conservative, and inflation-averse central bank (de Haan & Eijffinger, 2019). Even the most autonomous central bank, it has been argued, does not operate in a political vacuum (Fernández-Albertos 2015). Additionally, research on how central bank independence affects economic growth has produced conflicting findings (see Berger &Woitek, 1999; Alesina & Summers, 1993). In order to establish a clear relationship and provide recommendations that will accelerate economic growth in Sub-Saharan Africa, this study seeks to examine the role of central bank independence in shaping the impact of monetary policy on economic growth within the region.

There are several reasons why this study is important: First, policymakers can determine where changes are needed to improve the effectiveness of monetary policies by comprehending how central bank independence mediates the influence of monetary policy on economic expansion. Furthermore, by examining the long-term interplay between economic expansion, central bank independence, and monetary policy, the study emphasizes how these factors interact over time. In addition to adding to the body of existing literature, the knowledge gathered from this study will help central banks in Sub-Saharan Africa and other countries in comparable contexts create policies that will support financial stability and economic growth, both of which are critical for lowering poverty and raising living standards in developing countries. Therefore, the study investigates the influence of central bank independence on the relationship between monetary policy and economic growth in Sub-Saharan Africa.

2.0 Empirical Literature Review :

Numerous studies have investigated the nexus between monetary policy and economic expansion, including the role of central bank independence. For instance, Ufoeze, Odimgbe, Ezeabalisi, and Alajekwu (2018) analyzed the effect of monetary policy on economic growth in Nigeria over a span of 21 years (1986 to 2016). The study used the natural logarithm of Gross Domestic Product (GDP) as the dependent variable and monetary policy variables like the monetary policy rate, money supply, exchange rate, lending rate, and investment as independent factors. The researchers applied the Ordinary Least Squares method, alongside unit root and co-integration tests. The main finding was that, although investment, interest rates, and monetary policy rates had minimal positive effects on Nigeria's economic growth, the money supply played a significant role in driving the country's growth. The results suggest that monetary policy is an effective tool for achieving price stability and fostering economic growth, enabling effective management of the Nigerian economy.

Adeniyi, Omotosho, and Akanbi (2020) examined the link between Nigeria's economic expansion and monetary policy. Their study found that monetary policy influenced Nigeria's economic growth both in the short and long run. It also highlighted that while higher interest rates had a negative impact on growth, an increase in the money supply positively affected the economy. In a separate study, Ogundipe and Akinbobola (2020) used the Autoregressive Distributed Lag (ARDL) Bounds Testing approach to explore the relationship between monetary policy variables (money supply, interest rate, and exchange rate) and economic growth. Their findings revealed a strong positive correlation between the money supply and short-term economic growth. However, over time, the money supply and exchange rate both significantly boosted economic expansion. However, the study also discovered that interest rates had a short- and long-term detrimental effect on economic growth. The study concluded that if effectively implemented by policymakers, the monetary policy factors analyzed could be utilized to foster economic growth in Nigeria.

Oseni and Oyelade (2023) conducted a similar work examining the effect of monetary policy on economic growth in Nigeria using various economic variables. Their findings revealed that while lending rates had a notable negative impact on GDP, factors such as gross capital formation, total employment, and the broad money supply had positive and significant effects on GDP. According to the study, the government could cut the loan rate to encourage more private investment in Nigeria. This would encourage more private investors to borrow money, which would increase investment in the country.

Ajayi, Olapade, Oraka, and Giwa (2023) studied the effect of monetary policy on economic growth in Africa. They used Dynamic Ordinary Least Squares (DOLS) and Fully Modified Ordinary Least Squares (FMOLS) for estimation, and applied the Granger causality method to analyze the causal relationships between the variables. The co-integration test results showed a long-term relationship among the variables. The study found that monetary policy had a positive and significant impact on economic growth in Africa. Furthermore, Babatunde and Adeoti (2023) looked at how monetary policy affected sub-Saharan Africa's economic performance between 2005 and 2019. The study, which employed the Blundell and Bond system GMM technique for estimation and used economic growth, foreign direct investment, and gross domestic savings as indicators of economic performance, found that monetary policy was pivotal in shaping economic outcomes in sub-Saharan African countries. The results suggested that these nations could utilize monetary policy to boost economic growth, attract foreign investment, and encourage domestic savings, all of which would ultimately improve the welfare of their populations.

Additionally, Awoyemi et al. (2024) looked into how effective monetary policy was in West Africa before and after COVID-19. Panel fully modified ordinary least squares (FMOLS) were employed in the investigation. The results showed that, whilst monetary policy had a negligible impact following the pandemic, it had a 12.3% negative and considerable impact on economic growth before to COVID-19. Additionally, monetary policy had a 52.5% negative and substantial impact on inflation following the epidemic, compared to a 21.01% negative and significant impact prior to the COVID-19 pandemic. This suggested that the impact of COVID-19 on supply chains, demand, and the weakened economy were some of the reasons why the central bank's attempts to influence and control inflation had become less successful.

Nonetheless, Cukierman, Webb, and Neyapti (1992) claimed that a government might determine the degree of its commitment to price stability by designating the central bank as an organization with the authority and reputation to uphold price stability. Four metrics of central bank independence were created in this study, and their relationship to inflation results was examined. An aggregate legal index was constructed for four decades in 72 countries. The study developed three measures of true central bank independence: the central bank governor turnover rate, an index based on a survey of experts from 23 countries, and a combination of the legal index with the turnover rate. The findings revealed that in developed countries, legal independence was negatively correlated with inflation, while this relationship did not hold in developing countries. In emerging nations, the actual frequency of changes in the central bank's chief executive officer proved to be a more reliable indicator of central bank independence. One important factor in explaining cross-country differences in the rate of inflation was an inflation-based measure of overall central bank independence.

Using generalized impulse response functions, Berger and Woitek (1999) offered an alternate approach to determine if monetary policy conservatism matters in the instance of the German Bundesbank. As it happened, more conservative council majorities do, in fact, pursue policies that are more inflation-averse. Regarding alterations in the exchange rate regime, disputes between the government and the central bank, and the partisan makeup of the government, the findings were quite solid. According to the analysis, more conservative Bundesbank administrations are linked to stronger output, somewhat lower inflation, and a less volatile economy. In a different trend, Labonte and Makinen (2006) claimed in a publication on monetary policy and price stability that while central bank independence does not directly affect growth rates, it does aid in lowering inflation.

In order to evaluate the legal independence of central banking organizations, Dincer, Eichengreen, and Martínez (2024) compiled a nearly comprehensive collection of central bank statutes dating back to 1800. These were employed in the study to extend the current legal independence indexes both forward and backward in time. It measured the degree to which subjects in central banks' laws aided in independence using machine-learning techniques. According to the study, disclosure, transparency, and reporting requirements account for the largest positive contribution to the explanation of cross-country variation in central bank independence, whereas regulatory powers over securities markets, among other things, account for the largest negative contribution. These powers complicate the central bank's mandate, increase accountability, and make independence problematic.

For the first time in thirty years, Adrian, Khan, and Menand (2024) developed a brand-new index to gauge de jure central bank independence. The index uses weightings from a survey of 87 respondents, the majority of whom were general counsels and central bank governors, the study also made use of an extensive dataset from the IMF's Central Bank Legislation Database (CBLD) and the Monetary Operations and Instruments Database (MOID). Building on recent updates by Garriga (2016) and Romelli (2022), it enhanced the Cukierman, Webb, and Neyapti (CWN) index, which has been the benchmark for measuring central bank independence since 1992. For instance, it incorporates regions that are not included in the CWN index.

The Central Bank Independence – Extended (CBIE) index was first created in Romelli (2022), however Romelli (2024) provided a comprehensive update that expanded its coverage for 155 nations from 1923 to 2023. The update showed a persistent worldwide trend toward greater central bank independence that persisted across income levels and central bank independence indices. The analysis indicated that the pace of central bank reforms continued unabated notwithstanding the difficulties that followed the global financial crisis of 2008 and the subsequent resurgence of political scrutiny on central banks due to the COVID-19 pandemic. From 1923 to 2023, the study recorded 370 central bank design revisions. It also showed that since 2016, there has been a renewed emphasis on central bank independence. These results implied that the post-2008 delay in reforms was a transitory phase and that central bank independence was still regarded as essential to sound economic policymaking even in the face of mounting political pressure on central banks.

In order to improve operational independence, many nations have changed the institutional framework controlling their central banks, according to a study conducted by Ioannidou, Kokas, Lambert, and Michaelides (2023) that covered the years beginning in the 1980s. The study, which gathered systematic biographical data, global press coverage, and independent expert opinions, discovered that, particularly following major legislative reforms intended to shield central banks and their governors from political meddling, the appointments of central bank governors have become more politically motivated over the same time period. Additionally, the analysis demonstrated that politically motivated appointments were linked to worse inflation and financial stability results and suggested a lack of *de facto* independence.

Additionally, a study by Bianchi, Gómez-Cram, Kind, and Kung (2023) used a high-frequency technique to analyze how financial markets were affected by President Trump's comments criticizing the Federal Reserve. According to the analysis, the average impact on the anticipated fed funds rate was negative, statistically significant, and increased in size with time. Additionally, the tweets caused stock prices to rise and long-term U.S. Treasury yields to fall. The macroeconomy, stock market, bond premia, and actual monetary policy were all significantly impacted by the tweets, according to vector autoregression (VAR) evidence.

According to a study by Berger and Kißmer (2013) on the relationship between central bank independence and financial stability, central banks were more inclined to forego preemptive monetary tightening in order to preserve financial stability if they were more independent. The seemingly widely held belief that central bank independence promotes financial stability is in stark contrast to these findings. Additionally, between 1980 and 2013, Garriga and Rodriguez (2020) examined how central bank independence affected inflation in a sample of 118 developing nations. According to the analysis, lower inflation rates were linked to more central bank independence. Nonetheless, the study found that this effect on inflation was larger in more democratic nations, albeit it was also evident in less democratic nations.

3.0 Methodology :

The study randomly selects 21 out of 48 in Sub-Saharan Africa countries (United Nations, 2024), The selected countries are: Angola, Benin, Botswana, Burundi, Cameroon, Central African Republic, Chad, Gabon, Gambia, Ghana, Kenya, Lesotho, Madagascar, Mauritius, Namibia, Nigeria, Rwanda, Seychelles, South Africa, Tanzania, and Zimbabwe. Secondary data are used in this study.

3.1 Theoretical Framework

The Central Bank Autonomy and Growth Theory serves as the foundation for our investigation. This theory investigates the connection between central banking institutions' independence and their capacity to stimulate economic expansion. It makes the case that, especially in regions like Sub-Saharan Africa where political pressure might be strong, institutional independence is essential for the central bank to make efficient, growth-oriented monetary policy decisions free from political meddling. According to the model, central bank independence (CBI) is more resilient to political influences, which improves macroeconomic results and spurs growth.

Mathematically,

$$RGDPGR = f(CBI, Xi) \tag{1}$$

Where;
CBI represents central bank independence
Xi stands for control variables.
However, the objective of the study is to determine the role central bank independence in the effect of monetary policy on economic growth in the study area. Hence, model (1) becomes:

$$RGDPGR = f(MP, CBI * MP, Xi) \tag{2}$$

Where;
MP stands for monetary policy.
CBI*MP represents the interaction between central bank independence and monetary policy.
Meanwhile, a review of empirical literature shows that capital, labour and trade openness are important drivers of economic growth. Hence, they are hereby added as control variables (See Mankiw, Romer & Weil, 1992, Egbetunde & Obamuyi, 2018; Abinabo & Abubakar, 2023). After adding the aforementioned control variables, the model becomes:

$$RGDPGR = f(MP, CBI * MP, K, L, TRO) \tag{3}$$

Where;
K stands for capital
L represents labour
TRO stands for trade openness

3.2 Model Specification

Using Panel Vector Error Correction Model (PVECM), the estimated model is expressed as follows:

$$
\begin{aligned}
\Delta RGDPGR_{it} = {} & \text{ß}_0 + \sum_{j=1}^{k} \text{ß}_{1j}\,\Delta RGDPGR_{it-j} + \sum_{j=1}^{k} \text{ß}_{2j}\,\Delta MP_{it-j} + \sum_{j=1}^{k} \text{ß}_{3j}\,\Delta(CBI*MP)_{it-j} \\
& + \sum_{j=1}^{k} \text{ß}_{4j}\,\Delta GFC_{it-j} + \sum_{j=1}^{k} \text{ß}_{5j}\,\Delta LF_{it-j} + \sum_{j=1}^{k} \text{ß}_{6j}\,\Delta TRO_{it-j} + \omega_{1j} RGDPGR_{it-1} \\
& + \omega_{2j} MP_{it-1} + \omega_{3j}(CBI*MP)_{it-1} + \omega_{4j} GFC_{it-1} + \omega_{5j} LF_{it-1} + \omega_{6j} TRO_{it-1} \\
& + \omega_{7j} ECT_{it-1} + \varepsilon_{it-1} \tag{4}
\end{aligned}
$$

Where;
RGDPGR$_{it}$ represents real GDP growth rate (as proxy for economic growth) of country *i* over the period of study period.

MP_{it} stands for growth rate of broad money supply (proxy for monetary policy) of country i over the study period.

$(CBI*MP)_{it}$ represents central bank independence-monetary policy interaction of country i over the period of study period.

GFC_{it}= Gross fixed capital (as proxy for capital) of country i over the period of study.

$LF_{it,}$ = Labour Force (proxied by growth rate of population of 15-64 year old people) of country i over the period of study.

TRO_{it}= Trade Openness of country i over the period of study.

"ßo" denotes the intercept term, reflecting the average impact on the dependent variable of all factors not included in the model, especially when all explanatory variables are set to zero.

"β1, …, β6" and $\omega_1 ... \omega_7$ represent the parameters or partial regression coefficients of the model, indicating the change in the average value of real GDP for each unit change in an individual explanatory variable, while holding other variables constant. Finally, $"\varepsilon_t"$ is the stochastic error term, accounting for all factors that may affect the model but are not directly included, and it exhibits defined probabilistic properties throughout the study period.

It should be noted that if $ß_2 > 0$ and $ß_3 > 0$ in model 4, monetary policy has positive effect on economic growth, and central bank independence favourably affects that positive effect. If $ß_2 > 0$ and $ß_3 < 0$ in the same model, monetary policy positively affects economic growth, and central bank independence adversely affects the nature of the relationship. If $ß_2 < 0$ and $ß_3 > 0$ in the said model, monetary policy negatively impacts economic growth, and central bank independence helps reduce (mitigate) this negative effect. However, if $ß_2 < 0$ and $ß_3 < 0$, monetary policy still has a negative impact on economic growth, but central bank independence intensifies (aggravates) this negative effect. From model 4, the threshold of central bank independence is calculated as $ß_2 / ß_3$ (Bailliu, 200; Greene, 2008).

3.3 Data Sources and Measurement of Variables

Table 1 shows the sources and measurement of variables used in the study.

Table 1: Data Sources and Measurement of Variables

Variable	Indicator/Proxy	Variable Description	Measurement	Source
RGDPGR	Real Gross Domestic Product growth rate	RGDPGR as proxy for economic growth	Growth rate of Real Gross Domestic Product (GDP) in percentage	World Bank's World Development Indicators, 2023.
MP	Monetary policy	MP is proxied by broad money supply	Measured as percentage change in broad money supply	World Bank's World Development Indicators, 2023.
CBI	Central Bank Independence	The extent to which central bank is free of interference from politicians.	Central bank independence extended Index (CBIE) by Romelli (2022, 2024) measured from 0 to 1.	World Governance Indicators, 2023.
GFC	Gross fixed capital formation (shortened as gross fixed capital)	Gross fixed capital formation encompasses spending on new additions to the economy's fixed assets, along with net changes in inventory levels. It serves as an indicator of nonfinancial capital.	Measured as a percentage of GDP	World Bank's World Development Indicators, 2023.
LF	Labour force	The population growth rate serves as an indicator for the labor force.	Growth rate of population in percentage.	World Bank's World Development Indicators, 2023.
TRO	Trade openness	The volume trade between a country and the rest of the world.	The volume imports and exports as a proportion of GDP.	World Bank's World Development Indicators, 2023.

3.4 Method of Data Analysis and Analytical Techniques

The study uses both descriptive and inferential statistics. It also conducts correlation analysis with a view to examining which pair of variables suffers from multicollinearity. After completing the preliminary tests, the study uses the panel vector error correction model to examine the role of central bank independence in shaping the influence of monetary policy on economic expansion in Sub-Saharan Africa.

3.5 A priori Expectations

When a study of this nature is being conducted, the independent variables are expected, *a priori*, to carry either positive or negative sign, which indicates positive or negative relationship with the dependent variable respectively. For example, if a parameter estimate has a negative sign, it suggests that a reduction in the independent variable will lead to an increase in the dependent variable, and conversely. The expected relationships of the variables included in the study are presented in Table 2.

Table 2: *A priori* **Expectations**

Variable	parameter	Sign
RGDPGR	β_1	+/-
MP	β_2	+/-
(CBI $*$MP)	β_3	+/-
GFC	β_4	+
LF	β_5	+
TRO	β_6	+

4.0 Results and Discussion :

4.1 Descriptive Statistics

The descriptive statistics in respect of the variables used in the study are contained in Table 3. The table reveals that sample mean for central bank independence (CBI), gross fixed capital (GFC), labour force (LF), monetary policy (MP), real GDP growth rate (RGDPGR), and trade openness (TRO) are 0.610511, 0.20928, 0.026749, 0.19075, 0.037295, and 0.716126 respectively. The maximum values for CBI, GFC, LF, MP, RGDPGR, and TRO are 0.81, 0.597 231, 0.204065, 5.281943, 0.336294, and 2.221783 respectively, while the minimum values for CBI, GFC, LF, MP, RGDPGR, and TRO are 0.36, 0.020004, -0.02055, -0.58172, -0.36392, and 0.1635 respectively. The skewness in the result measures asymmetry of the distribution of the variables around its mean. The result in Table 4.1showed that GFC, LF, MP, and TRO are positively skewed, that is, the distributions of the series have long right tails, meaning that data for the variables have more higher values than the sample mean. The result also indicates that CBI and RGDPGR are negatively skewed, meaning that the distributions of the series have long-left tails. That is, the variables' data have more lower values than the sample mean. Kurtosis measures the flatness or peakedness of the distribution of a series. A mesokurtic variable is one that has normal distribution. The values of the kurtosis for CBI is less than 3, which suggests that the distribution is platykurtic (flat), meaning that the variable has more lower values than the sample mean. The kurtosis values for GFC, LF, MP, RGDPGR, and TRO exceed 3, indicating that their distributions are leptokurtic (peaked), meaning the series have more extreme values than the sample mean. The Jarque-Bera test evaluates the deviation in skewness and kurtosis between the series and a normal distribution. Statistically, if the p-value of the Jarque-Bera test is below 0.05, the null hypothesis of normality is rejected, indicating that the series does not conform to a normal distribution. The study rejects the null hypotheses of normal distribution for CBI, GFC, LF, MP, RGDPGR, and TRO, which suggest that these variables are not normally distributed.

Table 3: Descriptive Statistics

	CBI	GFC	LF	MP	RGDPGR	TRO
Mean	0.610511	0.20928	0.026749	0.19075	0.037295	0.716126
Median	0.61	0.203113	0.02934	0.132998	0.04188	0.582579
Maximum	0.81	0.597231	0.204065	5.281943	0.336294	2.221783
Minimum	0.36	0.020004	-0.02055	-0.58172	-0.36392	0.1635
Std. Dev.	0.113696	0.078166	0.014478	0.422256	0.048805	0.387713
Skewness	-0.0744	0.497143	4.399331	8.103674	-1.14053	1.338061
Kurtosis	2.123941	4.107217	56.85535	84.07331	15.52025	4.742453
Jarque-Bera	18.65483	52.31833	67745.29	155509	3684.586	240.9223
Probability	0.000089	0.00000	0.00000	0.0000	0.00000	0.00000
Sum	346.16	118.6617	14.60489	104.1496	20.36284	406.0435
Sum Sq. Dev.	7.316552	3.458212	0.114243	97.17356	1.298153	85.08178
Observations	567	567	546	546	546	567

4.2 Correlation Test Result

The essence of correlation analysis as a preliminary test in the study of this nature is to check for multicollinearity. The result reveals that pairwise correlation coefficients fell below 0.50, which indicates the absence of multicollinearity. This confirms that the variables can be included in the same model. Since the level of correlation between variables does not imply a causal relationship between the independent and dependent variables, the study employs the panel vector error correction model (PVECM). The results of the correlation analysis are presented in Table 4.

Table 4: Correlation Test Result

	C_ID	CBI	GFC	LF	MP	RGDPGR	TRO
C_ID	1	-0.05675	0.022912	-0.13852	0.005395	0.011256	0.294762
CBI	-0.05675	1	0.143837	0.081032	-0.03658	0.044502	-0.08056
GFC	0.022912	0.143837	1	0.055077	0.008876	0.199763	0.374497
LF	-0.13852	0.081032	0.055077	1	0.057166	0.252212	-0.2603
MP	0.005395	-0.03658	0.008876	0.057166	1	0.005173	0.01879
RGDPGR	0.011256	0.044502	0.199763	0.252212	0.005173	1	0.000393
TRO	0.294762	-0.08056	0.374497	-0.2603	0.01879	0.000393	1

4.3 Panel Unit Root Test

The results presented in Table 5 indicate that the series include both level [I(0)] and first-order [I(1)] variables, with four [I(0)] and two [I(1)] variables. The decision rule is to reject the null hypothesis, which asserts that a time series is non-stationary (i.e., it has a unit root), if the p-value is ≤ 0.05, suggesting that the variable is stationary.

Table 5: Panel Unit Root Test Result

Series	Im, Pesaran and Shin- W- Stat		Order of Integration
	Level	First Difference	
CBI	-1.02925	-8.05761***	I(1)
GFC	-2.17950**	-13.5109***	I(0)
LF	-2.96015***	-10.8124***	I(0)
MP	-8.40874***	-16.02147***	I(0)
RGDPGR	-8.50859***	-18.7781***	I(0)
TRO	-1.09707	-13.0461***	I(1)

, * mean 5% and 1% significance levels

4.4 Cointegration Test

The study uses both the max-eigen and trace statistics to arrive at a decision as to whether or not there is cointegration. The outcomes of the Johansen cointegration test are presented in Table 6. The decision rule is to reject the null hypothesis of no cointegration if the p-value is ≤ 0.05. The results show that the null hypothesis is rejected at the 1% significance level, indicating that there is cointegration (a long-term relationship) among the variables. Consequently, the study employs the panel vector error correction model (PVECM) to examine both the short-run and long-run causal relationships between the dependent and independent variables.

Table 6: Cointegration Test Result

Hypothesized No. of CE(s)	Trace Statistic	Prob**	Max-eigen Statistic	Prob.**
None *	140.000	0.0000	158.500	0.0000
At most 1 *	819.900	0.0000	1167.000	0.0000

At most 2 *		681.900	0.0000	363.400	0.0000
At most 3 *		433.200	0.0000	233.500	0.0000
At most 4 *		264.100	0.0000	155.900	0.0000
At most 5 *		144.000	0.0000	93.490	0.0000

4.5 Role of Central Bank Independence in the Effect of Monetary Policy on Economic Growth in Sub-Saharan Africa

Tables 7 and 8 present the short-term and long-term effects of the interaction between monetary policy and central bank independence on economic growth in the study area. The results in Table 7 indicate that the growth rate of real Gross Domestic Product (real GDP) in the current year is significantly negatively affected by the real GDP growth rate at lags 1 and 2. In other words, a 1% rise in the real GDP (RGDP) growth rate from the previous year would result in a 0.51% decrease in the RGDP growth rate this year, and a 1% increase in the real GDP (RGDP) growth rate from two years ago would result in a 0.36% decrease in the RGDP growth rate this year. These findings interrogate the primary products that drive growth in the study area, and whose prices are set on global markets, making the Sub-Saharan African economy vulnerable to external shocks. Additionally, the results indicate that monetary policy has a significant negative impact on economic growth in Sub-Saharan Africa (SSA), as measured by the annual increase in the broad money supply. Specifically, a 1% increase in the broad money supply would lead to a decline in economic growth in the short term, lower the region's economic growth rate by 0.08% and 0.13% at lags 1 and 2, respectively. These results are consistent with that of Awoyemi et al. (2024) and Abdulkadir, Asnakew, and Sendkie (2024), who found that monetary policy significantly hinders economic growth in West Africa and Ethiopia, respectively.

The results in Table 7 further indicate that the interaction between central bank independence and monetary policy has a significant negative effect on economic growth in the region. The coefficient for the relationship between monetary policy and economic growth in the short term is -0.081583 at a 10% level of significance, while the coefficient for the interaction term is -0.155074 at the same level. Additionally, the coefficient for the relationship between monetary policy at lag 2 and economic growth is -0.133905 at a 1% level of significance, and the coefficient for the interaction term is -0.216603 at a 1% level. Based on the estimated coefficients for monetary policy and the interaction term, the study finds that the overall impact of monetary policy on economic growth will be positive if the central bank independence extended (CBIE) index threshold level is between 0.53 and 0.62. However, the effect will be significant when the upper threshold of 0.62 is reached. The mean CBIE of 0.61 (Table 4.1) implies that overall; the central bank independence in Sub-Saharan Africa is not strong enough to favourably influence the impact of monetary policy on economic growth in the region. However, in countries where the CBIE is greater than 0.62, Monetary policy tends to stimulate economic growth in the short term in countries such as Angola, Burundi, Cameroon, the Central African Republic, Chad, Gabon, Ghana, Lesotho, Madagascar, Tanzania, Mauritius, and Rwanda.

This indicates that central bank independence in Sub-Saharan Africa is generally not strong enough and thereby constitutes an impediment to the effectiveness of monetary policy in the region. Hence, there might be need to significantly improve on central bank independence in affected countries in the region in order to enhance the effectiveness of monetary policy in order to speed up economic growth in Sub-Saharan Africa. The results also show that gross fixed capital formation (GFC) does not have a significant impact on economic growth in Sub-Saharan Africa, which contrasts with the findings of Oseni and Oyelade (2023), who found a positive effect of gross fixed capital formation on economic growth in Nigeria. Although trade openness (TRO) exerts no significant influence on economic growth in the region, this contrasts the finding of Abinabo and Abubakar (2023), which reveals that trade openness drives economic growth in Nigeria. Hence, there might be need to re-examine the structure of trade in the region. Furthermore, labour force has significant positive effect on economic growth in the study area at 5% level in the short run. That is, 1% increase in labour force would increase economic growth by 1.07%. This finding agrees with that of Eludire (2023) which reveals that labour force has significant positive effect on economic growth in both developing and advanced economies, but the effect is greater in the latter.

An ECT(-1) value of -0.025287 implies that the movement away from the long-run equilibrium in the relationship between central bank independence-monetary policy interaction and economic growth in Sub-Saharan Africa from the preceding year is corrected in the present year at an adjustment rate of approximately 2.5%. This rate is considered quite low.

Table 8 shows that, in the long run, monetary policy has a significant positive impact on economic growth in the study area. Specifically, a 1% increase in the broad money supply is expected to boost economic growth by approximately 2% in the long term. This suggests that monetary policy plays an effective role in driving economic growth in the region over the study period. This finding aligns with the results of Garriga and Rodriguez (2020), who concluded that monetary policy significantly helps reduce inflation which, this study believes, will in turn, stimulate investments and economic growth. Furthermore, the interaction between central bank independence and monetary policy has a significant negative effect on economic growth in the long run. Specifically, a one-unit improvement in the central bank independence-monetary policy interaction is associated with a 4% reduction in economic growth over the long term.

The results in Table 8 show that the coefficient for the relationship between monetary policy and economic growth in the long run is 2.008471 at 1% level of significance, while the coefficient for the interaction term is -4.081448 at 1% significance level. Based on these estimated coefficients, the study concludes that the overall impact of monetary policy on economic growth will be positive in the long run, provided that the central bank independence extended (CBIE) index reaches a threshold value of 0.49. Additionally, gross fixed capital formation, labour force, and trade openness do not have a significant effect on economic growth in the long run.

Table 7: Short Run PVECM Result on the Effect of Interaction between Central Bank Independence and Monetary Policy on Economic Growth in Sub-Saharan Africa

Error Correction	D(RGDPGR(-1))
ECT(-1)	-0.025287**
	[-1.96528]
D(RGDPGR(-1))	-0.511766***
	[-11.4353]
D(RGDPGR(-2))	-0.360959***
	[-7.72390]
D(MP(-1))	- 0.081583*
	[- 1.71162]
D(MP(-2))	-0.133905***
	[- 2.67077]
D(CBI(-1)*MP(-1))	-0.155074*
	[-1.87173]
D(CBI(-2)*MP(-2))	-0.216603***
	[-2.57839]
D(GFC(-1))	0.005177
	[0.08421]
D(GFC(-2))	0.048411
	[0.81475]
D(LF(-1))	1.073823**
	[2.39028]
D(LF(-2))	-0.063855
	[-0.20149]
D(TRO(-1))	0.032731
	[1.34403]
D(TRO(-2))	0.000152
	[0.00606]
C	-9.75E-05
	[-0.04104]
R-squared	0.270443
Adj. R-squared	0.250221
F-stat	13.37355 (0.000)

*, **,*** *mean 10%, 5% and 1% significance level. The figures in parenthesis are t-statistics.*

Table 8: Long Run PVECM Result on the Effect of Interaction between Central Bank Independence and Monetary Policy on Economic Growth in Sub-Saharan Africa

	1.000000
MP(-1)	2.008471***
	[8.26740]
CBI(-1)*MP(-1)	-4.081448***
	[-10.4288]
GFC(-1)	-0.027521
	[-0.16200]

LF(-1)	0.779640
	[0.67727]
TRO(-1)	-0.024261
	[-0.69661]
C	0.056437

*,**,*** mean 10%, 5% and 1% significance level. The figures in parenthesis are t-statistics.

5.0 Conclusion :

The study explores the role of central bank independence in shaping the impact of monetary policy on economic growth in Sub-Saharan Africa. It finds that the previous year's economic growth negatively influences current growth in the region. This could be attributed to the dominance of primary products in exports, which makes the Sub-Saharan African economy vulnerable to external shocks due to the externally determined prices of these goods. Therefore, there may be a need for greater value addition to primary products before export. The high volume of primary product exports also contributes to asymmetric trade patterns and the limited effect of trade openness on economic growth in the region. Additionally, while monetary policy has a significant negative effect on economic growth in the short term, it positively impacts growth in the long term. However, monetary policy does not manage itself; it is implemented by a central bank. Hence, the study also highlights that the interaction between central bank independence and monetary policy has a significant negative effect on economic growth in both the short and long runs. This suggests that the level of central bank independence in Sub-Saharan Africa is insufficient, hindering the effectiveness of monetary policy in promoting economic growth. The findings point to the excessive political interference in central bank operations, particularly in monetary policy matters, which requires urgent reforms. For instance, the list of countries where central bank governors have been removed by the executive in the last few years include Burundi, Liberia, and Nigeria, among others. Therefore, it may be necessary to strengthen the central bank laws in Sub-Saharan African countries to significantly enhance central bank independence and improve the effectiveness of monetary policy, with the aim of promoting faster economic growth in the region.

In view of the findings from this study, it is pertinent to recommend as follows:

I. Sub-Saharan Africa countries should embark on economic diversification strategy, and concentrate on value-addition with a view to reducing the asymmetric patterns of trade and accelerate sustainable economic growth in the region.

II. The Acts that established central banks in Sub-Saharan African countries should be reviewed and strengthened in order to eliminate interference, and fortify central bank independence with a view to enhancing the effectiveness of monetary policy on economic growth in the region.

III. Governments in Sub-Saharan Africa countries should review the composition of fixed capital formation and enhance its effectiveness with a view to ensuring its positive contribution to economic growth in the study area.

IV. National governments should regularly hone the skills of their labour force with a view to increasing their contribution to economic growth in Sub-Saharan Africa.

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