

## Monetary policy and economic growth in Africa: an FMOLS approach

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### Abstract

*The study investigated the effect of monetary policy on economic growth and analyse the causal relationship between monetary policy and economic growth in Africa. The study adopted the fully modified ordinary least squares (FMOLS) and the dynamic ordinary least squares (DOLS) estimation techniques. Im, Pesaran and Shin (IPS) was adopted to test for stationarity in the datasets. The granger causality method was used to analyse the second research hypothesis. The stationarity test results show that three of the seven variables were stationary at level while the remaining four were stationary at first order difference. The co-integration test results show that there is long run relationship among the datasets. Results from this study show the impact of monetary policy on economic growth in Africa. For the per capita income model, the regression estimates reveal money supply ( $MS = 0.012235$ ;  $p$  -values:  $0.0213$ ) had positive significant impact on economic growth among the African countries examined, but does not granger cause economic growth of the countries. On the other hand, credit to the private sector and exchange rate did not significantly impact on economic growth among the African countries examined, neither do they granger cause economic growth of the countries ( $CPS = -0.144277$ ;  $p$  -values:  $0.6091$ ). The study concludes that only money supply impacts on economic growth in Africa. The study thereby recommends that for more impact of monetary policy to be felt in Africa there is need for greater financial inclusion in Africa, by making sure that many adults in the region have access to banking services. Equally monetary authorities in Africa need to revise their monetary policy and improve on areas that do not encourage economic growth*

**Keywords:** 1.Monetary, 2.Policies, 3.Income, 4.African, 5.Countries.

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### 1. Introduction

Monetary policy refers to the credit control and any other conscious measures adopted by a country's monetary authority to manage the value, supply, and cost of money in the economy in order to achieve the government's macroeconomic goals. The quantity of money issued by the monetary authority accomplishes the monetary policy aim. Monetary policy aims for price stability, long-term economic development, full employment, a steady long-term interest rate, and a stable real exchange rate. This is accomplished via the use of different monetary policy tools such as interest rates, money supply, and credit ceilings. Through its contractionary and expansionary measures, monetary policy accomplishes macroeconomic aims (Akanbi& Ajagbe,2012).

Africa is regarded as one of the poorest continents in the world. Over the years, economic growth and development has been pursued vigorously by African nations. The World Economic and Financial Survey (2004) showed that monetary policy in Sub-Saharan Africa was poorly developed, and was weak to transmit desirable outcomes in the economy. Exchange rates have been unstable in the region, mostly owing to excessive dependence on imported goods; which poses a huge constrain to external reserves of regional countries. Inflation targeting has been weak, as inflationary pressures are high among countries in the region; owing to a poorly developed financial system that operates alongside with a competitive informal financial system. However, it is fair to say that the World Economic and Financial Survey (2004) on ineffectiveness of monetary policy in Sub-Saharan Africa lacks empirical evidence, as it only describes the situations. More so, the survey was conducted based on prior statistics, and these data may not represent the current situations. Sub-Saharan African countries have evolved since the start of the year 2000, because of the adoption of several innovations in banking systems within the region. For instance, the Nigerian banking system was recapitalized in 2004 to the tune of 25 billion Naira, so as to make banks responsive to monetary policy actions (Muritala, Ijaiya, Adekunle & Abidoye, 2017). Many African countries are experiencing decline in fiscal deficits in recent times, so as to increase the effectiveness of monetary policies (Mitsuhiro, 2016). Therefore, one would expect that monetary policy has improved on its effectiveness towards influencing macroeconomic aggregates in Sub-Saharan Africa.

There are empirical studies on the relationship between monetary policy and economic growth in Africa. In Ghana, empirical results from Ahiabor (2013) revealed that monetary policy has significant impact on economic performance. In Nigerian, empirical results from Adigwe, Echekeba and Onyeagba (2015); Bodunrin (2016); and Onwueteaka, Okoye and Molokwu (2019) reveal that monetary policy has significant influence on economic growth in Nigeria. Despite these findings, it is observed that there are gaps in existing empirical literature on the impact of monetary policy on economic growth. Notably, most empirical analyses in the literature are based on regression analysis. There is need to adopt the granger causality, so as to provide robust findings on the subject matter. As such, the broad objective of the study is to investigate the impact of monetary policy on economic growth in Africa. Also, this study will analyse the causal relationship between monetary policy and economic growth in Africa. The time scope to be covered in the research is from 1990 to 2019 and focuses on eleven Sub-Saharan African countries.

## 2. Literature Review

The review of literature will cover conceptual review, theoretical review and empirical review.

### Concept of Monetary Policy

The Central Bank of Nigeria (2006) defines monetary policy as "particular acts made by the central bank to manage the value, supply, and cost of money in the economy in order to achieve the government's macroeconomic goals. In agreement with this definition, Akanbi and Ajagbe (2012) described Monetary Policy as a tool granted to the Central Bank of Nigeria (CBN) by the federal government to manage the aggregate money in circulation and its cost." The Central Bank of Nigeria (CBN), like other central banks in developing nations, accomplishes its monetary policy aim through controlling the quantity of money in circulation. The policy goal is to maintain wage and price stability for products and services. Other restrictions are also required to regulate the amount of money in circulation and to give domestic money a value. Furthermore, Iyoha, Oyefusi, and Oriakhi (2003) described monetary policy as a macroeconomic instrument that includes the employment of monetary tools such as interest rates, money supply, and credit ceiling to accomplish certain macroeconomic goals. These goals include price stability, long-term economic growth, full employment, a steady long-term interest rate, and a stable real exchange rate. Fiscal policy is a tool used to supplement the effects of the CBN's monetary policy.

Monetary policy is often used to control inflation or interest rates in order to maintain price stability and widespread faith in the currency. Classical economists and monetarists have proposed that monetary policy is a suitable macroeconomic instrument for guaranteeing market efficiency, especially in terms of controlling inflation in the economy. Monetary policy is linked to interest rates and credit availability. The central bank controls interest rates by increasing or decreasing the monetary base, which consists of currency in circulation and bank reserves on deposit with the central bank. Central banks, on the other hand, have three basic instruments for monetary policy: open market operations, the discount rate, and reserve requirements. Open market operations are the most regularly utilised mechanism for the central bank to manage credit. This requires controlling the amount of money in circulation by purchasing and selling financial instruments such as treasury bills, corporate bonds, or foreign currencies in return for money on deposit at the Central Bank, which is convertible to currency (Bordo, 2008).

## **Theoretical Review**

### **Classical Quantity Theory on Monetary Policy**

The classical quantity theory of money (CQTM) argues that the overall price level of goods and services is directly proportional to the amount of money in circulation, or money supply. The hypothesis is descended from Nicolaus Copernicus and School of Salamanca followers such as Jean Bodin, Henry Thornton, and others who observed a rise in prices after the influx of gold and silver used in currency from the New World (Volckart, 1997). John Stuart Mill, who elaborated on David Hume's theories, developed the "equation of exchange," which relates the supply of money to the value of money transactions. In the late nineteenth and early twentieth centuries, Simon Newcomb, Alfred de Foville, and Ludwig von Mises created the quantity theory. Irving Fisher, on the other hand, popularised it (Volckart, 1997). As a result, the author is credited with the invention of this theory, which is based on the dichotomous notion that the economy may be split into two major sectors - money and real. As a result, money sector operations have no effect on real sector activities, save that money supply raises the overall price level in the economy. In mathematical terms, this assertion is:  $MV = PQ$ , where  $M$  is the nominal amount of money,  $V$  is the velocity of money in final expenditures,  $P$  is the general price level, and  $Q$  represents production.

The left hand of the equation represents the financial sector, while the right hand represents the real sector. Money supply, not production, according to the notion, affects price level. Furthermore, the theory claims that the velocity of money in an economy is constant. This is known as monetary neutrality; that is, the money supply solely impacts the price level in the real sector. This assertion is in contrast to the Keynesian theory on speculative demand for money which shows that the velocity of money fluctuates with changes in interest rates.

### **Monetarism**

Monetarism is a monetary economics school of thought that emphasises the role of governments in managing the quantity of money in circulation. Monetarist theory holds that changes in the money supply have a significant impact on national production in the near term and on price levels over longer time periods. Monetarists argue that rather than engaging in discretionary monetary policy, monetary policy goals are better attained by targeting the growth rate of the money supply (Cagan, 1987). Monetarism is concerned with the macroeconomic impacts of money supply and central banking. Today, monetary policy is most closely identified with Milton Friedman's work, who was among the group of economists who accepted Keynesian economics but subsequently criticised Keynes' idea of gluts utilising fiscal policy (government

spending). Friedman contends that excessive money supply growth is inevitably inflationary, and that monetary authorities should primarily concentrate on preserving price stability.

Monetarist theory derives from two historically opposing schools of thought: the hard money policies that dominated monetary thinking in the late nineteenth century, and John Maynard Keynes' monetary ideas, which offered a demand-driven model for money (Mankiw, 1989). While Keynes concentrated on currency value stability, with consequent panics due to inadequate money supply leading to other currency and collapse, Friedman focused on price stability, which is the equilibrium between supply and demand for money. The theory ascribed inflation to a central bank's surplus money supply while deflationary spirals to the opposite impact of a central bank's inability to boost the money supply during a liquidity crisis. Friedman, like other monetarists, argued that actively manipulating the money supply or its growth rate would destabilise rather than stabilise the economy.

### **Empirical Literature**

In Ghanaian literature, Ahiabor (2013) investigated the effect of monetary policy (interest rate, exchange rate and money supply) on economic growth between 1985 and 2009. Using the OLS estimation technique, the research discovered that the exchange rate and money supply had significant positive influence on inflation in the nation, but interest rates had a significant negative impact on inflation. These findings support the quantity theory of money's contention that inflation is a monetary phenomenon. In another related study in Ghana, Sena, Asante and Brafa – Insaيدoo (2021) investigated the role of financial development in enhancing the effect of monetary policy on economic growth in Ghana. Using the Autoregressive Distributed Lag (ADL) estimation technique to analyse the model built with data between 1980 and 2016, the study revealed that financial development strengthens the effectiveness of monetary policy on economic growth in Ghana. This results also appears to be in agreement with the findings of earlier study by Arayssi and Fakhir (2017) who investigated the relationship between financial development and economic growth in Kenya between 1960 and 2013 and concluded that financial development interplay with FDI to promote economic growth.

In Nigeria, empirical research on the issue provide varied findings using the same estimation technique. For instance, Okotori (2019) used secondary time series monthly data from 2009 to 2017 to explore the dynamics of monetary policy as a tool for reducing inflation in Nigeria. The data was analysed using the Johansen co-integration approach. All the monetary policy tools (money supply, treasury bill rate, reserve requirement ratio, liquidity ratio, and exchange rate) employed revealed considerable impact on inflation in Nigeria. These findings differ slightly from those of Akarara and Azebi (2018), who used the Johansen co-integration method and discovered that only treasury bills have a significant impact on inflation in both the long and short run periods, whereas money supply and exchange rate are significant determinants of inflation only in the short run, and interest rate only has a significant impact on inflation in the long run. Adodo, Akindutire, and Ogunyemi (2018) used the Johansen co-integration approach to examine the effect of monetary policy on inflation in Nigeria and discovered that only money supply and interest rate had a substantial influence on inflation.

Mamman and Hashim (2014) used the OLS estimation approach to conduct an empirical study on the influence of bank lending on economic development in Nigeria from 1987 to 2012. The research used only secondary data and a multiple regression model. According to the research's findings, bank lending accounts for about 82.6 percent of the variance in economic growth in Nigeria throughout the studied period. The research shows that bank lending has a statistically significant influence on economic development in Nigeria. This shows that bank lending has a significant impact on the performance of the Nigerian economy. Adegbite and Alabi (2013) also used the Johansen co-integration approach to evaluate the influence of monetary policy

(as assessed by the monetary policy rate and the wide money supply) on the GDP indicator from 1970 to 2011. The research used the OLS estimating approach and found that money supply considerably enhanced GDP in Nigeria, but monetary policy rates had little effect.

Similarly, Anwor and Okorie (2016) investigated the impact of monetary policy on economic development in Nigeria from 1982 to 2013. Monetary policy was monitored using the interest rate, cash reserve ratio, and interest rate, while economic growth was evaluated using real GDP. The research used error correction techniques and discovered that only the cash reserve ratio had a substantial influence on real GDP in Nigeria, demonstrating that monetary policy impacts just a tiny aspect of the country's economic performance.

Onwueteaka, Okoye, and Molokwu (2019) evaluated the influence of the monetary transmission mechanism on economic growth (as proxied by money supply and interest rate) (measured using GDP). Annual time data from 1980 to 2017 were used in the research. Using the OLS, the research discovered that only money supply had a substantial effect on GDP in Nigeria over the years studied, whereas credit to the private sector had no significant impact on GDP in the nation. The effect of the money supply on GDP is positive. This is similar with the findings of Adigwe, Echekeba, and Onyeagba (2015) and Bodunrin (2016), who employed the Johansen co-integration approach and discovered that money supply is the only monetary tool that has a substantial effect on economic development in Nigeria.

Ayman (2017) investigated effect of commercial banking performance on Jordan's economic development between 2010 and 2015. This was accomplished by examining the relationship between profitability, deposit and credit facilities as proxies for commercial bank performance, and gross domestic product as a proxy for economic growth. In the research, thirteen banks were selected in a panel regression analysis utilising the ordinary least squares (OLS) approach. The regression results revealed a substantial positive relationship between bank performance metrics and economic growth. The findings show that metrics of bank performance, particularly profitability, deposits, and lending, have a positive association with economic growth as measured by GDP.

Nguena (2013) in his rethinking monetary policy in Africa recommend promotion of credible monetary policy oriented towards improving economic growth under the constraints of price stability to curb incessant bane of inflation on economic growth in Africa. Exploring African countries further, Adeleke and Obi (2018) investigated the effect of monetary policy dynamic on economic growth using data from 37 African countries. The result of the dynamic panel data estimation technique employed in the study revealed that the monetary policy rates did not lead to sustainable growth in SSA due to limited effects it has on boosting domestic output. In particular, the expansionary monetary policy was not effective because of weak financial deepening in these countries. The study therefore recommend policy that will improve financial deepening in these countries. Taking another dimension on the study of effect of monetary policy on economic growth in SSA, Ubi-Abai and Ekere (2018) applied Dynamic Panel Generalised Method of Moment estimation technique to examined the effect of fiscal and monetary policies on economic growth in 47 SSA countries between 1996 and 2016. The result revealed that fiscal and monetary policies enhance economic growth in SSA. In another study on the impact of monetary policy on economic growth in eight West African Economic Union (WAEMU), Frank and Fei-Ming (2020) examines the relationship between economic growth and monetary policy using panel co-integration structure. The results shows that money supply and gross fixed capital formation significantly affect economic growth positively in the sub region. Also the domestic credit to the private sector and official exchange rate indicated a positive and statistically significant effect on economic growth. From the review of literature, economic growth can be predicated on several factors, which include economic factors such as capital accumulation. Traditional theories of the finance-growth nexus have maintained that the financial sector stimulates economic growth. Several ideas, like the supply-leading theory, have been proposed to support this assumption. However, proponents of the demand-following theory have questioned this statement in economic literature. The empirical papers examined provide a foundation for evaluating the

finance-growth nexus. The findings of the empirical review do not all concur. This may be related to differences in technique used. However, it was discovered that most findings in the class of vector autoregressive (VAR) estimators discount the existence of finance-led growth. The VAR approach is distinguished by its capacity to solve endogeneity issues, which other estimators, such as the Ordinary Least Squares, are prone to. Endogeneity issues are known to skew parameter estimations. As a consequence, data obtained with the OLS should not be considered. Our emphasis therefore is on importance of using the VAR approach in this present investigation to minimise endogeneity issues.

### 3. Methodology

#### Theoretical Framework

The model of this study draws upon the supply leading hypothesis originated by Gurley and Shaw (1967) and McKinnon and Shaw (1967). The hypothesis links economic growth to monetary policy activities. It asserts that development of the monetary and financial sector has a positive effect on economic growth. Accordingly, the effect runs from monetary policy to economic growth and it is caused by an improvement in the financial sector. One of the relevant highlights of this theory is that the monetary authority engages in income distribution needed to grow the domestic economy. In other words, financial intermediation caused by monetary policy initiatives helps to aid productivity, which in turn steers economic growth.

#### Model Specification

Based on the foregoing, the study proceeds to adopt a multiple regression model. The regression model is based on the Cobb–Douglas production function. The Cobb–Douglas production function is used to model economic growth. It is basically a production function widely used to represent the technological relationship between the amounts of two or more inputs (particularly physical capital and labour) and the amount of output that can be produced by those inputs. It is mathematically stated as:

$$Y = A L^{\beta_1} K^{\beta_2} \quad (1)$$

Where: Y = total output; L = labour input; K = capital input; A = total factor productivity;  $\beta_1$  and  $\beta_2$  are the output elasticities of labour and capital respectively

Introducing monetary policy instruments such as money supply, credit to private sector and exchange rate into the model as well as Natural resource as a control variable, Equation (1) is thus restated as:

$$Y = A L^{\beta_1} K^{\beta_2} MS^{\beta_3} CPS^{\beta_4} EXR^{\beta_5} RES^{\beta_5} \quad (2)$$

Converting the implicit equation (2) into explicit form equation 3 is obtained as:

$$GDP = \beta_0 + \beta_1 LAB_{it} + \beta_2 CAP_{it} + \beta_3 MS_{it} + \beta_4 CPS_{it} + \beta_5 EXR_{it} + \beta_6 RES_{it} + U_{it} \quad (3)$$

Where: GDP = Gross Domestic Product (proxied using GDP growth rate); LAB = Labour input (proxied using population growth rate); CAP = Capital input (proxied using gross fixed capital formation); MS = Broad money supply; EXR = Exchange rate; CPS = Credit to private sector;  $\beta_0$  is the intercept of the model;  $\beta_1$  to  $\beta_6$  are parameter estimates; U is the stochastic error term

#### Sources of Data

The study is a quantitative one which engaged panel data to provide answers to the research questions of the study. The data is a panel data, which is obtained from World Development Indicator (WDI) published by

World Bank on **ten** Sub-Saharan African countries. These countries are Benin Republic, Cameroon, Congo Democratic Republic, Gabon, Kenya, Namibia, Nigeria, Sierra Leone, Sudan and Togo. These countries were selected because they have sufficient data on the variables employed for the study. The WDI has insufficient data for most African countries; hence, the need to make use of ten Sub-Saharan African countries in this study. The data covers periods from 1990 to 2019. They are obtained from World Bank Statistics.

**Table 1: Data Sources and Measurement**

Variables	Description	Source
GDP	This is measured real GDP.	World Bank
LAB	This is measured as annual population growth.	World Bank
CAP	Percentage increase real gross fixed capital formation.	World Bank
EXR	This is measured using nominal exchange rate.	World Bank
MS	Broad money (% of GDP).	World Bank
CPS	This is measured as credit to private sector (% of GDP).	World Bank
RES	This is measured as percentage of total natural resources to GDP	World Bank

*Source: Author's compilation (2021)*

**Estimation Techniques**

In order to analyse the first research question, this study make use of the fully modified ordinary least squares (FMOLS)and the Dynamic Ordinary Least Squares (DOLS) methods. These are co-integrating techniques used when there are problems of serial correlation and endogeneity with datasets. They produce reliable parameter estimates in a regression analysis. Reason for using these regression techniques is to provide robust findings on the topic investigated. The Im, Pesaran and Shin (IPS) test were used to test for presence of stationarity, while the Johansen Fisher Panel test is used to test for co-integration in the datasets. To analyse the research question, this study makes use of granger causality method. This is a statistical technique used to ascertain whether the time series of one variable can be used to forecast the future values of another variable.

**4. Results and Discussions**

**Descriptive Analyses**

**Table 2: Descriptive Statistics**

Statistics	GDP	CAP	LAB	MS	CPS	EXR	RES
Mean	40.63	8.42	2.65	115.49	15.30	604.00	15.61
Median	14.17	2.67	2.68	16.26	10.99	479.27	11.11
Maximum	477.16	78.20	4.63	6968.92	57.76	9716.71	59.60
Minimum	1.30	-0.04	-0.44	-29.25	1.60	0.00	0.00
Std. Dev.	84.80	15.91	0.62	609.44	12.60	1135.29	13.67
Skewness	3.66	2.78	-1.37	7.34	1.48	4.86	1.13
Kurtosis	16.35	9.49	9.15	64.47	4.52	30.72	3.60
Observations	330	330	330	330	330	330	330

*Source: Author's Computation (2021)*

Table 2 presents the descriptive statistics for the datasets among the ten Sub-Saharan African countries used in this study. The table shows that the mean value for GDP is lower than its standard deviation value. This indicates that most of the values in the distribution are not close to the mean values. In other words, economic performance among the African countries examined is lower than the average mean. This suggests that many of the African countries had poor growth in these indicators between 1990 and 2019. Likewise, the mean value of capital is lower than its standard deviation value. This shows that capital investment has been low in the African countries examined, throughout periods of 1990 and 2019. Similarly, the mean value for money supply (MS) is lower than its standard deviation value. This shows that money supply was low among the African countries. However, the mean value for credit to private sector (CPS) is higher than its standard deviation. This suggests that many of the African countries committed large credit to their private sector. Therefore, monetary policy initiatives among the African countries targeted an improved private sector, and lowered money supply. On the other hand, mean value of exchange rate is lower than its standard deviation value. This indicates that many of the African countries have had low exchange rates during the years.

### Test for Multicollinearity

**Table 3: Correlation Matrix Results**

	GDP	CAP	LAB	MS	CPS	EXR	RES
GDP	1						
CAP	0.04	1					
LAB	-0.01	-0.02	1				
MS	-0.04	-0.07	0.13	1			
CPS	-0.09	-0.11	-0.29	-0.08	1		
EXR	-0.16	-0.17	-0.02	-0.02	-0.26	1	
RES	-0.05	0.01	0.17	0.09	-0.39	0.12	1

Source: Author's Computation

It was important to ensure that there is absence of multicollinearity in the model. This is because presence of multicollinearity would bring about spurious results. Test for multicollinearity was conducted using the correlation matrix method. As shown in Table 3, it is revealed that the coefficients are lower than 0.8. This is an indication that there is absence of multicollinearity among the datasets.

### Unit Root Analysis

**Table 4 Panel: Augmented Dickey Fuller Test Results**

Variables	Statistic	Prob.	Order of Integration
GDP	-2.90498	0.0000	I(1)
LAB	-13.9920	0.0000	I(1)
CAP	-7.89208	0.0000	I(1)
MS	-6.47177	0.0000	I(0)
CPS	-2.00338	0.0226	I(0)
EXR	-5.87729	0.0000	I(1)
RES	-2.69047	0.0036	I(0)

Source: Author's Compilation (2021)

This table presents the unit root test results using the Im, Pesaran and Shin (IPS) test. The probability values show that the datasets are all stationary. However, MS, CPS and RES variables were stationary at levels, while CAP, LAB and EXR variables were only stationary at first difference. This results suggest the need to test for co-integration.

### Co-integration Analysis

**Table 5: Unrestricted Co-integration Rank Test (Trace and Maximum Eigenvalue)**

Hypothesized	Fisher Stat.*		Fisher Stat.*	
No. of CE(s)	(From trace test)	Prob.	(From max-eigen test)	Prob.
None	611.1	0.0000	562.9	0.0000
At most 1	442.4	0.0000	190.0	0.0000
At most 2	302.7	0.0000	140.7	0.0000
At most 3	194.9	0.0000	88.19	0.0000
At most 4	126.4	0.0000	67.47	0.0000
At most 5	84.54	0.0000	58.49	0.0003
At most 6	69.92	0.0000	69.92	0.0000

Source: Author's Compilation (2021)

This table presents the co-integration test results. The p-values are all statistically significant at 1% level. This shows that there is long-run relationship among the data series of this study. As such, by co-integrating the data series, they have regained their long-run relationship.

### Analyses of Research Hypotheses

#### Hypothesis One

H<sub>0</sub>: Monetary policy does not exert significant impact on economic growth in Africa.

H<sub>1</sub>: Monetary policy exerts significant impact on economic growth in Africa.

**Table 6: FMOLS Panel Regression Results**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LAB	4.047171	5.577894	0.725573	0.4687
CAP	9.486344	0.864282	10.97598	0.0000*
MS	0.012235	0.005285	2.315164	0.0213**
CPS	-0.814850	0.576564	-1.413287	0.1586
EXR	-0.000297	0.003770	-0.078813	0.9372
RES	-1.095796	0.406121	-2.698200	0.0074***
R-squared	0.892864	Mean dependent var		41.23762
Adjusted R-squared	0.887188	S.D. dependent var		85.88801
S.E. of regression	28.84767	Sum squared resid		251320.8
Long-run variance	2204.276			

Source: Author's Compilation

Hint: (\*) (\*\*) (\*\*\*) indicate significance at 1%, 5% and 10% respectively

**Table 7: DOLS Panel Regression Results**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LAB	3.465950	4.246197	0.816248	0.4164
CAP	5.333635	0.277334	19.23183	0.0000*
MS	0.005672	0.006196	0.915428	0.3623
CPS	-0.144277	0.281214	-0.513052	0.6091
EXR	0.000642	0.008465	0.075808	0.9397
RES	-0.502150	0.286285	-1.754024	0.0827***
R-squared	0.980118	Mean dependent var		40.89795
Adjusted R-squared	0.936718	S.D. dependent var		84.80788
S.E. of regression	21.33417	Sum squared resid		42328.67
Long-run variance	275.7658			

Source: Author's Compilation

Hint: (\*) (\*\*) (\*\*\*) indicate significance at 1%, 5% and 10% respectively

Tables 6 and 7 present the panel regression results, using FMOLS and DOLS techniques. The adjusted r-squared and r-squared values in both tables 5 and 6 reveal that the exogenous variables explained more than 85% of the changes in economic growth among the ten African countries examined. Therefore, the model estimated has strong predictive power.

Based on the parameter estimates, it is revealed that labour and capital positively impacted on economic growth in Africa. Both FMOLS and DOLS are consistent that capital significantly impact on economic in Africa, while both regression techniques reveal that labour did not exert significant effect on economic growth in Africa. This shows that capital input has been effective in promoting economic growth in Africa, which is an indication of a growing and vibrant private sector in the region. The inability of labour input to significantly influence economic growth suggests that the development of labour skills in Africa is low, and hence labour does not significantly contribute to the growth of the economy of the region.

Also, both FMOLS and DOLS estimates agree that money supply had positive impact on economic growth in Africa. The FMOLS estimates show that the impact is statistically significant. On the other hand, both regression methods reveal that credit to the private sector had insignificant impact on economic growth among the African countries. Both FMOLS and DOLS estimates agree that natural resources significantly contributed to economic growth among the African countries investigated. This indicates that there has been poor resource management in these countries. Both FMOLS and DOLS estimates agree that exchange rate did not exert significant impact on economic growth among the African countries examined.

**Hypothesis Two**

H<sub>0</sub>: There is no causal relationship between monetary policy and economic growth in Africa.

H<sub>1</sub>: There is causal relationship between monetary policy and economic growth in Africa.

**Table 8: Panel Causality Tests**

Null Hypothesis:	Obs	F-Statistic	Prob.
CAP does not Granger Cause GDP	308	8.94447	0.0002
GDP does not Granger Cause CAP		11.5596	1.E-05
LAB does not Granger Cause GDP	308	0.01729	0.9829
GDP does not Granger Cause LAB		0.16828	0.8452
MS does not Granger Cause GDP	308	0.07173	0.9308

GDP does not Granger Cause MS		0.37306	0.6889
CPS does not Granger Cause GDP	308	0.56744	0.5676
GDP does not Granger Cause CPS		0.58395	0.5583
EXR does not Granger Cause GDP	308	0.04399	0.9570
GDP does not Granger Cause EXR		0.58189	0.5595
RES does not Granger Cause GDP	308	0.08135	0.9219
GDP does not Granger Cause RES		0.29709	0.7432

Source: Author's Compilation (2021)

Table 8 shows the causal influence of labour, capital and monetary policy variables (MS, CPS, EXR) on economic growth. The probability results show that capital input granger causes economic growth among the African countries examined. However, none of capital and monetary policy variables (MS, CPS, EXR) granger caused economic growth among the African countries. Based on these results, there is no causal relationship between monetary policy and economic growth in Africa. Therefore, the null hypothesis is accepted.

**Discussion of Findings**

Results from this study show the impact of monetary policy on economic growth in Africa. For the per capita income model, the regression estimates reveal money supply had significant positive impact on economic growth among the African countries examined, but does not granger cause economic growth of the countries. This indicates that the contribution of monetary supply on economic growth in Africa is only in the immediate period, while it does not influence the future performance of economic growth in the region. Therefore, monetary policy associated with money supply in Africa does not take into cognizance future economic performance. On the other hand, credit to the private sector and exchange rate did not significantly impact on economic growth among the African countries examined, neither do they granger cause economic growth of the countries. This reveals that money supply is the only effective monetary policy in Africa. This result gains the support of many empirical findings in the literature. For instance, Nwoko and Ihemeje and Anumadu (2016) found that none of the monetary policy instruments has significant impact on GDP performance in Nigeria. Onwueteka, Okoye and Molokwu (2019) found that money supply is the only monetary instrument that significantly influences economic growth in Nigeria. Likewise, Anwor and Okorie (2016) only cash reserve ratio had significant impact on real GDP in Nigeria, indicating that monetary policy only affects a small dimension of economic performance in the country. Therefore, there the capacity for economic growth to be spurred by monetary policy in Africa is very low.

**5. Conclusion and Recommendations**

Based on the foregoing, the study concludes that only money supply impacts on economic growth in Africa. This therefore, shows that monetary policy is weak in Africa, and needs to be improve upon to make it an effective mechanism for affecting several growth indicators. One reason that accounts for this weakness is the financial system. As earlier discussed in this study, the financial system in Africa is weak, as there is poor financial inclusion. Therefore, improving the financial system is tantamount to improving the effectiveness of monetary policy in the region.

## Recommendations

Based on the foregoing, the following recommendations are reached:

- There is need for greater financial inclusion in Africa, by making sure that many adults in the region have access to banking services.
- Monetary authorities in Africa need to revise their monetary policy and improve on areas that do not encourage economic growth. For instance, money supply was found to be low in several African countries investigated. There is need to improve on this, and ensure that all bottlenecks associated with monetary policy should be eliminated.
- There should be strong synergy among monetary authorities in Africa, so as to help each other grow their monetary policies and create an all-encompassing growth in the region.

## References

1. Adegbite, T. A. & Alabi, W. O. (2013). *Monetary policy and economic growth: The Nigerian experience (1970-2010)*. *Prime Journal of Business Administration and Management*, 3(1), 822-833.
2. Adeleke, O. and Obi, M. M. (2018). *Monetary policy dynamics and the economic growth of the Sub - Saharan Africa (SSA)*. *Journal of Entrepreneurship and Economics*, 6(1):36 – 58.
3. Adigwe, J. O., Echekoba, M. and Onyeagbe, L. (2015): "An Econometric Model of the Nigerian Monetary Sector: Outline and Preliminary results, Mimeo, Central Bank of Nigeria.
4. Adigwe, P. K., Echekoba, F.N. & Onyeagba, J. B.C. (2015). *Monetary policy and economic growth in Nigeria: A critical evaluation*. *IOSR Journal of Business and Management*, 17(2), 110-119
5. Adodo, F. L., Akindutire, O. R., & Ogunyemi, J. K. (2018). *Monetary policy and control of inflation in Nigeria*. *International Journal of Management, IT and Engineering*, 8(12), 154-170.
6. Ahiabor, G. (2013). *The effects of monetary policy on inflation in Ghana*. *Developing Country Studies*, 3(12), 82-89.
7. Akanbi, T.A. & Ajagbe, F.A. (2012). *Analysis of monetary policy on commercial banks in Nigeria*. *African Journal of Business Management* Vol. 6(51), pp. 12038-1204
8. Akarara, M. and Ajebi, E.M. (2018) 'Monetary and fiscal policy switching', *Journal of Money, Credit and Banking*, 39(4), 809–842
9. Alimi, R. S. (2012). *The Quantity Theory of Money and Its Long Run Implications: Empirical Evidence from Nigeria*. MPRA Paper No. 49598.
10. Anwor, A.C. & Okorie, M. (2016). *Measuring the Effect of Monetary Policy Innovations in Nigeria: A Structural Vector Auto-regressive (SVAR) Approach*, *African Journal of Accounting, Economics, Finance and Banking Research*, 5 (5), pp. 112-129. 8.
11. Arayssi, I.S., & Fakin, Y (2017). *Monetary Policy, Inflation and Economic Growth in Pakistan: Exploring the Co-integration and Causality Relationships*, *Pakistan Journal of Commerce and Social Science*, 6 (2), 332-347
12. Ayman. (2017) 'Mobile capital, domestic institutions, and Electorally induced monetary and fiscal policy', *The American Political Science Review*, 94(2)323–346.
13. Backhouse R.E. and B. W. Bateman (2011), *Capitalist Revolutionary*, Cambridge (MA): Harvard UP.
14. Bodurin, M. (2016) 'Optimal monetary and fiscal policy: A linear-quadratic approach', *NBER Macroeconomics Annual*, 271–333.
15. Bordo A. (2008). *Foreign Direct Investment and Gross Domestic Product: An Application on ECO Region (1995-2011)*. *International Journal of Business and Social Science*, 3(22), 189-198.42.
16. Cagan, P., & Schwartz, A. J. (1987). *Has the growth of money substitutes hindered monetary policy? In Money in Historical Perspective (pp. 209-233)*. University of Chicago Press.

17. Frank, E. G. and Fei – Ming, H. (2020). *The effect of monetary policy on economic growth of WAEMU Countries. Scientific Research: An Academic Publisher*, 8(6).
18. Gurley, J. G., & Shaw, E. S. (1967). *Financial structure and economic development. Economic development and cultural change*, 15(3), 257-268.
19. Iyoha, M. A., Oyefusi, S. A., & Oriakhi, D. E. (2003). *An introduction to modern macroeconomics. Benin: Mindex Publishing Co. Ltd.*
20. Mamman, P. & Hashim, P. (2014). *Impact of Monetary Policy on Economic Growth: A Case Study of South Africa, Mediterranean Journal of Social Sciences*, 5 (5), 76-84. 7.
21. Mankiw, N. G. (1989). *Real business cycles: A new Keynesian perspective. Journal of economic perspectives*, 3(3), 79-90.
22. McKinnon, R.I. and Shaw, E.S (1967). *Financial Liberalization and Economic Development: A Reassessment of Interest-Rate Policies and Asia and Latin America, International Centre for Economic Growth, Occasional Paper, No.6.*
23. Muritala, O., Ijaiya, H., Adekunle, S., Abidoye, A, (2017). *An Econometric Investigation of Money Demand Behaviour in four Asian developing countries, International Economic Journal* 3 (4), 79-93
24. Nguena, C. L. (2013). *Rethinking pro-growth monetary policy in Africa. Monetarist versus Keynesian approach. Africa Economic Brief: Chief Economist Complex*, 4 (6).
25. Nogueira, R. (2009). *Credibility in emerging economies: Does inflation targeting matter? Manchester School*. 79. 1080-1098.
26. Nwoko, M., D. Ihomeje, L.F, & Anumadu, K. (2016). *Determinant Factors of Economic Growth in Malaysia: Multivariate Co-integration and Causality Analysis. European Journal of Economics, Finance and Administrative Sciences*, 24, 123-137
27. Odior, E.S. & Alenoghena, R.O. (2016). *Empirical Verification of Milton Friedman's Theory of Demand for Real Money Balances in Nigeria: Generalized Linear Model Analysis. Journal of Empirical Economics*, 5,1, 35-50
28. Okotori, T. W. (2019). *The Dynamics of monetary policy and inflation in Nigeria. IOSR Journal of Economics and Finance (IOSR-JEF)*, 10(2), 37-49.
29. Onwueteaka, G., Okoye, M., and Onyeagbe, A. (2019) "Long Run Elasticity's of the Demand for Money in Korea: Evidence from Co integration Analysis, *International Economic Journal*, 8(2), 1 -16
30. Soldatos, E. M. (2015): "Stability of the Nigerian M2 Money Demand Function in the SAP Period." *Economics Bulletin*, 14(3), 1-9
31. Sena, M. A., Asante, G. N. and Brafa – Insaideo, W. G. (2021). *Monetary policy and economic growth in Ghana: Does financial development matter. Cogent Economics and Finance*, 9((1)
32. Ubi-Abai, I. and Ekere, D. (2018). *Fiscal policy, monetary policy and economic growth in sub-saharan Africa. IDEAS: MPRA Paper 91950, University Library of Munich, Germany.*
33. Volckart, R. K. (1997). *Causal relationship between foreign direct investment and growth: Evidence from BRICS countries. International Business Research*, 2(4), 2 -19