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Broad Money Supply and Economic Growth: Evidence from Sub-Saharan Africa

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Abstract

This study examines the impact of broad money supply on economic growth using sub-Saharan Africa as a focal point covering the period from 1995 to 2021 on data generated from World Development Indicator. The study employs Blundell and Bond system GMM technique for the estimation. Real gross domestic product is proxied for economic growth which is the dependent variable. Broad money supply is used in the study as a variable of main interest. Other control variables include labour force, industrial value added, trade openness and gross fixed capital formation. The study reveals that broad money supply exhibits a positive and statistically significant relationship, at one percent level of significance, with economic growth in Sub-Saharan Africa both in the short-run and in the long-run within the study period. The study concludes that sub-Saharan African countries could effectively use broad money supply to improve economic growth which ultimately lead to well-being of the citizens.

Keywords:
Broad Money Supply; Economic Growth; Sub-Saharan Africa; System Generalized Method of Moments.

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Background to the Study

With 49 countries in Sub-Saharan Africa and a population of over 1.14 billion, Sub-Saharan Africa is the world's second most populated region, after Asia, with an estimated 4.64 billion people as of 2020. The scope, magnitude, and level of economic growth of these nations vary. Despite making up over 12% of the world's population, this region only made up 2% of the global GDP (UNCTAD, 2020). Sub-Saharan Africa has abundant natural and human resources, but the region is nevertheless marked by a lack of access to basic amenities like power, water, decent healthcare, housing, and work opportunities—all of which are crucial markers of economic performance (UNCTAD, 2020).

The aforementioned makes it clear that a significant problem impeding development in the majority of sub-Saharan Africa is the underutilization of natural and human resources, as well as the political office holders' misappropriation of funds intended for infrastructure development. Every nation, established or developing, wants to see economic progress, and how best to use the money supply to accomplish this goal has long been a source of debate among academics and decision-makers. Romer (1986) contended that capital accumulation, which is thought to boost productivity through a spillover effect, facilitates economic expansion. With a large money supply, a well-developed and effective financial system promotes capital accumulation. Thus, in order to achieve economic performance, financial and monetary aspects are essential. Money supply often determines the direction of economy of any nation, since economic actors like: economists, analysts, investors, and financial experts usually await outcomes of their respective apex bank for decision-making.

Given the empirical literature now in publication, particularly when it comes to the money supply and economic growth, very little study has been conducted in sub-Saharan Africa. The few researches on sub-Saharan Africa used time series data analytical approaches, some of which are country-specific; any unobserved country-specific influence is reflected by the error term. The estimates might be skewed due to the likelihood of endogeneity for most of the regressors. Therefore, this study aims to fill this gap by empirically examining the impact of broad money supply on economic growth in Sub-Saharan Africa using System Generalized Method of Moment within the framework of dynamic panel data estimation is more appropriate in cases where some unobservable factors affect both the dependent variable and the explanatory variables and some explanatory variables are strongly related to past values of the dependent variable. The remainder of this study is organized as follows. Section 2 contains review of theoretical and empirical literature that are relevant to the study. Section 3 presents the model specification and methods of estimations. Section 4 presents estimated results and analysis, while Section 5 concludes the study.

Literature Review

Conceptual Review

Gao, Kulish and Nicolini (2020) observe that one way to gauge the quantity of money in circulation in an economy is to look at broad money. According to Greenwood and Hanke

(2022) broad money supply (M2) includes narrow money (M1), which is made up of assets that can be easily converted into cash to buy goods and services, as well as the more illiquid forms of money like bank deposits, treasury bills, and gilts. These are easily convertible into cash, which makes them regarded as "near money."

In the words of Haas, Neely and Emmons (2020), the formula used to determine each nation's money supply is different. The broadest term for money is "broad money," which includes fewer liquid assets like certificates of deposit, foreign currencies, money market accounts, marketable securities, Treasury bills, and anything else that can be quickly changed into cash (excluding company shares). Narrow money is defined as cash and checkable deposits. Put simply, an abundance of money makes it easier for businesses to obtain financing, which causes the economy to grow faster. Prices may decline or stagnate as the economy slows down and there is less money in circulation. Here, one tool that central bankers use to assess what, if any, interventions to make in order to affect the economy is broad money.

Greenwood and Hanke (2022) viewed M1 as the money supply that encompasses physical currency and coin, demand deposits, traveler's checks, and other checkable deposits. The narrow money supply only contains the most liquid financial assets. These funds must be accessible on demand, which limits the category to physical notes and coins and funds held in the most accessible deposit accounts. Narrow money is seen as the basic number of notes and coins and operational deposits at the Central Bank. The name is derived from the fact that M1/M0 are the narrowest or most restrictive forms of money that are the basis for the medium of exchange within an economy. This category of money is considered to be the most readily available for transactions and commerce.

According to Congdon (2021) broad money supply (M2) is the total amount of cash that everyone has on hand or in short-term bank deposits. It is the most thorough way to calculate the money supply of a given country, the totality of assets that can be used by households and businesses to make payments or keep as short-term investments, such as currency, funds in bank accounts, and anything of money like value. Broad money includes notes and coins but also savings accounts and deposits in a savings account. Since the financial securities covered by the broad money definition are less liquid than cash and instant savings accounts, they are referred to as "near money." Assets like shares and long-term dated securities are not included in broad money. Despite being tradable, these are not considered part of broad money because they are classified as assets rather than money.

Economic growth, according to Kessier (2012), happens when a community becomes more productive and capable of creating more products and services. The introduction of new goods and services boosts economic growth. Henry (2006) defined economic growth in a restricted sense as an increase in national income per capita, and it entails an investigation of the process, particularly in quantitative terms, with an emphasis on the functional relationships between endogenous factors. He also considers economic

growth in a broader sense to include increases in the gross domestic product, the gross national product, and national income, as well as increases in national wealth, including production capacity, expressed in both absolute and relative size, per capita, and encompassing also economic structural change. He stressed that economic growth is generated from the optimal use of available resources, improving the country's production potential, and enabling income distribution between people and society.

Economic growth has two unique meanings, according to Daly, Czech, Blackwelder, Magnus-Johnson, and Zencey (2010). It sometimes refers to the expansion of what we call the economy (the physical subsystem of our world made up of the stock of population and wealth, as well as the flow of production and consumption). That is when the economy is bigger. The phrase also has a second, quite unrelated connotation. If the expansion of some objects or activities causes benefits to increase faster than costs, we say the expansion has a net benefit. In the words of Amadeo (2016), economic growth is defined as how much more the economy generates than it produced previously. When the economy is producing more, businesses are more profitable, and stock prices rise. This approach frequently leads to an increase in the company's capacity to invest and hire more personnel. More job creation means more money in your pocket. During periods of higher economic growth, consumers will have more money to spend on new goods and services. As a result, he underlined that all countries seek good economic growth as measured by changes in the GDP. It takes into consideration all final goods and services produced in the country here.

Guru (2016) divided economic growth into two categories: In one sense, it is described as a long-term sustained yearly rise in the economy's real national income. To put it another way, economic growth indicates an increase in the Net National Product (NNP) trend. Some economists have challenged this description as insufficient and unsatisfying. They contend that while overall national income is rising, people's standard of living is dropping. This might happen when the population grows faster than the total national revenue. As a result, the second and superior approach to define economic growth is in terms of per capita income. His second view to economic growth means the annual increase in real per capita income of a country over a long period. To him, the rate of economic growth is measured both in terms of increase in overall gross national product and per capita income.

Theoretical Review

Endogenous Theory of Growth

Romer (1986) presents an endogenous growth model in which knowledge and capital accumulation brings technological spillovers. This technological spillover, he argues, results in externalities and is responsible for economic growth. The implication of the non-rivalry argument by Romer is linked to market size and innovation that attracts investments in capital stock and research and development.

Endogenous growth economists believe that productivity improvements can be tied directly to faster innovation and more investments in human capital. As such, they advocate for government and private sector institutions to nurture innovation initiatives while offering incentives for individuals and businesses to be more creative. Therefore, growth according to endogenous theory is a direct function of internal processes that has nothing to do with the external processes. The endogenous growth theory holds that long-term economic growth can be explained by investments in human capital, R&D, and the establishment of institutions that can finance individuals' inventive endeavors. By contending that technological advancement is not a given but rather results from investments in human capital and research and development, this model underlines the shortcomings of the Solow model. As a result, the newly acquired technology or knowledge stimulates innovation and continued financial investment in human capital, which is a crucial component of economic growth. The importance of governmental action is the key justification offered by the endogenous model. Theoretically, effective government policies can increase a nation's pace of growth, especially if they promote increased market competition and innovation. The endogenous growth theory contends that the previous growth theory needed to be revised because it did not account for government involvement or policies, nor did it adequately account for the role of savings and technological advancement. The function of private institutions was also highlighted by the theory. According to endogenous growth theory, creating private institutions that encourage innovation and give incentives for people to be creative is crucial for economic growth. This has the implication that financial intermediaries that support and allocate funds to the creation of new technologies may assist in fostering long-term economic growth. According to Schumpeter (1911), the endogenous theory best reflects the function of financial intermediaries.

Empirical Review

Gachugu and Luseno (2023) used the money supply as a proxy for financial deepening to study the relationship between financial deepening and economic development in Kenya. GDP information was utilized as a stand-in for economic growth. The study's foundation was the financial intermediation theory, which was supported by additional hypotheses about financial deepening. A historical research design was used in the study. The study employed a bivariate Autoregressive model (bVAR). Both descriptive and inferential statistics were used to analyze the data. According to the research, a unit increase in the money supply as a share of GDP will eventually lead to a 0.3215 unit decline in GDP growth. This is so that the economy doesn't suffer long-term damage from the money supply. The results of the study showed that Kenya's money supply had a long-term detrimental impact on economic growth. Accordingly, the report urges the government to tighten monetary policy, which may entail reducing open market operation activities like the floatation of infrastructure bonds.

Ida and Komang (2022) reexamined the connection between Zambia's inflation rate and the country's money supply, currency rate, and fuel prices. In this study, secondary data were employed, and time series data from 2012 to 2021 were used to obtain data. SPSS

Version 22.0 was used to conduct the study's multiple linear regression analysis, multiple coefficients of determination (R2), partial hypothesis test (t test), and simultaneous hypothesis test (F test). Based on the test results, it can be concluded that the money supply, exchange rate, and gasoline price all have a positive impact on the inflation rate, either partially or simultaneously. For the economy to reach the target level, the study suggests increasing the money supply. Time series data on monetary policy variables (narrow money supply, broad money supply, exchange rate, interest rate, and monetary policy rate), inflation rate, and nominal gross domestic product during a time period spanning 1990 to 2021 are used by Anachedo, Obi-Nwosu, Okeke, and Ubah (2022). The Central Bank of Nigeria statistical bulletin served as the source for all of the information. The Johansen Cointegration test and the Vector Error Correction Mechanism were used to examine the data. According to the results, inflation has a small but favorable impact on Nigeria's economic expansion. This suggests that higher inflation rates have, over time, produced higher rates of economic growth. Long-term economic growth in Nigeria was found to be strongly and negatively impacted by interest rates. Higher interest rates deter borrowers from borrowing money for investments, which has a debilitating and contractionary impact on the nation's economic production. According to the report, monetary authorities should implement expansionary policies to guarantee that there is enough supply of money accessible for transactions and investments that would foster long-term economic growth.

Using time series data from 2000 to 2020, Razia and Omarya (2022) investigate the impact of the broad money supply (M2) on the per capita economic development in Palestine. The study employed the cointegration method, the error correction model, and the autoregressive distributed lag model (ARDL) to examine how the money supply affects GDP per person. The gross domestic product (GDP) per person, the broad money supply (M2), the gross fixed capital formation (GFCF), and the inflation rate (INF) are the four macroeconomic variables that drive the model. The findings indicate that the money supply, total capital formation, and inflation rate all have a favorable short-term impact on economic growth. However, none of these variables affect the economic growth in the long term.

Onipede, Afiemo, Nduka, and Apinran (2021) concentrated on the dynamic effects of the broader money supply (M3) on economic growth in Nigeria between 2010M1 and 2018M12 (measured by the Purchasing Manager Index). Using the Autoregressive Distributed Lag (ARDL) method, the study examined the long- and short-run relationships between the chosen macroeconomic variables, including broad money supply, consumer price index, oil price, external reserves, and economic growth. The study's results show that, over the long run, the relationship between the broad money supply and economic growth is both statistically significant and consistent with theory. The error correction coefficient, which is -0.38072, deviates statistically from zero and is negative, as predicted by the underlying assumptions. The outcome demonstrates that the long-term recovery of the divergence from the equilibrium between economic growth and other predictors occurs at an average rate of roughly 38% monthly. It follows that the

Central Bank of Nigeria is urged to keep the growth of its monetary aggregate's constant and in a manner that is consistent with economic expansion. Of course, this is intended to be used in addition to the government's Economic Recovery and Growth Plan (ERGP).

Ogbanje and Ihemezie (2021) looked at the effect of wide money supply and exchange rates on Nigeria's agricultural GDP. The Central Bank of Nigeria provided secondary statistics for the years 1981 to 2018. Johansen Co-integration test, Augmented Dickey-Fuller, descriptive statistics, and a vector autoregression model were all used. A high coefficient of variance was present in broad money. At the initial difference, the variables were constant. The long-term association is disregarded by the Johansen Co-integration test. The chi2 statistic is statistically significant, as shown by the result using the agricultural GSP model of the VAR, which has an R2 of 0.9978. With statistically significant and z-statistics of 3.92 and 5.44, respectively, the money supply and rate have coefficients of 0.3389 and 0.2502, respectively. The results point to increased general spending for higher agricultural GDP. To avoid the trade-off effect on inflation, an increase in the exchange rate should be implemented for an increase in the agricultural GNP.

Mahara (2021) used time series yearly data from 1976 to 2019 to evaluate the link between broad money supply, inflation, capital spending, and economic development in Nepal, using the ARDL bounds testing technique to co-integration. The model's variables were the real GDP growth rate, the broad money supply, and inflation. The information was obtained from Current Macroeconomic and Financial Situation-2019/20. The study's empirical findings revealed a strong long-run positive link between broad money supply, capital spending, and growth. The study is country-specific and falls outside of the scope of the present investigation. As a result, the influence of wide money supply on economic growth in Sub-Saharan Africa must be considered.

Matres and Le (2021) investigated the effect of wide money supply on the pace of economic growth. The study included a panel of 217 nations from 1960 to 2020, as well as four alternative models. World Development Indicators included statistics on GDP growth rate, broad money supply, inflation rate, unemployment rate, real interest rate, foreign direct investment, government expenditure, gross fixed capital formation, real exchange rate, and corruption. The analysis discovered evidence of an inverse link between the real interest rate and inflation, as well as between the broad money supply and economic growth. Although the study focused on a wide range of countries, including developed and developing nations, the general application of the findings on economies with different levels of financial development and institutions may be difficult. Therefore, there is a need to focus on a specific group with a similar financial structure in order to generalize the findings.

Yakubu and Abdallah (2021) studied the impact of banks' financial intermediation functions on economic growth in Sub-Saharan Africa. The study included information from 11 Sub-Saharan African countries between 1970 and 2016. The study employs the

random effects approach based on the suggestion of the Breusch-Pagan test, using broad money supply, bank loans to the private sector, and bank deposits as financial intermediation metrics. Except for bank deposits, the data suggest that wide money supply and bank loans to the private sector have a major impact on economic development. Despite the fact that the research area is the same, this study used a static technique to data analysis, whereas the current study used a dynamic approach. The fact that time series data are dynamic in nature, whereby a variable's present value depends on its prior values, influences the choosing of this technique.

Aigheyisi and Edore (2019) conducted an empirical study employing the Shin-Greenwood-Yin Nonlinear Autoregressive Distributed Lag (NARDL) approach to cointegrating and error correction modeling to examine the asymmetric effects of broad money supply on economic growth in Nigeria. For the analysis, annual time series data from 1981 to 2016 were employed. The analysis found an asymmetry between the variables because a rise in the broad money supply has been demonstrated to have a positive, significant impact on economic growth over the short and long terms. According to the findings, it is suggested that large money supply and inflation should be controlled in order to boost economic activity. The research is not based on any economic theory.

In Nigeria between 1986 and 2017, Imoagwu and Ezeanyeji (2019) looked at the connection between financial development and economic growth. They specifically looked at the impact of financial deepening on economic development in Nigeria, as measured by the ratio of broad money supply to GDP, interest rates, and loans to the private sector. To achieve its goals, the study used the econometric approach of vector autoregressive regression. According to the findings, financial development has a considerable positive link with economic growth in Nigeria. The ratio of bank credit to private sector to GDP has positive significant impact on economic growth in Nigeria only in the long run while it is positive and insignificant in the short run. The research is country-specific, though on a country within the purview of the present study.

Puatwoe and Piabuo (2017) investigated the influence of financial development on economic growth in Cameroon using time series data. The study employed three typical indices of financial development that are regarded as bank-based financial development (broad money, deposit/GDP, and domestic credit to the private sector). The Auto Regressive Distributive Lag (ARDL) estimate approach revealed a short-run positive association between broad money supply, government expenditure, and economic growth, as well as a short-run negative relationship between bank deposits, private investment, and economic growth. However, in the long run, all financial development indicators demonstrate a favourable and considerable influence on economic growth. The study thus confirms the existence of a positive and long-term impact of all the indicators of financial development on economic growth through bound test. It is therefore proposed that the financial reforms in Cameroon should be pushed forward in order to boost the development of the financial sector thus an increase in its role on economic growth. This is a single country study which ignores the issue of globalization with respect to financial development.

Dingela and Khobai, (2017) investigated the dynamic impact of broad money supply on economic growth per capita in South Africa using time-series data from 1980 to 2016. To evaluate the influence of wide money supply on GDP per capita, the study used the autoregressive distributed lag bounds testing technique to cointegration and an error correction model. Using four variables, including GDP per capita, broad money supply, interest rate, and inflation rate, the researchers discovered a statistically significant positive association between broad money supply and economic growth in both the short and long term. According to the report, the South African government should maintain consistency and adopt "the Taylor rule" to allow broad money supply to rise at a stable rate in tandem with economic development. This study is nation-specific, and the findings from one country may be insufficient to generalize.

Chaitip, Chokethaworn, Chaiboonsri, and Khounkhalax (2015) examined the relationship between money supply and economic growth in ASEAN member countries using macroeconomic variables comprising of GDP growth rates, broad money supply and demand deposits. Using secondary data, covering the duration of nineteen-year period from 1995 to 2013, panel ARDL and pooled mean group estimator were applied. The result showed that broad money supply positively influences economic growth in Thailand, Indonesia, Singapore, Malaysia, Philippines, Vietnam, Lao PDR and Cambodia. The estimation techniques used in the study are inadequate in addressing issues of endogeniety inherent in panel data models.

Methodology

The model used in the study is anchored on the endogenous growth theory by Romer (1986) based on the known assumption that money supply will have a spillover effect on the economy by increasing the industrial value-added thereby reducing the diminishing return to capital accumulation. Thus, the dependent variable is growth rate of Real Gross Domestic Product Per Capita (RGDPP) of Sub-Saharan Africa to represent economic growth. Broad Money Supply (M2) as an indicator of Bank-Based Financial is used as the variable of interest. Other control variables include Labour Force Total (LFT) of Sub-Saharan Africa, Industrial value Added (IVA) as Industrial performance of Sub-Saharan Africa, Trade Openness (TOP) of Sub-Saharan Africa and Gross Fixed Capital Formation (GFCF) of Sub-Saharan Africa.

Thus the broad money supply (M2) (bank-based financial development) - growth model to address the research objective is as follows:

$$GDPP_{it} = f(M_{2it} + LFT_{it} + IVA_{it} + TOP_{it} + GEDU_{it}) \quad (1)$$

Where:

$RGDPP$ = growth rate of Real Gross Domestic Product Per Capita to represent Economic Growth

M_2 = Broad Money Supply

LFT = Labour Force –Total

IVA = Industrial Value Added
TOP = Trade Openness
$GFCF$ = Gross Fixed Capital Formation measuring investment ratio
i = Cross-sectional Unit = 1, 2, . . ., 10
t = period of time = 1, . . ., 5

Taking the logarithm (ln) and considering the relevant econometric model for estimating equation (1) the model becomes:

$$\ln RGDPP_{it} = \beta_0 + \beta_1 \ln M2_{it} + \beta_2 \ln LFT_{it} + \beta_3 \ln IVA_{it} + \beta_4 \ln TOP_{it} + \beta_5 \ln GFCF_{it} + \varepsilon_{it} \quad (2)$$

Where:

β_0 is the intercept
β_1 to β_5 are the parameter coefficient to be estimated
ln is the Natural logarithm
ε_{it} is the error term
And the other variables stand as explained above

The application of the typical dynamic panel data model to equation (2) in order to examine the relationship between broad money supply and economic growth in Sub-Saharan Africa, the model is re-stated as:

$$\ln RGDPP_{it} = \beta_0 + \delta \ln RGDPP_{I,T-1} + \beta_1 \ln M2_{it} + \beta_2 \ln LFT_{it} + \beta_3 \ln IVA_{it} + \beta_4 \ln TOP_{it} + \beta_5 \ln GFCF_{it} + \mu_i + \eta_{it} \quad (3)$$

Where:

β_0 is time invariant cross-sectional intercept
δ is the coefficient of the lagged value of dependent variable?
β_1 to β_5 are parameter coefficients to be estimated
μ_i is Cross-sectional specific Effect or Fixed Effect
η_{it} is an idiosyncratic error/ common cross-section time series effect?
Other variables are as defined above.

The *a priori* expectations of the coefficient of the variable of the model in equation (3) are as follows: $\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0, \beta_5 > 0$

Empirical Results

The dynamic panel data model estimation result for Broad Money Supply-Economic Growth Model in the short run is presented in Table 1. The result is presented in four separate columns from column 1 to column 4. Column 1 reports the result of the

estimation using a one-step system GMM without lags; column 2 comprises the result of the estimation from a one-step system GMM with lags; column 3 is made up of the result of the estimation using a two-step system GMM without lags; and lastly, column 4 includes the result of the estimation using two-step system GMM with lags. The interpretation is concentrated on the result in column 4 (two-step system GMM with lags) as the estimator yields a more asymptotically efficient estimate than the one-step system GMM estimator. In order to control for the endogeneity of regressors, two classes of instruments are used in the estimation of the model. These are the instruments for the orthogonal deviation equation, which is the first differenced equation and the instruments for the level equation. This study gives more emphasis on the two-step system GMM for the analysis.

Table 1: Dynamic Panel Data Short-run Result for Broad Money Supply (M2) – Economic Growth Model

Regress and: RGDPP		System GMM		
Specification Options:	One-step without	One-step with lags	Two-step without lags	Two-step with lags
Regressors	1a	1b-collapse	2a	2b-collapse
$lnRGDPP_{it-1}$	0.965***	0.957***	0.935***	0.929***
	(0.000)	(0.000)	(0.000)	(0.000)
LnM2	1.263***	1.232***	1.327***	1.186***
	(0.000)	(0.000)	(0.000)	(0.001)
lnLFT	0.115***	0.110***	0.129***	0.1199***
	(0.004)	(0.009)	(0.003)	(0.006)
lnIVA	.135***	.131**	0.027	0.130*
	(0.008)	(0.018)	(0.823)	(0.061)
lnTOP	-.037	-0.036	-0.029	-0.022
	(0.155)	(0.147)	(0.335)	(0.467)
lnGFCF	-.0013	-0.0009	0.0056	-0.0011
	(0.709)	(0.776)	(0.513)	(0.818)
Constant	12.779	12.480	14.050	11.801
	(0.001)	(0.000)	(0.001)	(0.003)
Number of Obs	38	38	38	38
Number of id	10	10	10	10
country effect	YES	YES	YES	YES
year effect	NO	NO	NO	NO
Sargan_test	8.70	2.98	8.70	2.98
Sargan Prob	(0.368)	(0.226)	(0.368)	(0.226)
Hansen_test	1.94	1.91	1.94	1.91
Hansen Prob	(0.983)	(0.384)	(0.983)	(0.384)
AR(1)_test	-1.63	-1.71*	-1.46	-1.74
AR(1)_P-value	(0.103)	(0.088)	(0.143)	(0.021)
AR(2)_test	0.11	0.24	0.32	0.51
AR(2)_P-value	(0.910)	(0.807)	(0.749)	(0.610)
No. of Instruments	15	9	15	9
F-Stats	41443.46	31231.63	58314.51	46563.85
F-Stats P-Value	(0.000)	(0.000)	(0.000)	(0.000)

*NOTES: The p-values are reported in brackets. ***, **, *, represent 1%, 5% and 10% significances levels respectively.*
1a & 1b denote one-step SGMM without and with lags respectively while 2a & 2b; denote Two-Step SGMM without and with lags respectively. Also, the Regressions follow Roodman (2009) by collapsing the instrument matrix.
Source: Author's computation Using STATA 14.0(2023)

Table 1 reports the dynamic panel data result of the estimation for broad money supply-economic growth model. In order to examine the reliability of the coefficient estimates as well as misspecification test, the following diagnostic statistics were carefully checked. They include the number of instruments, the first order [(1)] *AR* and the second order [(2)] *AR* autocorrelation tests proposed by Arellano and Bound, and the test of over-identifying restrictions Using Sargan and Hansen tests. The number of instruments (9) is less than the number of groups (10) authenticating the validity of the instruments.

The Arellano-Bond test for autocorrelation are reported as (1) *AR* and (2)*AR* in the lower portion of Table 1. The and report the test statistic values of -1.74 and 0.51 with the probability values of 0.021 and 0.610 respectively. This is enough reason to reject the null hypothesis of no serial correlation of order one but accept the null hypothesis of no higher serial autocorrelation. The probability values are in line with the expectations because for the Arellano-Bond GMM estimator to be valid for estimation, we expect to reject the null hypothesis for the test while we do not reject the null hypothesis for . The probability value of 0.021 in is enough evidence to reject the null hypothesis at 5% level of significance.

The test of over-identifying restrictions of whether the instruments as a group, appear strictly exogenous is implemented using Sargan and Hansen tests. The results are equally reported in the lower portion of Table 1. However, where the probability values of either Sargan or Hansen or both do not conform with the P>0.05 option, the rule of thumb as suggested by Roodman (2009) that the number of instruments in any given equation must be less or equal to the number of groups suffices. Therefore, column 2b (two-step system GMM with lags) with 9 as the number of instruments as against 10 as the number of groups is plausible for interpretation and discussions. The F-statistic which tells you whether your regressors as a group are jointly significant in explaining the dependent variable equally performed well. It appears with the value of 41443.46 with a probability value of 0.000 which is clear evidence for the rejection of the null hypothesis at 1% level of significance. This implies that all the exogenous variables in the model jointly explained the systemic variations in economic growth in Sub-Saharan Africa over the period of study. A closer look at the regressors reveals that the coefficient estimates are in consonance with theoretical postulations. The Blundell-Bond robust estimates of lagged real gross domestic product per capita are positively signed and statistically significant at 1% level of significance irrespective of the option used for the estimation. This shows that the past behaviour of economic growth is fundamental in explaining the current behaviour of economic growth in Sub-Saharan Africa. In definite terms, a 1% increase in real gross domestic product per capita dynamics will explain about 0.929% increase in the contemporaneous realizations of current economic growth within Sub-Saharan Africa during the study period. The result of the model also suggests that economic growth feeds on the post values for optimal performance.

A cursory look at the regressor of interest, Broad Money Supply, reveals a positive and significant impact on economic growth regardless of the specification option adopted. The short-run impact of broad money supply is positive with a value of 1.186. This means

that a 1% change in broad money supply is associated with a 1.186% increase in economic growth in the short run, at 1% significance level, holding other variables constant. Hence, broad money supply and economic growth exhibit an elastic relationship in Sub-Saharan Africa during the study period. Therefore, wen broad money supply is driving financial development, there will be improvement in economic growth in Sub-Saharan Africa. The relationship between labour force and real gross domestic product per capita is positive and statistically significant at 1% level of significance. The magnitude of the coefficient estimates of 0.1199 and the probability value of 0.006 implies that a 1% increase in labour force will result in about 0.1199% increase in economic growth in the short run at 1% level of significance. Therefore, labour force stands inelastic in explaining the growth behaviour in Sub-Saharan Africa within the study period.

Industrial value-added reveals a positive and significant relationship across all specification options adopted for the model. The finding is sufficiently consistent with theoretical postulations. The coefficient estimates with respect to industrial value-added have a positive value of 0.130. In definitive terms, a 1% increase in industrial value-added will explain positively about 0.130% variation in economic growth, in the short run, among Sub-Saharan Africa. The positive relationship is hinged on the theoretical postulation that, a higher level of industrial output translates to higher income which in effect triggers economic activities that leads to economic growth.

The coefficient estimates with respect to trade openness consistently show a negative value and it is also not significant in explaining the growth behaviour of Sub-Saharan Africa. The Blundell-Bond robust estimate has a negative value of -0.022. Precisely, a 1% increase in trade openness is associated with about 0.022 decreases in economic growth on average in the short run, ceteris paribus. Trade openness and economic growth exhibit an insignificant and inelastic relationship in Sub-Saharan Africa. The findings of the result spelled out the realities of trade openness within the region in which imports are more than exports. Furthermore, the exports are mostly raw materials in their crude form.

Gross fixed capital formation reports a negative value of -0.0011. This implies that a 1% increase in gross fixed capital formation will insignificantly decrease economic growth by about 0.0011% in the short run, all things being equal, among Sub-Saharan Africa. The findings uphold the fact that capital formation within the region is not significant enough to spur economic growth, thereby calling for a need to develop the financial sector within the region.

Table 2: Dynamic Panel Data Long run Result for Broad Money Supply (M2) – Economic Growth Model.

Regress and: RGDPP	System GMM			
Specification Options:	One-step without	One-step with lags	Two-step without lags	Two-step with lags
Regressors	1a	1b-collapse	2a	2b-collapse
LnM2	1.207***	1.205***	1.311***	1.222***
	[.044]	[.038]	[.086]	[.053]
	(0.000)	(0.000)	(0.000)	(0.000)
lnLFT	-.110***	-.108***	-.128***	-.124***
	[.017]	[.021]	[.020]	[.018]
	(0.000)	(0.000)	(0.000)	(0.000)
lnIVA	.129***	.128***	-	.134**
	[.043]	[.042]	-	[068]
	(0.003)	(0.002)	-	(0.047)

*Notes: Standard errors is reported in brackets [ ] while p-values are reported in Parentheses ( ). ***, **, *, represent 1%, 5% and 10% significances levels respectively.*
1a & 1b denote one-step SGMM without and with lags respectively while 2a & 2b; denote Two-Step SGMM without and with lags respectively.
Source: Author's computation Using STATA 14.0 (2023)

Table 2 reports the long-run result from the estimation of broad money supply and economic growth model. The result is reported in four separate columns from column 1 to column 4. Column 1 reports the result of the estimation using a one-step system GMM without lags; column 2 comprises the result of the estimation from a one-step system GMM with lags; column 3 is made up of the result of the estimation using a two-step system GMM without lags; and lastly, column 4 includes the result of the estimation using two-step system GMM with lags. The interpretation is concentrated on the result in column 4 (two-step system GMM with lags) as the estimator yields more asymptotically efficient estimates than the one-step system GMM estimator. The result reports that the long-run impact of broad money supply and industrial value-added is positive. In specific terms, 1% increase in broad money supply will increase economic growth by 1.22% in the long run at 1% level of significance, holding all the other variables used in the model constant, across Sub-Saharan Africa. Broad money supply and economic growth exhibit an elastic relationship. With regards to industrial value-added, a 1% increase in industrial value-added leads to about 0.134% increase in economic growth in the long run among Sub-Saharan Africa and the relationship is inelastic. Labour force, however, revealed a negative but statistically significant relationship with economic growth in the long run among Sub-Sahara Africa. The magnitudes of the long-run coefficient estimates indicate a marginal improvement over those of the short-run estimates.

This result indicates a positive relationship between broad money supply and economic growth. The finding is in consonance with theoretical postulations as an increase in broad

money supply is expected to positively affect the income of households which will boost their demand and productivity, hence, economic growth. With the coefficient estimate for broad money supply and its associated probability value as presented in Table 2, the null hypothesis that broad money supply has no significant impact on economic growth across Sub-Saharan Africa is rejected at 1% significance level. Therefore, it is concluded that broad money supply has a significant impact on the economic growth of Sub-Saharan Africa. The finding is in line with those of Mahara (2021), Aigheyisi and Edore (2019), Dingela and Khobai, (2017), and Chaitip, Chokethaworn, Chaiboonsri, and Khounkhalax (2015), which also in their individual studies in various study areas found a positive and significant association between money supply and economic growth. The finding of the current study contradicts those of Matres, and Le, (2021), Yakubu and Abdallah (2021), which in their respective studies found evidence for a negative relationship between money supply and economic growth.

Broad money supply is evidently proven in the empirical result to be growth-enhancing variable. The positive coefficient estimates of 1.186 for broad money supply confirms its elastic positive influence on economic growth within the region. This implies that real economic growth is an increasing function of broad money supply, meaning that as money supply increases, so does economic growth. It implies that broad money supply within the region is probably directed to productive sectors of the economy. This finding tends to support the relevance of monetary expansion policies and is in line with the findings of Mahara (2021), Yakubu and Abdallah (2021), Aigheyisi and Edore (2019) and Imoagwu and Ezeanyeji (2019) who also in their respective studies in different study areas found a positive and significant relationship between bread money supply and economic growth. However, it contradicts the findings of Matres and Le, (2021) who found a negative in their study using a panel of 217 countries in the world spanning from 1960 to 2020. An increase in broad money supply increases personal income, this further leads to an increase in aggregate demand and triggers investment which eventually leads to economic growth. The expansion in money supply causes aggregate demand of the people to increase, and that has a multiplier effect on the economy of Sub-Saharan Africa.

The long-run impact of broad money supply is positive with a coefficient value of approximately 1.207. This means that a 1% increase in broad money supply is associated with a 1.207% increase in economic growth in the long run, at 1% significance level, on average, ceteris paribus, across Sub-Sahara Africa. Hence broad money supply and economic growth exhibit an elastic relationship. The finding is collaborated by Puatwoe and Piabuo (2017), Dingela and Khobai, (2017) and Chaitip, Chokethaworn, Chaiboonsri, and Khounkhalax (2015).

Conclusion

This study examines the impact of broad money supply on economic growth in Sub-Saharan Africa. The study applied system generalized method of moments which assumes of no serial correlation in the error term and weak exogeneity of explanatory

variables. The validity of the instruments was checked by the Sargan and Hansen tests of over-identifying restrictions which test for correlation between the instruments and the model residuals as well as the AR (1) and AR (2) tests that checks whether the differenced error terms are first and second order serially correlated. All of the applied diagnostic tests confirmed the robustness of the models and hence, the estimates. The coefficient estimates provide evidence for a positive and statistically significant relationship between broad money supply and economic growth in Sub-Sahara Africa both in the short run and in the long run.

With regards to the findings of the study in which broad money supply evidently revealed a positive, elastic and statistically significant impact on economic growth of Sub-Sahara Africa, the following recommendations are considered necessary: The central banks in Sub-Saharan Africa should emphasize monetary policy instruments that help to increase the money supply within the region; The Apex banks within the region should be encouraged to increase money supply to real sectors of the economy such as industrial sector, manufacturing sector, mining sector and agricultural sector in order to broaden and enhance the growth of the economy within the region.

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