

# Has Policy Rate Been an Effective Tool in Taming Inflation?: A Sub-Saharan African Perspective

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## Abstract

This paper explores the effectiveness of monetary policy rate as a tool to tame inflation in sub-Saharan Africa (SSA) using the system GMM estimator and other econometric approaches. Financial data (unconsolidated) from Orbis for the period 2011-2018 was used for the purpose of this study. We find that expected inflation, GDP growth rate, unemployment, the exchange rate, broad money supply, and policy rate significantly influence the inflation rate in SSA. The result clearly points to the fact that targeting inflation using monetary policy rate has not been an effective tool for taming inflation in SSA. To the extent that the baseline result indicates the monetary policy rate has no substantial impact on inflation in the region, there is therefore the need to re-evaluate monetary policy design that could help control inflation. In terms of potential policy implications of this paper based on our results, policy makers or monetary authorities should not arbitrarily raise policy rate to control inflation but should also consider other monetary policies such as money supply. The paper concludes that the credibility and accountability of the monetary policy authorities should be improved by setting targets appropriate to their institutional capacity and meeting them.

## Key words

monetary policy rate, GMM, inflation, sub-Saharan Africa.

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## Introduction

To combat inflation while promoting economic growth and safeguarding the vulnerable requires policymakers to engineer a tactful approach to ensure a soft landing.

There is no denying that a contractionary monetary policy is the preferred strategy. The central bank sets the monetary policy rate to influence the evolution of

the economy's main monetary variables. Though there are other means of controlling inflation, such as price and wage controls, the former has proved more effective. The policy rate is the short-term, often overnight, rate that central banks charge commercial banks while lending or giving loans to them. In recent years the persistent increase in the general price levels of goods and services within sub-Saharan Africa (hereinafter, SSA) has become a challenge to policymakers. The situation has been unsatisfactory due to the COVID-19 pandemic, rising energy prices, and high public debt. These factors explain current load shedding in South Africa, currency depreciation, and elevated inflation in Ghana and Nigeria, to name but a few. It is widely accepted that external factors have had more significant explanatory momentum than domestic factors in explaining inflation in recent years (*World Economic Outlook, October 2022: Countering the Cost-of-Living Crisis*, no date). The IMF Report (2022) has revealed that most African countries, especially those within the SSA region, have recorded median inflation as high as 9% since July 2022, compared to slightly above the 5% average pre-pandemic era (2009-2019). The transmission mechanism of monetary policy significantly affects both output and prices. A contractionary monetary policy, similarly to an increased interest rate, raises the cost of borrowing, reduces consumers' disposable incomes, and decreases investors' investment capabilities. The aftermath should see a decline in economic activity with lower inflation. A further impact of the contractionary policy is the appreciation of the domestic currency, as foreign investors seek to take advantage of the increased interest rates. Exports become expensive, and imports become relatively cheaper, leading to a deteriorating balance of payment. Taylor (1993) stated that any deviation in the inflation target and output gap will induce

monetary policymakers to alter the interest rate to ensure price stability and growth. Monetary policy in SSA has been centred on money targets and exchange rate pegs. Since the 1960s, when most SSA countries regained independence, most of their currencies were pegged to the UK pound and French franc and were managed by currency boards. The independent activities of central banks surfaced after the collapse of currency boards due to nationalist movements. Also, the failure of the Bretton Woods system led to an increase in the duties performed by the central bank through exchange rate management. Over time, a high concentration on primary exports and unfavourable commodity terms of trade led to distortions in macroeconomic and monetary policy regimes. Nevertheless, by the early 2000s, most SSA countries experienced macroeconomic stability through single-digit inflation and sustained growth. After 2007 when some countries had adopted inflation targeting with the reduced role of the exchange rate as a nominal anchor, it has become essential for countries within the region to adopt better countercyclical policies to sustain output and prices (see Aryeetey and Fosu, 2002; Berg and Portillo, 2018). Monetary policy arrangements in SSA in the past decade have witnessed significant improvement in SSA. Andrieu et al. (2018) attribute this to the independence of central bank, more sustained and stable growth, support from fiscal-based stabilisation efforts, and stabilising inflation to single digits on average. Despite the strides made, monetary policy and credibility generally remain weaker (Mishkin, 2003; Kovac et al., 2022) and have been attributed to relatively high inflation within the region. Mainstream economics emphasises that the main objective of monetary policy is to be able to determine the level of inflation in the economy. Ball (1999) argues that a sound monetary policy should produce

low average inflation and keep output and inflation as low as possible. Countries such as New Zealand and Canada adopted monetary policies targeting inflation as far back as the 1990s; Ghana, Uganda, and South Africa have also made the switch, with the principal target of the European Central Bank (ECB) being price stability, to mention but a few. Although a great deal of empirical research has been done on the nexus between monetary policy and inflation, many of them have concentrated more on country specifics than on cross-country ones, and several have surveyed the SSA region (see e.g. Savvides, 1998; Asongu, 2014), while others have focused on broad money supply and exchange rate as the only monetary policy variables. This means there is still scope for the empirical exploration of modern monetary policy analysis and inflation in sub-Saharan Africa. By employing a dynamic panel regression model, this paper contributes to extant literature in SSA by employing a wider database from countries across SSA to explore how monetary policy rates have been an effective tool in stabilising inflation following the global financial crisis of 2008. We address these challenges in this paper by employing the generalised method of moments (GMM) to ascertain the effectiveness of monetary policy rates in addressing inflation fluctuations in SSA. Amato and Gerlach (2002) stated that countries which pursue inflation targeting can execute a more systematic interest rate response by the central bank to inflation and that the effective transmission of monetary policy is expected. Against this background, the intention of this paper was to explore how the countries within SSA have influenced inflation with the policy rate and how certain macroeconomic variables have affected inflation.

The rest of the article is structured as follows: a brief review of the literature on the monetary policy rate and inflation is undertaken in section 1. The empirical

strategy and data are presented in section 2. Section 3 contains the model estimation and results, whilst section 4 discusses the main results

## 1. Literature Review

The literature on inflation is one area of macroeconomics that has been explored in great detail, both theoretically and empirically. It explains how harmful inflation could be if greater attention is not directed thereto. Two leading theories are proposed in the literature, namely the monetarist theory and the structuralist theory. The monetarist theory stems from demand-related factors bolstered by expansionary monetary and fiscal policies. Proponents argue that increased economic growth and employment increase the money supply, creating inflationary pressures (Hendry, 2001; Smets and Wouters, 2003). Structuralists view factors influencing inflation from supply-side-related sources. They believe that when prices of factors of production such as labour cost and inputs increase, it is reflected in the prices of the final output, and this causes inflation (see Bernanke, 2005; Christiano et al., 2005).

The cross-country and country-specific determinants of inflation have attracted various theories to explain the perspectives of developed, developing, and emerging economies alike. Gbadebo and Mohammed (2015) used the error correction model on quarterly data from Nigeria between 1989 and 2012. Their main motive was to determine how monetary policy controlled inflationary pressures. They found that the major causes of inflation in Nigeria were interest rates, exchange rates, money supply, and oil prices. While money supply and oil price positively affected inflation, exchange rates and interest rates had the opposite effect. This meant that exchange rate targeting was a primary instrument used by monetary authorities to manage inflation within the study period. Bonga-Bonga and Kabundi (2011) also

examined the impact of the monetary policy instrument and repurchase rate on inflation and output in South Africa between 1998 and 2008. They employed the structural vector autoregressive model (SVAR), finding that monetary policy instruments and repurchase rates did not impact inflation over their sample period.

Based on a cross-country assessment, Asongu (2014) explored the effect of monetary policy on inflation in Africa from 1987 to 2010, employing the vector autoregressive model and the vector error correction model. He used financial depth, allocation efficiency, financial activity, and financial size as proxies for monetary policy, concluding that the variables affected long-run price variability. However, in situations of distortions, depth and size were significant adjusters of inflation to cointegration. However, the short-run impact of monetary policy variables on inflation was not overwhelming. Mohanty and Klau (2004) also reviewed monetary policies and interest rate-setting behaviour in some developing economies. They concluded that in most emerging economies, monetary policy responded more strongly to exchange rates than inflation and the output gap.

Contemporary empirical data provides mixed results on inflation using policy rates across the globe. Using a panel data set of 28 EU countries in the period 1970-2015, Afonso, Alves and Balhote (2019) show how economic and institutional events influence the reaction of central monetary authorities when inflation has a significant impact on monetary policies. However, contradictory evidence was reported by Cavoli, Gopalan and Rajan (2023), who reported that monetary policy rate and the coefficients to the monetary policy rule are lower when the economy has significant number of the population involved and engaged into banking activities. This research was based on the study of 47 emerging and developing economies between 1995 and 2017.

## 2. Methodology

This section of the paper discusses and explains all the variables used in this research, not excluding data strategy and model specification. Macroeconomic data for 31 sub-Saharan African countries were obtained from the IMF, the World Bank, and IFS for 2010-2021. In order to meet the objective of this paper, widely used variables, both theoretical and empirical, were employed (Emerenini and Eke, 2014; Cioran, 2014; Hossain and Islam, 2013).

Since the objective of this paper is to provide empirical evidence of how policy rates have been employed over the years by various central banks across the sub-Saharan African region to control inflation, we use the consumer price index as our dependent variable (see Emerenini and Eke (2014)).

As one of the explanatory variables, the broad money supply represented by M2 in the model is expected to have a positive relationship with inflation. This is because a rise in the monetary base pushes individuals within an economy to increase their spending on goods and services, thereby leading to an increase in prices.

GDP growth is also expected to have a significant and positive impact on inflation, mainly post-dated (a rise in inflation following an increase in economic growth). It stands to reason that inflation could be expected given the current level of economic growth.

A positive/negative coefficient is expected for the exchange rate depending on how heavily dependent the economy is on imports. A sharp depreciation of the local currency in an import-driven economy is likely to lead to a sustained increase in the prices of goods and services.

Unemployment is one of the explanatory variables of this study, and an inverse relationship between inflation and this variable is expected. As such, inflation targeting can serve as a means of managing unemployment in an economy.

As the policy rate is used as a means of controlling the rise in inflation and price stability, a negative/positive coefficient is expected for this variable depending on the characteristics of the economy under study and the real interest rate, which has a direct correlation with policy rate and is expected to have a similar relationship to inflation.

To help empirically analyse how central banks use policy rates across the

Sub-Saharan African continent to control inflation and stabilise prices, a dynamic panel model is used (TWO SYSTEM GMM). Using this dynamic panel model will help to tackle any potential endogeneity problem that may be encountered between inflation as our dependent variable and the explanatory variables. The dynamic mathematical model, which is based on both short-run and long-run analysis, is as follows

$$CPI_{jt} = \beta_0 + \beta_1CPI_{jt-1} + \beta_2EXCHR_{jt} + \beta_3M2_{jt} + \beta_4GDP_{jt} + \beta_5POLICY\_RATE_{jt} + \beta_6REALINTRATE_{jt} + \epsilon_{it} \tag{1}$$

where  $CPI_{jt}$  in the model relates to the consumer price index (inflation) in country  $j$  and time  $t$ ,  $EXCHR$  relates to the exchange rate;  $M2$  represents broad money supply;  $GDP$  represents annual GDP growth;  $POLICY\_RATE$  represents the monetary policy rate of central banks;  $REALINTRATE$  is the real interest rate, and  $\epsilon_{it}$  is the error term.

The dynamic panel model was used to include a lagged dependent variable in the model and to address the issue of endogeneity and inconsistency of the results. Two of the specification tests proposed by Arellano

and Bond (1991) were investigated, since the validity of the instruments affects the consistency of the GMM estimator (Sargan-Hansen test). A check for the first and second-order serial auto-correlation of the Arellano-Bond test was also run. These tests were used to verify the presence/absence of first/second order serial correlation in the dynamic model.

Further, the long-term impact of the model was also tested, where significant variables from the first estimate were measured. The long-run effects for the  $K^{th}$  parameter are computed as follows:

$$B_k \div [1-\phi] \tag{2}$$

### 3. Research results

This section presents the empirical results from research into how the monetary policy rate of central banks is used to tame inflation or otherwise for 31 sub-Saharan African countries based on short-run analysis. The descriptive statistics and the correlation matrix are presented in appendix 1 and 2, respectively.

Table 1 shows the results of the impact of monetary policy rate as a means of controlling inflation in 31 sub-Saharan African countries using two-step system GMM estimation. To begin with, the validity of the two-step system GMM used for this research should be verified. The lagged dependent

variable (Consumer Price Index) was significant, which justifies the use of the dynamic specification. The validity of the instruments used for this study from the diagnostics test was also confirmed. The values of AR(1) and AR(2) for Arellano-Bond serial correlation showed the presence of first-order serial correlation for AR(1) and the absence of second-order serial correlation for AR(2). The null hypothesis of over-identification of instruments of the Hansen’s J test p-value was equally within the accepted value, hence the acceptance of the null hypothesis. The variables used for this study showed no sign of suffering from multi-collinearity issues, as shown in Appendix 2.

## 4. Discussions

From the GMM estimation in Table 1, GDP was significant at 10% with a positive coefficient, which confirms the earlier prediction of the positive impact of GDP on inflation in the short-run. This result supports the monetarist theory that inflation fuels economic growth to some extent. Empirical evidence, as in the research of Koulakiotis, Lyroudi and Papasyriopoulos (2012), supports our research results from 14 European countries where strong evidence of a bi-directional effect was found using a panel univariate GARCH model. Further empirical evidence from Samuel et al. (2015) and Enejoh and Tsauni (2017) supports our results. However, other empirical evidence (Koulakiotis, Lyroudi and Papasyriopoulos, 2012; Emerenini and Eke, 2014; Olugbenga Adaramola and Dada, 2020) indicates that inflation has an inverse relationship to economic growth for research done in Nigeria and Europe.

Unemployment in the short run was also negative and significant at 10% from the GMM estimates in Table 1. This result also supports the earlier prediction of a negative relationship. This result suggests that inflation targeting can serve as an effective tool for managing unemployment, since a percentage increase in unemployment reduces inflation in a significant manner. In support of our results, Cioran (2014) provides empirical evidence of the negative impact of unemployment on inflation in Romania using an OLS regression estimation method. Further evidence (Korkmaz and Abdullazade, 2020) shows a unidirectional negative relationship between unemployment and inflation.

Table 1 also shows a negative and significant (5%) impact of the exchange rate on inflation. This result indicates that in the short run, a percentage increase in the exchange rate for countries under study leads to a 5% decrease in inflation. This result is surprising because sub-Saharan African

countries are import dependent, significantly affecting their exchange rate, and leading to inflation challenges in both the short and long term. The relative stability of the local currencies in the countries under study could lead to reduced inflation. The results are supported by Emerenini & Eke's (2014) research on the impact of the policy rate on inflation in Nigeria. Other empirical results, however, point to the positive impact of the exchange rate on inflation (Monfared & Akin, 2017; Samuel et al., 2015).

As predicted earlier, money supply (M2) had a significant positive effect at 1% based on short-run analysis. This implies that a percentage increase in money supply will likely increase inflation by 1%. A great deal of empirical evidence supports these results, as shown in Table 1 (Emerenini and Eke, 2014; Monfared and Akin, 2017; Batarseh, 2021). Using a Granger causality test for the period 1980-2019, Batarseh (2021) found that the money supply in Jordan positively impacted inflation and was also significant at 5%.

The primary variable of interest, the monetary policy rate, was positive and significant at 1%, as seen in Table 1. This result suggests that an increase in the policy rate in sub-Saharan African countries does not help curb inflation rise for the period under study. Empirical evidence from Cioran (2014) supports these results, whereby a study of the causal relationship between the monetary policy rate and other macroeconomic variables showed a direct relationship between inflation and policy rate in Romania for the period 1997-2013. However, Emerenini and Eke (2014) showed evidence of an inverse relationship, although the results were insignificant for a Nigerian study for the period 2007-2014.

The real interest rate from Table 1 was positive, albeit not significant; suggesting that a real interest rate increase will most likely fuel inflation.

To help further understand the phenomenon relating to the research objective, the

GMM results were re-estimated to understand the long-term impact of the significant variables on inflation. As observed in Table 1 (Model 1), all significant variables (GDP, M2, unemployment, exchange rate, and policy rate) were re-estimated using Equation (2) above to determine their long-term effect on inflation.

The long-run two-step system GMM again showed that the significant variables from Model 1 were equally significant, and each variable maintained its previous coefficient sign. The coefficients from the long-run analysis suggest that the explanatory variables strongly correlate with the dependent variable (CPI) in both the short and long term.

**Table 1. Impact of policy rate on inflation in sub-Saharan African countries (two-step system GMM)**

VARIABLES	(Model 1)	(Model 2)
	CPI Short-run	CPI Long-run
CPI <sub>-1log</sub>	-0.136** (0.054)	
GDP <sub>log</sub>	0.172* (0.101)	0.1512* (0.089)
Unemployment <sub>log</sub>	-0.180* (0.099)	-0.159** (0.083)
Exchange Rate <sub>log</sub>	-0.119** (0.060)	-0.105** (0.050)
M2 <sub>log</sub>	0.150*** (0.034)	0.132*** (0.028)
Policy Rate <sub>log</sub>	0.429*** (0.105)	0.378*** (0.096)
Real interest rate <sub>log</sub>	0.019 (0.557)	
Constant	1.106 (1.850)	

VARIABLES	(Model 1)	(Model 2)
	CPI Short-run	CPI Long-run
Observations	172	
Number of years	11	
AR(1)	0.0168	
AR(2)	0.179	
Hansen	0.770	
Sargan	0.718	

Note: The dependent variable is the Consumer Price Index. The first model shows the impact of the policy rate on inflation in the short run. The second model shows the long-run analysis using the significant values from Model 1. All the estimations are based on the two-step system GMM covering 2010-2021. \*Statistically significant at 10% \*\*Statistically significant at 5% \*\*\*Statistically significant at 1%

Source: calculated by authors

To show how sensitive and robust the results from Table 1 were, the results were simulated in this section using two different regression models, the fixed effects model and the OLS regression, to substantiate the strength of the primary model estimations. As can be seen in Table 2, two of the explanatory variables have consistently proven to be solid and robust in the latest estimations (OLS and Fixed Effects). GDP was positive and significant at 1% in both Model 1 and 5% for Model 2 from Table 2. This outcome further supports the evidence that sustained economic growth will likely fuel inflation, especially in the long run.

The policy rate again was positive and significant at 1% from Table 2 for both OLS and fixed effect regressions. As the primary

variable of interest in support of the research objective, this result proves that the central bank monetary policy rate strongly impacts inflation. In sub-Saharan African countries, however, the impact had been positive for the periods under study, implying that an increase in policy rate has not been an effective tool in controlling inflation in these economies.

Somewhat surprisingly, the robustness check showed that real interest was negative and significant at 5%, suggesting that this variable helps to reduce inflation in sub-Saharan African countries. This result runs contrary to the results from the primary model, where real interest was insignificant and positive. Further research into these inconsistent results seems worthwhile.

**Table 2.** Impact of policy rate on inflation: sub-Saharan African countries

VARIABLES	(Fixed Effect)	(OLS)
	CPI <sub>log</sub>	CPI <sub>log</sub>
GDP <sub>log</sub>	0.154*** (0.0390)	0.142** (0.0564)
Unemployment <sub>log</sub>	-0.0913 (0.0521)	-0.0761 (0.0500)
Exchange Rate <sub>log</sub>	-0.0492 (0.0287)	-0.0434 (0.0282)
M2 <sub>log</sub>	0.0638 (0.0670)	0.112 (0.0838)
Policy Rate <sub>log</sub>	0.503*** (0.0599)	0.508*** (0.0479)
Real interest Rate <sub>log</sub>	-0.166** (0.0671)	-0.192** (0.0930)
Constant	1.198*** (0.302)	1.106** (0.510)
Observations	186	186
R-squared	0.577	0.549
Number of years	11	11
Number of countries	31	31

Note: The dependent variable is the consumer price index. The first model is the fixed effect regression model, while the second is the OLS regression. All estimations covered the period 2010-2021.

\*Statistically significant at 10% \*\*Statistically significant at 5% \*\*\*Statistically significant at 1%

Source: calculated by authors

## Conclusions and Recommendations

This paper explored monetary policy rate as an effective tool for taming inflation in sub-Saharan Africa over the period 2010-2021. The system GMM estimator was employed to ascertain both the short and long-run dynamics due to its ability to deal with endogeneity and produce efficient results. The results confirmed that expected inflation, GDP growth rate, unemployment, the exchange rate, broad money supply, and policy rate significantly explain inflation within the SSA region. The fixed effects

and ordinary least squares models were used to verify the robustness of our results. One may observe that the monetary policy rate positively affects inflation, and the magnitude thereof is highly significant. This goes to explain that a contractionary monetary policy has a destabilising consequence on inflation. Although these results are supported by certain other papers (Cioran, 2014; Afonso, Alves and Balhote, 2019), still other studies (Emerenini and Eke, 2014; Cavoli, Gopalan and Rajan, 2023) provided contrary evidence in Nigeria and other emerging and developing economies.

Finally, when it comes to policy recommendations, although it is generally believed that restrictive monetary policy stabilises inflation, this is not the case in SSA. This means that central banks within the region should consider reducing policy rates as an inflation-targeting tool to enhance capital formation and growth. Furthermore, the credibility and accountability of the monetary policy authorities should be improved by setting targets appropriate to their institutional capacity and meeting them. This can be supported by sound fiscal policy to ensure the optimal management of the economy through price stability and sustainable growth. It is also necessary for central banks to re-evaluate the monetary policy rates and the design of policy rates to make them more effective. Further research should consider other measures of sustaining and managing inflation, such as fiscal policy, since fiscal policy tools to address inflation in SSA were beyond the scope of this paper. Empirical evidence suggests that the traditional means of controlling inflation have not been effective in recent years.

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## Appendices

### Appendix A

#### Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
CPI <sub>log</sub>	355	2.104	.556	-2.253	3.558
GDP <sub>log</sub>	372	4.91	.57	4.129	8.033
Unemployment <sub>log</sub>	372	1.667	.948	-1.139	3.513
Exchange rate <sub>log</sub>	371	5.418	1.881	.358	9.253
M2 <sub>log</sub>	308	3.531	.467	-.047	6.23
Policy rate <sub>log</sub>	305	1.766	.812	-.693	3.367
Real interest rate <sub>log</sub>	238	3.387	.325	-.148	3.981

Source: Authors' calculation

### Appendix B

#### Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) CPI	1.000						
(2) GDP	0.353	1.000					
(3) Unemployment	0.125	0.129	1.000				
(4) Exchange rate	-0.224	0.170	-0.504	1.000			
(5) M2	0.106	0.042	-0.062	-0.118	1.000		
(6) Policy rate	0.704	0.339	0.044	-0.261	0.211	1.000	
(7) Real interest rate	-0.065	-0.134	-0.074	0.055	-0.050	0.109	1.000

Source: Authors' calculation

### Appendix C

#### Variance inflation factor

	VIF	1/VIF
Exchange rate <sub>log</sub>	2.648	0.378
Unemployment <sub>log</sub>	2.325	0.43
Policy rate <sub>log</sub>	1.543	0.648
GDP <sub>log</sub>	1.401	0.714
Real interest rate <sub>log</sub>	1.069	0.935
M2 <sub>log</sub>	1.009	0.991
Mean VIF	1.666	.

Source: Authors' calculation

## Appendix D

### Definition of variables

Variable Name	Description	Source	Exp. Sign
<b>Dependent Variable</b>			
Consumer Price Index	Average change in price paid by consumers over a period	IMF /IFS	
<b>Independent Variables</b>			
GDP	Year-over-year economic growth	IMF/IFS	+/-
Unemployment	Year-over-year unemployment rate	IMF/IFS	-
M2	Money supply, including cash, cheque deposits etc.	IMF/IFS	-
Exchange Rate	The rate of local currency relative to the dollar	IMF/IFS	+/-
Policy Rate	The rate at which central banks lend to commercial banks	IMF/IFS	+
Real Interest Rate	Interest charged by commercial banks to credit customers	IMF/IFS	-

Source: Author